APPENDIX G

HCS SUMMARY

PRELIMINARY INTERSECTION CONGESTION REDUCTION SUMMARY

 # OF INTERSECTION LEGS WITH IMPROVED DELAY OR V/C (VOLUME TO CAPACITY RATIO) IN BOTH AM AND PM PEAKS

INTERSECTIONS	ALTERNATIVE 4C RIGHT TURN LANES		ALTERNATIVE 4D with continuous right and turn lane		ALTERNATIVE 1B		ALT 1C		ALTERNATIVE 2+3		ALT 2A-1		ALTERNATIVE 4		ALT 4D WITH KMART FIRST ENTRANCE CLOSED		ALTERNATIVE 5		ALTERNATIVE 6		ALTERNATIVE 7		ALTERNATIVE 8	
	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD	KY 321	X ROAD
KY 321 @ KY 40	0	0	0	0	6	0	4	0	1	1	5	1	0	0	0	0	0	0	4	0	4	0	3	1
KY 321/WalMart/Lowes	3	0	1	0	4	1	1	0	1	0	1	0	6	0	0	1	6	0	2	0	1	0	4	0
KY 321 @ Arbys/Kmart	0	4	0	4	4	5	5	5	4	3	4	5	0	6	0	0	0	6	4	6	4	5	0	0
KY 321 @ Mayo Plaza (McDonalds Intersection)	2	0	0	0	2	0	2	0	0	0	0	0	8	0	0	0	8	0	3	0	2	0	0	0
KY 321 @ JCCHS Entrance	0	0	0	0	2	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	2	0	0	0
KY 321@JCCMS/Post Office	3	0	0	0	2	0	0	0	2	0	1	0	8	0	0	0	8	0	3	0	1	0	0	0
KY 321 @ Appletree Plaza	3	0	0	0	2	0	1	0	2	0	2	0	6	0	0	0	6	0	3	0	2	0	0	0
KY 321 @ KY 2378 (James Trimble Boulevard)	0	0	0	0	3	0	3	0	3	0	3	0	4	0	0	0	4	0	2	0	3	0	0	0
KY 321 @ KY 321X	0	0	0	0	4	2	4	2	2	1	3	2	0	0	0	0	0	3	0	0	0	0	0	0
TOTAL # OF INTERSECTION LEGS WITH IMPROVED DELAY OR V/C (VOLUME TO CAPACITY RATIO)	**11**	**4**	**1**	**4**	**29**	**8**	**22**	**7**	**15**	**5**	**21**	**8**	**32**	**6**	**0**	**1**	**32**	**9**	**22**	**6**	**19**	**5**	**7**	**1**

IMPROVED DELAY OR V/C RATIO NOT EXCEEDING 1.0

KY 321X/KY 321 INTERSECTION T1
2035 PEAK HOUR CAPACITY ANALYSIS

AM	Northbound, Left			Southbound, Left			Westbound, TRL			Eastbound, TRL		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.01	8.2	A	0.26	10.3	B	0.31	23.5	C	0.02	10.8	B
No-Build	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Right Turn Alternative	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Walmart/Kmart Continuous Right	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Alternative 1B	0.01	8.4	A	0.33	11.3	B	0.42	32	D	0.02	11.3	B
Alternative 1C	0.03	8.4	A	0.34	11.5	B	0.48	33.8	D	0.02	11.4	B
Alternative 2+3	0.01	8.6	A	0.34	12	B	0.4	48.4	E	0.02	11.8	B
Alternative 2C-1	0.01	8.5	A	0.36	11.7	B	0.49	38.2	E	0.02	11.7	B
Alternative 4	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Alternative 4D	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Alternative 5	0.01	8.6	A	0.4	12.8	B	0.44	30.4	D	0.01	9.8	A
Alternative 6	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Alternative 7	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B
Alternative 8	0.01	8.6	A	0.4	12.7	B	0.63	54.5	F	0.02	11.8	B

PM	Northbound, Left			Southbound, Left			Westbound, TRL			Eastbound, TRL		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.01	8.4	A	0.29	10.5	B	0.81	63.6	F	0.29	39.6	E
No-Build	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Right Turn Alternative	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Walmart/Kmart Continuous Right	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Alternative 1B	0.01	8.5	A	0.32	11.3	B	1.42	N/A	F	0.79	131.8	F
Alternative 1C	0.01	8.6	A	0.37	11.9	B	1.83	N/A	F	1.1	N/A	F
Alternative 2+3	0.01	8.9	A	0.37	12.4	B	2.11	N/A	F	1.03	N/A	F
Alternative 2C-1	0.01	8.9	A	0.41	12.8	B	2.62	N/A	F	1.57	N/A	F
Alternative 4	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Alternative 4D	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Alternative 5	0.01	8.9	A	0.44	13.3	B	2.09	N/A	F	0.99	209.7	F
Alternative 6	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Alternative 7	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F
Alternative 8	0.01	8.9	A	0.43	13.3	B	3.16	N/A	F	1.94	N/A	F

KY 321/2ND STREET (KY 2378) INTERSECTION #T5
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Eastbound, Left/Through			Eastbound, Right			Westbound, Left			Westbound, Right			Northbound, Left			Northbound, Through			Northbound, Right			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	---	---	---	---	---	---	0.059	37.9	D	0.508	45.3	D	---	---	---	0.699	35.1	D	0.14	25.6	C	0.891	69.4	E	0.589	7.9	A
No-Build	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.966	85.5	F	0.22	30.7	C	0.929	73	E	0.741	9.6	A
Right Turn Alternative	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.966	85.5	F	0.22	30.7	C	0.929	73	E	0.741	9.6	A
Walmart/Kmart Continuous Right	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.966	85.5	F	0.22	30.7	C	0.929	73	E	0.741	9.6	A
Alternative 1B	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.809	50.6	D	0.22	30.7	C	0.929	73	E	0.657	8.7	A
Alternative 1C	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.837	53.3	D	0.22	30.7	C	0.929	73	E	0.706	9.2	A
Alternative 2+3	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.837	53.3	D	0.22	30.7	C	0.929	73	E	0.696	9	A
Alternative 2C-1	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D				0.83	52.5	D	0.22	30.7	C	0.929	73	E	0.716	9.3	A
Alternative 4	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.507	35.8	D	0.22	30.7	C	0.929	73	E	0.389	7	A
Alternative 4D	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.966	85.5	F	0.22	30.7	C	0.929	73	E	0.741	9.6	A
Alternative 5	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.507	35.8	D	0.22	30.7	C	0.929	73	E	0.389	7	A
Alternative 6	3.504	N/A	F	0.455	44.1	D	1.47	N/A	F	0.685	51.7	D	0.803	90.2	F	0.901	62.6	E	0.152	29.5	C	0.929	73	E	0.777	21.6	C
Alternative 7	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.852	54.9	D	0.22	30.7	C	0.929	73	E	0.574	8	A
Alternative 8	---	---	---	---	---	---	0.079	38.2	D	0.685	51.6	D	---	---	---	0.966	85.5	F	0.22	30.7	C	0.929	73	E	0.741	9.6	A

PM

	Eastbound, Left/Through			Eastbound, Right			Westbound, Left			Westbound, Right			Northbound, Left			Northbound, Through			Northbound, Right			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	---	---	---	---	---	---	0.069	29.1	C	0.483	35.1	D	---	---	---	1.038	150.9	F	0.104	25.9	C	0.853	63	E	0.756	13.3	B
No-Build	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.433	N/A	F	0.168	29.7	C	0.888	62.1	E	0.961	20.9	C
Right Turn Alternative	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.433	N/A	F	0.168	29.7	C	0.888	62.1	E	0.961	20.9	C
Walmart/Kmart Continuous Right	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.433	N/A	F	0.168	29.7	C	0.888	62.1	E	0.961	20.9	C
Alternative 1B	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.227	N/A	F	0.168	29.7	C	0.888	62.1	E	0.783	13.8	B
Alternative 1C	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.267	N/A	F	0.168	29.7	C	0.888	62.1	E	0.821	14.6	B
Alternative 2+3	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.275	N/A	F	0.168	29.7	C	0.888	62.1	E	0.913	17.4	B
Alternative 2C-1	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.314	N/A	F	0.168	29.7	C	0.888	62.1	E	0.922	18.5	B
Alternative 4	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	0.753	42	D	0.168	29.7	C	0.888	62.1	E	0.505	10.5	B
Alternative 4D	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.433	N/A	F	0.168	29.7	C	0.888	62.1	E	0.961	20.9	C
Alternative 5	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	0.753	42	D	0.168	29.7	C	0.888	62.1	E	0.505	10.5	B
Alternative 6	2.805	N/A	F	0.358	33	C	1.869	N/A	F	0.638	39.5	D	0.822	76.3	E	1.25	N/A	F	0.168	29.6	C	0.887	62.1	E	1.137	N/A	F
Alternative 7	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.259	N/A	F	0.168	29.7	C	0.888	62.1	E	0.81	14.3	B
Alternative 8	---	---	---	---	---	---	0.103	29.5	C	0.638	39.4	D	---	---	---	1.433	N/A	F	0.168	29.7	C	0.888	62.1	E	0.961	20.9	C

KY 321/APPLETREE PLAZA INTERSECTION #7
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Westbound, Left			Westbound, Right			Northbound, Through			Northbound,Through/ Right			Northbound, Right			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.244	47.5	D	0.275	48	D	---	---	---	0.828	17.6	B	---	---	---	0.81	75	E	0.619	4.3	A
No-Build	0.244	47.5	D	0.275	48	D	---	---	---	0.96	23.9	C	---	---	---	0.81	75	E	0.8	5.4	A
Right Turn Alternative	0.244	47.5	D	0.275	48	D	---	---	---	0.835	16	B	0.129	16.7	B	0.81	75	E	0.8	5.4	A
Walmart/Kmart Continuous Right	0.244	47.5	D	0.275	48	D	---	---	---	0.96	23.9	C	---	---	---	0.81	75	E	0.8	5.4	A
Alternative 1B	0.244	47.5	D	0.275	48	D	---	---	---	0.911	20.1	C	---	---	---	0.81	75	E	0.725	4.8	A
Alternative 1C	0.244	47.5	D	0.275	48	D	---	---	---	0.922	20.5	C	---	---	---	0.81	75	E	0.734	4.9	A
Alternative 2+3	0.244	47.5	D	0.275	48	D	---	---	---	0.897	19.7	B	---	---	---	0.81	75	E	0.721	4.3	A
Alternative 2C-1	0.244	47.5	D	0.275	48	D	---	---	---	0.865	18.6	B	---	---	---	0.81	75	E	0.778	5.2	A
Alternative 4	0.244	47.5	D	0.275	48	D	0.48	11.1	B	0.48	13.4	B	---	---	---	0.81	75	E	0.41	3.1	A
Alternative 4D	0.244	47.5	D	0.275	48	D	---	---	---	0.96	23.9	C	---	---	---	0.81	75	E	0.8	5.4	A
Alternative 5	0.244	47.5	D	0.275	48	D	0.48	11.1	B	0.48	13.4	B	---	---	---	0.81	75	E	0.41	3.1	A
Alternative 6	0.244	47.5	D	0.275	48	D	---	---	---	0.839	17.2	B	---	---	---	0.81	75	E	0.575	4.2	A
Alternative 7	0.244	47.5	D	0.275	48	D	---	---	---	0.844	18.1	B	---	---	---	0.81	75	E	0.65	4.4	A
Alternative 8	0.244	47.5	D	0.275	48	D	---	---	---	0.96	23.9	C	---	---	---	0.81	75	E	0.8	5.4	A

PM

	Westbound, Left			Westbound, Right			Northbound, Through			Northbound,Through/ Right			Northbound, Right			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.214	37.6	D	0.24	38	D	---	---	---	1.15	N/A	F	---	---	---	0.791	65.3	E	0.912	11	B
No-Build	0.214	37.6	D	0.24	38	D	---	---	---	1.473	N/A	F	---	---	---	0.791	65.3	E	1.178	N/A	F
Right Turn Alternative	0.214	37.6	D	0.24	38	D	---	---	---	1.335	N/A	F	0.143	18.4	B	0.791	65.3	E	1.178	N/A	F
Walmart/Kmart Continuous Right	0.214	37.6	D	0.24	38	D	---	---	---	1.473	N/A	F	---	---	---	0.791	65.3	E	1.178	N/A	F
Alternative 1B	0.214	37.6	D	0.24	38	D	---	---	---	1.274	N/A	F	---	---	---	0.791	65.3	E	1.022	56.6	F
Alternative 1C	0.214	37.6	D	0.24	38	D	---	---	---	1.303	N/A	F	---	---	---	0.791	65.3	E	1.055	113.4	F
Alternative 2+3	0.214	37.6	D	0.24	38	D	---	---	---	1.191	N/A	F	---	---	---	0.791	65.3	E	1.093	180.8	F
Alternative 2C-1	0.214	37.6	D	0.24	38	D	---	---	---	1.211	N/A	F	---	---	---	0.791	65.3	E	1.155	N/A	F
Alternative 4	0.214	37.6	D	0.24	38	D	0.753	17.1	B	0.738	18.8	B	---	---	---	0.791	65.3	E	0.604	6.6	A
Alternative 4D	0.214	37.6	D	0.24	38	D	---	---	---	1.473	N/A	F	---	---	---	0.791	65.3	E	1.178	N/A	F
Alternative 5	0.214	37.6	D	0.24	38	D	0.753	17.1	B	0.738	18.8	B	---	---	---	0.791	65.3	E	0.604	6.6	A
Alternative 6	0.214	37.6	D	0.24	38	D	---	---	---	1.085	179.8	F	---	---	---	0.791	65.3	E	0.969	15.1	B
Alternative 7	0.214	37.6	D	0.24	38	D	---	---	---	1.297	N/A	F	---	---	---	0.791	65.3	E	1.045	96.8	F
Alternative 8	0.214	37.6	D	0.24	38	D	---	---	---	1.473	N/A	F	---	---	---	0.791	65.3	E	1.178	N/A	F

KY 321/POST OFFICE/JOHNSON CENTRAL SCHOOL INTERSECTION #T6
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Eastbound, L/T/R			Westbound, L/T/R			Northbound, Left			Northbound,Through			Northbound, Through/Right			Northbound, Right			Southbound, Left			Southbound, Through			Southbound, Through/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.13	55.6	E	0.799	71.3	E	0.532	78.2	E	---	---	---	0.774	11.8	B	---	---	---	0.87	71.5	E	---	---	---	0.581	2.8	A
No-Build	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.127	N/A	F	---	---	---	0.897	70.5	E	---	---	---	0.798	7.7	A
Right Turn Alternative	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	0.969	26.6	C	0.163	19.2	B	0.897	70.5	E	---	---	---	0.798	7.7	A
Walmart/Kmart Continuous Right	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.127	N/A	F	---	---	---	0.897	70.5	E	---	---	---	0.798	7.7	A
Alternative 1B	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.004	46.7	D	---	---	---	0.897	70.5	E	---	---	---	0.719	6.8	A
Alternative 1C	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.027	78.6	F	---	---	---	0.897	70.5	E	---	---	---	0.728	6.9	A
Alternative 2+3	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	0.971	27.8	C	---	---	---	0.897	70.5	E	---	---	---	0.668	6.1	A
Alternative 2C-1	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.021	69.7	F	---	---	---	0.897	70.5	E	---	---	---	0.775	7.4	A
Alternative 4	0.105	49	D	0.839	75	E	0.532	78.2	E	0.563	14.4	B	0.564	17	B	---	---	---	0.897	70.5	E	0.399	4.9	A	0.399	5.3	A
Alternative 4D	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.127	N/A	F	---	---	---	0.897	70.5	E	---	---	---	0.798	7.7	A
Alternative 5	0.105	49	D	0.839	75	E	0.532	78.2	E	0.563	14.4	B	0.564	17	B	---	---	---	0.897	70.5	E	0.399	4.9	A	0.399	5.3	A
Alternative 6	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.015	61.2	E	---	---	---	0.897	70.5	E	---	---	---	0.561	5.8	A
Alternative 7	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.038	97.3	F	---	---	---	0.897	70.5	E	---	---	---	0.64	6.2	A
Alternative 8	0.105	49	D	0.839	75	E	0.532	78.2	E	---	---	---	1.127	N/A	F	---	---	---	0.897	70.5	E	---	---	---	0.798	7.7	A

PM	Westbound, L/T/R			Westbound, L/T/R			Northbound, Left			Northbound,Through			Northbound, Through/Right			Northbound, Right			Southbound, Left			Southbound, Through			Southbound, Through/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.378	53.7	D	0.741	62	E	0.777	66.4	E	---	---	---	0.783	5.5	A	---	---	---	0.777	66.4	E	---	---	---	0.836	6	A
No-Build	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.117	N/A	F	---	---	---	0.799	65.2	E	---	---	---	1.191	N/A	F
Right Turn Alternative	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.047	101.3	F	0.073	12	B	0.799	65.2	E	---	---	---	1.191	N/A	F
Walmart/Kmart Continuous Right	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.117	N/A	F	---	---	---	0.799	65.2	E	---	---	---	1.191	N/A	F
Alternative 1B	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	0.987	23.1	C	---	---	---	0.799	65.2	E	---	---	---	1.025	66.3	E
Alternative 1C	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.012	46	D	---	---	---	0.799	65.2	E	---	---	---	1.061	126.5	F
Alternative 2+3	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.044	96.5	F	---	---	---	0.799	65.2	E	---	---	---	1.031	69.5	E
Alternative 2C-1	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.092	183.2	F	---	---	---	0.799	65.2	E	---	---	---	1.166	N/A	F
Alternative 4	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	0.558	7.8	A	0.559	8.8	A	---	---	---	0.799	65.2	E	0.595	8		0.596	8.8	A
Alternative 4D	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.117	N/A	F	---	---	---	0.799	65.2	E	---	---	---	1.191	N/A	F
Alternative 5	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	0.558	7.8	A	0.559	8.8	A	---	---	---	0.799	65.2	E	0.595	8		0.596	8.8	A
Alternative 6	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	0.977	20	B	---	---	---	0.799	65.2	E	---	---	---	0.97	18.5	B
Alternative 7	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.007	39.4	D	---	---	---	0.799	65.2	E	---	---	---	1.051	109	F
Alternative 8	0.389	48.2	D	0.789	59.9	E	0.799	65.2	E	---	---	---	1.117	N/A	F	---	---	---	0.799	65.2	E	---	---	---	1.191	N/A	F

KY 321/JCCHS INTERSECTION #5
2035 PEAK HOUR CAPACITY ANALYSIS

AM	Southbound, Left			Westbound, Left/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.25	10.8	B	0.95	160.6	F
No-Build	0.34	12.1	B	2.22	N/A	F
Right Turn Alternative	0.34	12.1	B	2	N/A	F
Walmart/Kmart Continuous Right	0.34	12.1	B	2.22	N/A	F
Alternative 1B	0.32	11.5	B	1.97	N/A	F
Alternative 1C	0.32	11.7	B	2.05	N/A	F
Alternative 2+3	0.36	13	B	2.04	N/A	F
Alternative 2C-1	0.24	11.4	B	0.92	206.6	F
Alternative 4	0.34	12.2	B	1.43	N/A	F
Alternative 4D	0.34	12.1	B	2.22	N/A	F
Alternative 5	0.34	12.2	B	1.43	N/A	F
Alternative 6	0.34	12.2	B	2.05	N/A	F
Alternative 7	0.33	11.8	B	1.93	N/A	F
Alternative 8	0.34	12.1	B	2.22	N/A	F

PM	Southbound, Left			Westbound, Left/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.09	11.4	B	1.43	N/A	F
No-Build	0.14	14.1	B	5.04	N/A	F
Right Turn Alternative	0.14	14.1	B	4.65	N/A	F
Walmart/Kmart Continuous Right	0.14	14.1	B	5.04	N/A	F
Alternative 1B	0.13	12.8	B	3.1	N/A	F
Alternative 1C	0.13	13.1	B	3.36	N/A	F
Alternative 2+3	0.15	14.4	B	4.65	N/A	F
Alternative 2C-1	0.07	13.2	B	2	N/A	F
Alternative 4	0.14	14.2	B	2.12	N/A	F
Alternative 4D	0.14	14.1	B	5.04	N/A	F
Alternative 5	0.14	14.2	B	2.12	N/A	F
Alternative 6	0.12	12.8	B	2.69	N/A	F
Alternative 7	0.13	13	B	3.27	N/A	F
Alternative 8	0.14	14.1	B	5.04	N/A	F

KY 321 & Mayo Plaza INTERSECTION #T8
2035 Peak Hour Capacity Analysis

AM

	Eastbound, Left/Through			Eastbound, Right			Westbound, Left/Through			Westbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.678	96.9	F	0.059	33.9	C	5.057	N/A	F	0.178	79.6	E
No-Build	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Right Turn Alternative	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Walmart/Kmart Continuous Right	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 1B	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 1C	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 2+3	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 2C-1	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 4	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 4D	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 5	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 6	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 7	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D
Alternative 8	0.678	97.1	F	0.079	34.2	C	6.295	N/A	F	0.217	36.1	D

	Northbound, Left			Northbound, Through			Northbound, Through/Right			Northbound, Right			Southbound, Left			Southbound, Through			Southbound, Through/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.766	79.6	E	---	---	---	0.811	31.7	C	---	---	---	0.859	74.3	E	---	---	---	0.956	29.5	C
No-Build	0.772	78.3	E	---	---	---	1.104	228.3	F	---	---	---	0.886	74.4	E	---	---	---	1.247	N/A	F
Right Turn Alternative	0.772	78.3	E	0.787	30.2	C	---	---	---	0.327	31.2	C	0.886	74.4	E	---	---	---	1.247	N/A	F
Walmart/Kmart Continuous Right	0.772	78.3	E	---	---	---	1.104	228.3	F	---	---	---	0.886	74.4	E	---	---	---	1.247	N/A	F
Alternative 1B	0.772	78.3	E	---	---	---	0.949	40.7	D	---	---	---	0.886	74.4	E	---	---	---	1.143	N/A	F
Alternative 1C	0.772	78.3	E	---	---	---	0.977	45.4	D	---	---	---	0.886	74.4	E	---	---	---	1.155	N/A	F
Alternative 2+3	0.772	78.3	E	---	---	---	1.062	153.2	F	---	---	---	0.886	74.4	E	---	---	---	1.149	N/A	F
Alternative 2C-1	0.772	78.3	E	---	---	---	1.069	165.6	F	---	---	---	0.886	74.4	E	---	---	---	1.045	N/A	F
Alternative 4	0.772	78.3	E	0.552	25.8	C	0.553	30.8	C	---	---	---	0.886	74.4	E	0.624	19.8	B	0.624	20	B
Alternative 4D	0.772	78.3	E	---	---	---	1.104	228.3	F	---	---	---	0.886	74.4	E	---	---	---	1.247	N/A	F
Alternative 5	0.772	78.3	E	0.552	25.8	C	0.553	30.8	C	---	---	---	0.886	74.4	E	0.624	19.8	B	0.624	20	B
Alternative 6	0.772	78.3	E	---	---	---	0.963	42.4	D	---	---	---	0.886	74.4	E	---	---	---	0.934	28.5	C
Alternative 7	0.772	78.3	E	---	---	---	0.991	51.3	D	---	---	---	0.886	74.4	E	---	---	---	1.161	N/A	F
Alternative 8	0.772	78.3	E	---	---	---	1.104	228.3	F	---	---	---	0.886	74.4	E	---	---	---	1.247	N/A	F

N/A* With very high v/c ratio, delay calculations are unreliable.

PM

	Eastbound, Left/Through			Eastbound, Right			Westbound, Left/Through			Westbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	2.98	N/A*	F	0.189	33.2	C	4.798	N/A*	F	0.21	33.4	C
No-Build	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Right Turn Alternative	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Walmart/Kmart Continuous Right	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 1B	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 1C	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 2+3	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 2C-1	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 4	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 4D	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 5	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 6	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 7	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C
Alternative 8	3.636	N/A*	F	0.231	33.7	C	6.299	N/A*	F	0.252	34	C

	Northbound, Left			Northbound, Through			Northbound, Through/Right			Northbound, Right			Southbound, Left			Southbound, Through			Southbound, Through/Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.813	64.4	E	---	---	---	1.082	176.8	F	---	---	---	0.767	68.1	E	---	---	---	0.794	24.5	C
No-Build	0.839	62.9	E	---	---	---	1.412	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.069	157.4	F
Right Turn Alternative	0.839	62.9	E	---	---	---	1.12	242.2	F	0.301	22.1	C	0.773	67.2	E	---	---	---	1.069	157.4	F
Walmart/Kmart Continuous Right	0.839	62.9	E	---	---	---	1.412	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.069	157.4	F
Alternative 1B	0.839	62.9	E	---	---	---	1.251	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	0.838	27.6	C
Alternative 1C	0.839	62.9	E	---	---	---	1.282	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	0.887	29.2	C
Alternative 2+3	0.839	62.9	E	---	---	---	1.449	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.013	64.5	F
Alternative 2C-1	0.839	62.9	E	---	---	---	1.381	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.027	85.6	F
Alternative 4	0.839	62.9	E	0.704	18.9	B	0.707	22.2	C	---	---	---	0.773	67.2	E	0.534	21.8	C	0.534	22.3	C
Alternative 4D	0.839	65.5	E	---	---	---	1.412	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.069	157.4	F
Alternative 5	0.839	62.9	E	0.704	18.5	B	0.707	22.2	C	---	---	---	0.773	67.2	E	0.534	21.8	C	0.534	22.3	C
Alternative 6	0.839	62.9	E	---	---	---	1.238	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	0.761	25.8	C
Alternative 7	0.839	62.9	E	---	---	---	1.276	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	0.873	28.7	C
Alternative 8	0.839	62.9	E	---	---	---	1.412	N/A*	F	---	---	---	0.773	67.2	E	---	---	---	1.069	157.4	F

N/A* With very high v/c ratio, delay calculations are unreliable.

KY 321/K MART INTERSECTION #T9
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Northbound, Left			Southbound, Left			Westbound, Left/Through			Westbound, Right			Eastbound, Left/Through			Eastbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.01	10.9	B	0.07	9.1	A	0.43	122.1	F	0.07	13	B	0.11	92.6	F	0.02	19.3	C
No-Build	0.02	12.8	B	0.11	10.1	B	1.74	N/A	F	0.12	15.8	C	0.65	N/A	F	0.06	27.5	D
Right Turn Alternative	0.02	12.8	B	0.11	10.1	B	1.74	N/A	F	0.11	15.5	C	0.61	N/A	F	0.06	26.4	D
Walmart/Kmart Continuous Right	0.02	12.8	B	0.11	10.1	B	1.74	N/A	F	0.11	15.5	C	0.61	N/A	F	0.06	26.4	D
Alternative 1B	0.02	12.2	B	0.1	9.5	A	1.22	N/A	F	0.1	14	B	0.44	N/A	F	0.06	24.7	C
Alternative 1C	0.02	12.2	B	0.1	9.6	A	1.27	N/A	F	0.1	14.3	B	0.46	N/A	F	0.06	25	C
Alternative 2+3	0.02	12.2	B	0.11	9.9	A	1.43	N/A	F	0.11	15.3	C	0.52	N/A	F	0.06	24.8	C
Alternative 2C-1	0.02	11.8	B	0.11	9.9	A	1.27	N/A	F	0.11	15.4	C	0.48	N/A	F	0.05	23.2	C
Alternative 4	0.02	12.9	B	0.11	10.1	B	0.62	150	F	0.07	11.1	B	0.38	191.2	F	0.03	13.7	B
Alternative 4D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Alternative 5	0.02	12.9	B	0.11	10.1	B	0.62	150	F	0.07	11.1	B	0.38	191.2	F	0.03	13.7	B
Alternative 6	0.02	11.1	B	0.1	9.6	A	0.89	N/A	F	0.1	14.2	B	0.32	155.1	F	0.04	20	C
Alternative 7	0.02	11.6	B	0.1	9.7	A	1.1	N/A	F	0.1	14.5	B	0.39	N/A	F	0.05	22.1	C
Alternative 8	0.02	12.8	B	0.11	10.1	B	1.74	N/A	F	0.12	15.8	C	0.65	N/A	F	0.06	27.5	D

PM

	Northbound, Left			Southbound, Left			Westbound, Left/Through			Westbound, Right			Eastbound, Left/Through			Eastbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.03	9.5	A	0.13	11.2	B	0.75	N/A	F	0.26	21.1	C	1.42	N/A	F	0.03	14	B
No-Build	0.05	10.6	B	0.21	13.7	B	4.4	N/A	F	0.48	37.4	E	11	N/A	F	0.04	17.1	C
Right Turn Alternative	0.05	10.6	B	0.21	13.7	B	4.4	N/A	F	0.45	33.4	D	9.17	N/A	F	0.03	16.2	C
Walmart/Kmart Continuous Right	0.05	10.6	B	0.21	13.7	B	4.4	N/A	F	0.45	33.4	D	9.17	N/A	F	0.03	16.2	C
Alternative 1B	0.04	9.7	A	0.19	12.4	B	2.1	N/A	F	0.4	28.2	D	4.23	N/A	F	0.03	14.4	B
Alternative 1C	0.04	9.9	A	0.19	12.6	B	2.32	N/A	F	0.41	29.8	D	5.5	N/A	F	0.03	14.9	B
Alternative 2+3	0.05	10.3	B	0.22	14	B	4.89	N/A	F	0.5	40.1	E	11	N/A	F	0.03	16.4	C
Alternative 2C-1	0.05	10.4	B	0.21	13.4	B	3.67	N/A	F	0.46	35	E	9.17	N/A	F	0.03	16.5	C
Alternative 4	0.05	10.6	B	0.21	13.8	B	2.75	N/A	F	0.22	14.9	B	3.24	N/A	F	0.02	11.5	B
Alternative 4D	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Alternative 5	0.05	10.6	B	0.21	13.8	B	2.75	N/A	F	0.22	14.9	B	3.24	N/A	F	0.02	11.5	B
Alternative 6	0.04	9.5	A	0.18	12.3	B	1.76	N/A	F	0.39	27.8	D	3.67	N/A	F	0.03	13.7	B
Alternative 7	0.04	9.8	A	0.19	12.6	B	2.32	N/A	F	0.41	29.5	D	4.58	N/A	F	0.03	14.8	B
Alternative 8	0.05	10.6	B	0.21	13.7	B	4.4	N/A	F	0.48	37.4	E	11	N/A	F	0.04	17.1	C

KY 321/WALMART INTERSECTION #T10
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Eastbound, Through/Left			Eastbound, Right			Westbound, Through/Left			Westbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	1.583	N/A	F	0.217	50.6	D	0.795	103.7	F	0.186	50.2	D
No-Build	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Right Turn Alternative	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Walmart/Kmart Continuous Right	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 1B	2.193	N/A	F	0.207	41.3	D	1.034	N/A	F	0.092	39.7	D
Alternative 1C	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 2+3	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 2C-1	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 4	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 4D	2.461	N/A	F	0.212	38.6	D	1.052	N/A	F	0.169	37.9	D
Alternative 5	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 6	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 7	2.188	N/A	F	0.202	40.5	D	1.031	N/A	F	0.18	40.2	D
Alternative 8	1.437	N/A	F	0.269	50.4	D	1.256	N/A	F	0.164	48.9	D

	Northbound, Left			Northbound, Through			Northbound, Through/Right			Southbound, Left			Southbound, Through			Southbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.846	73	E	---	---	---	0.478	10.1	B	0.827	79.3	E	0.928	26.6	C	0.137	16.5	B
No-Build	0.875	72	E	---	---	---	0.768	24.3	C	0.86	77.9	E	1.455	N/A	F	0.214	26.1	C
Right Turn Alternative	0.875	72	E	---	---	---	0.768	24.3	C	0.86	77.9	E	0.831	30.7	C	0.837	33.8	C
Walmart/Kmart Continuous Right	0.875	72	E	---	---	---	0.768	24.3	C	0.86	77.9	E	0.831	30.7	C	0.837	33.8	C
Alternative 1B	0.875	72	E	---	---	---	0.646	16.5	B	0.789	82.3	F	1.415	N/A	F	0.211	25.4	C
Alternative 1C	0.875	72	E	---	---	---	0.679	18.2	B	0.86	77.9	E	1.421	N/A	F	0.214	26.1	C
Alternative 2+3	0.875	72	E	---	---	---	0.731	23.5	C	0.86	77.9	E	1.351	N/A	F	0.214	26.1	C
Alternative 2C-1	0.875	72	E	---	---	---	0.737	23.7	C	0.86	77.9	E	1.241	N/A	F	0.214	26.1	C
Alternative 4	0.875	72	E	0.384	18.2	B	0.384	19.1	B	0.86	77.9	E	0.764	26.1	C	0.214	26.1	C
Alternative 4D	0.886	72.8	E	---	---	---	0.787	26.9	C	0.863	79.7	E	1.457	N/A	F	0.323	30.2	C
Alternative 5	0.875	72	E	0.384	18.2	B	0.384	19.1	B	0.86	77.9	E	0.764	26.1	C	0.214	26.1	C
Alternative 6	0.875	72	E	---	---	---	0.642	22	C	0.86	77.9	E	0.86	77.9	E	0.214	26.1	C
Alternative 7	0.875	72	E	---	---	---	0.668	22.4	C	0.86	77.9	E	1.235	N/A	F	0.214	26.1	C
Alternative 8	0.869	71.5	E	---	---	---	0.631	11.6	B	0.816	79.9	E	1.247	N/A	F	0.092	18	B

PM

	Eastbound, Through/Left			Eastbound, Right			Westbound, Through/Left			Westbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	6.605	N/A	F	0.517	39.3	D	1.364	N/A	F	0.323	35.9	D
No-Build	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Right Turn Alternative	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Walmart/Kmart Continuous Right	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 1B	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 1C	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 2+3	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 2C-1	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 4	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 4D	9.31	N/A	F	0.668	44.2	D	1.705	N/A	F	0.41	37.3	D
Alternative 5	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 6	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 7	8.448	N/A	F	0.647	43.3	D	1.705	N/A	F	0.41	37.3	D
Alternative 8	6.147	N/A	F	0.647	43.3	D	1.926	N/A	F	0.28	35.3	D

	Northbound, Left			Northbound, Through			Northbound, Through/Right			Southbound, Left			Southbound, Through			Southbound, Right		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.924	59.6	E	---	---	---	0.952	30.9	C	0.834	68.3	E	1.078	193.5	F	0.363	34.9	C
No-Build	0.996	78.7	E	---	---	---	1.296	N/A	F	0.858	66.8	E	1.517	N/A	F	0.508	40.5	D
Right Turn Alternative	0.996	78.7	E	---	---	---	1.296	N/A	F	0.858	66.8	E	1.011	102.1	F	1.014	110.6	F
Walmart/Kmart Continuous Right	0.996	78.7	E	---	---	---	1.296	N/A	F	0.858	66.8	E	1.011	102.1	F	1.014	110.6	F
Alternative 1B	0.996	78.7	E	---	---	---	1.086	182.2	F	0.787	71.2	E	1.479	N/A	F	0.508	40.5	D
Alternative 1C	0.996	78.7	E	---	---	---	1.095	193.6	F	0.858	66.8	E	1.423	N/A	F	0.508	40.5	D
Alternative 2+3	0.996	78.7	E	---	---	---	1.324	N/A	F	0.858	66.8	E	1.442	N/A	F	0.508	40.5	D
Alternative 2C-1	0.996	78.7	E	---	---	---	1.254	N/A	F	0.858	66.8	E	1.46	N/A	F	0.508	40.5	D
Alternative 4	0.996	78.7	E	0.648	23.1	C	0.648	23.9	C	0.858	66.8	E	0.797	39.2	D	0.508	40.5	D
Alternative 4D	1.082	N/A	F	---	---	---	1.24	N/A	F	0.858	66.8	E	1.329	N/A	F	0.729	46.8	D
Alternative 5	0.996	78.7	E	0.648	23.1	C	0.648	23.9	C	0.858	66.8	E	0.797	39.2	D	0.508	40.5	D
Alternative 6	0.996	78.7	E	---	---	---	1.101	N/A	F	0.858	66.8	E	1.105	242.7	F	0.508	40.5	D
Alternative 7	0.996	78.7	E	---	---	---	1.143	N/A	F	0.858	66.8	E	1.255	N/A	F	0.508	40.5	D
Alternative 8	0.996	78.7	E	---	---	---	1.213	N/A	F	0.819	69.1	E	1.517	N/A	F	0.254	35.9	D

KY 321/KY 40 INTERSECTION #T11
2035 PEAK HOUR CAPACITY ANALYSIS

AM

	Eastbound, Left			Eastbound, Through			Westbound, Left			Westbound, Through			Northbound, Left			Northbound, Through			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.257	83.3	F	0.801	71.8	E	0.791	91.9	F	0.274	59.3	E	0.776	64.1	E	0.144	10.9	B	0.865	83.3	F	0.388	24	C
No-Build	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Right Turn Alternative	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Walmart/Kmart Continuous Right	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Alternative 1B	0.257	83.3	F	0.848	68.5	E	0.82	89	F	0.306	49.5	D	0.787	61.9	E	0.202	22.7	C	0.893	79.1	E	0.577	38.7	D
Alternative 1C	0.257	83.3	F	0.845	68.5	E	0.82	89	F	0.299	49.9	D	0.789	61.5	E	0.227	22.1	C	0.891	79.5	E	0.582	38.8	D
Alternative 2+3	0.257	83.3	F	0.846	68.4	E	0.82	89	F	0.314	49.7	D	0.795	60.2	E	0.21	23	C	0.895	78.8	E	0.588	40.5	D
Alternative 2C-1	0.257	83.3	F	0.867	69.3	E	0.82	89	F	0.264	47.1	D	0.792	61.1	E	0.239	27.2	C	0.903	76.9	E	0.557	40.5	D
Alternative 4	0.257	83.3	F	0.838	67.8	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Alternative 4D	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Alternative 5	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.794	60.2	E	0.214	19.4	B	0.884	80.7	F	0.608	39.5	D
Alternative 6	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.774	64.6	E	0.214	19.4	B	0.884	80.7	F	0.558	34.1	C
Alternative 7	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.779	63.7	E	0.214	19.4	B	0.884	80.7	F	0.568	35.1	D
Alternative 8	0.257	83.3	F	0.838	68.7	E	0.82	89	F	0.275	51.1	D	0.782	53	D	0.214	19.4	B	0.884	80.7	F	0.575	35.9	D

PM

	Eastbound, Left			Eastbound, Through			Westbound, Left			Westbound, Through			Northbound, Left			Northbound, Through			Southbound, Left			Southbound, Through		
	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS	v/c Ratio	Delay	LOS
Existing	0.25	73.2	E	0.58	66.4	E	0.853	74.4	E	0.501	55.6	E	0.804	41.5	D	0.302	6.8	A	0.619	73.5	E	0.355	33.4	C
No-Build	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Right Turn Alternative	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Walmart/Kmart Continuous Right	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Alternative 1B	0.25	73.2	E	0.692	61.3	E	0.884	78.1	E	0.557	47.5	D	0.823	38.6	D	0.423	15.3	B	0.785	78	E	0.609	52.4	D
Alternative 1C	0.25	73.2	E	0.68	61.7	E	0.884	78.1	E	0.569	48.1	D	0.824	38.1	D	0.458	14.8	B	0.78	78.6	E	0.622	53	D
Alternative 2+3	0.25	73.2	E	0.682	63	E	0.884	78.1	E	0.479	47.9	D	0.831	35.7	D	0.453	13.2	B	0.77	80.1	F	0.681	57.2	E
Alternative 2C-1	0.25	73.2	E	0.668	63	E	0.884	78.1	E	0.513	48.7	D	0.828	36.3	D	0.428	12.8	B	0.77	80.1	F	0.656	54.9	D
Alternative 4	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Alternative 4D	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Alternative 5	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.829	35.6	D	0.43	11.9	B	0.711	77.3	E	0.68	56	E
Alternative 6	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.812	40.3	D	0.43	11.9	B	0.711	77.3	E	0.567	46.1	D
Alternative 7	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.816	39.2	D	0.43	11.9	B	0.711	77.3	E	0.588	47.9	D
Alternative 8	0.25	73.2	E	0.655	63.7	E	0.884	78.1	E	0.502	49.2	D	0.804	43.2	D	0.43	11.9	B	0.711	77.3	E	0.516	41.6	D

HIGHWAY CAPACITY ANALYSIS

APPENDIX G

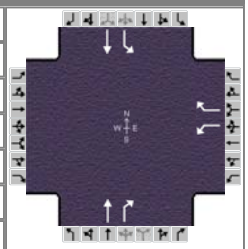
HIGHWAY CAPACITY ANALYSIS

ALTERNATIVE 1B AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

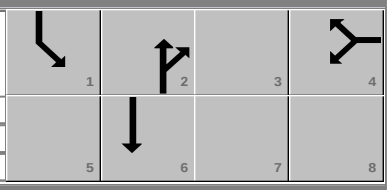
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 1B				



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		310		565	130	230	670	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	628	144	256	744	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	47.4	9.4	22.8	25.9	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	47.4	9.4	22.8	25.9	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.809	0.220	0.929	0.657	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		23.2	3.7	10.6	6.3	
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				38.1	0.0	47.5		41.0	30.0	66.7	8.4	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	9.5	0.8	6.3	0.3	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				38.2	0.0	51.6		50.6	30.7	73.0	8.7	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	46.9		D	25.1		C
Intersection Delay s/veh / LOS	37.4						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	2.1	B

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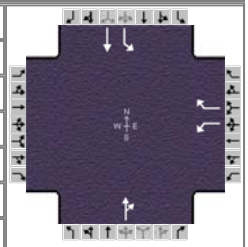
2010 HCS Signalized Intersection Results Summary

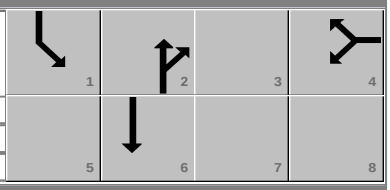
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 1B				



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		795	100	100	760	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	994	111	0	900
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1826	1774	0	1842
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	80.9	9.9	0.0	25.2
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	80.9	9.9	0.0	25.2
Capacity *(c)*, veh/h				455	0	405			1024	137		1241
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.971	0.810	0.000	0.725
Available Capacity (c_a), veh/h				455	0	405			1024	327		1241
Back of Queue *(Q)*, veh/ln				3.6		3.6			26.8	4.5		4.3
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				47.2	0.0	47.6			20.6	72.7		4.5
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	4.9	2.3	0.0	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
Control Delay *(d)*, s/veh				47.5	0.0	48.0			25.5	75.0		4.8
Level of Service (LOS)				D		D			C	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	25.5		C	12.5		B
Intersection Delay s/veh / LOS	21.8						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.2	B

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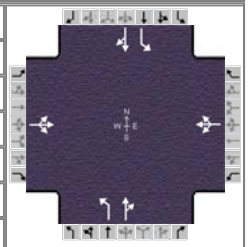
2010 HCS Signalized Intersection Results Summary

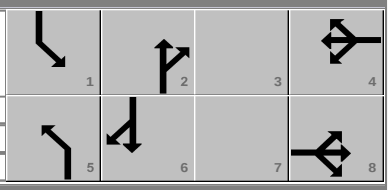
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 1B				



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	0	20	90	0	130	20	755	120	190	750	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	0	972	211	0	856
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	0	1818	1774	0	1854
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	28.5
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	28.5
Capacity (*c*), veh/h	317			291			42		968	235		1190
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.004	0.897	0.000	0.719
Available Capacity (c_a), veh/h	390			365			355		968	355		1190
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9		34.7	8.5		5.6
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	48.8			60.2			77.2		25.1	68.3		6.4
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	21.5	2.2	0.0	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	0.0	0.0	0.0
Control Delay (*d*), s/veh	49.0			75.0			78.2		46.7	70.5		6.8
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		47.4	D		19.4	B	
Intersection Delay s/veh / LOS	37.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.1	B	2.2	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 1B
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		615	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		683	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes		0	0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		804		197				
v/c		0.32		1.97				
95% queue length		1.37		28.91				
Control Delay		11.5		494.0				
LOS		B		F				
Approach Delay				494.0				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	605	40	80	1150	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	672	44	88	1277	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	513	885	27		443	25		194
v/c	0.02	0.10	1.22		0.10	0.44		0.06
95% queue length	0.07	0.33	3.91		0.33	1.34		0.18
Control Delay	12.2	9.5	463.7		14.0	233.7		24.7
LOS	B	A	F		B	F		C
Approach Delay				206.7			129.2	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	570	120	250	430	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	633	133	277	477	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

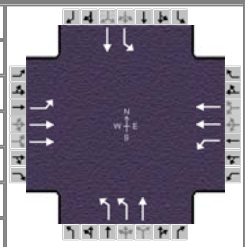
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	75	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	83	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	277		94			11	
C(m) (vph)	1075	847		225			584	
v/c	0.01	0.33		0.42			0.02	
95% queue length	0.03	1.43		1.93			0.06	
Control Delay	8.4	11.3		32.0			11.3	
LOS	A	B		D			B	
Approach Delay				32.0			11.3	
Approach LOS				D			B	

2010 HCS Signalized Intersection Results Summary

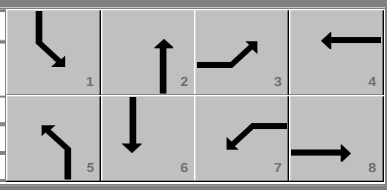
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 1B				



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	535		95	240		370	140		225	405	

Signal Information			
Cycle, s	160.0	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	24.2	1.0	66.0	3.9	1.1	31.6
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	2.0	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	38.1	18.2	45.8	30.3	72.3	31.3	73.3
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	27.9	11.4	11.8	20.1		24.1	
Green Extension Time *(g_e)*, s	0.0	3.8	0.3	4.8	4.1	0.0	1.1	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.12	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	594	0	106	267	0	411	156	0	250	450	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	25.9	0.0	9.4	9.8	0.0	18.1	6.8	0.0	22.1	29.6	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	25.9	0.0	9.4	9.8	0.0	18.1	6.8	0.0	22.1	29.6	0.0
Capacity *(c)*, veh/h	43	701		129	871		522	769		280	781	
Volume-to-Capacity Ratio *(X)*	0.257	0.848	0.000	0.820	0.306	0.000	0.787	0.202	0.000	0.893	0.577	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1587	769		817	781	
Back of Queue *(Q)*, veh/ln	0.5	12.1		4.8	4.3		7.5	2.9		10.9	13.9	
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	76.6	61.9		73.2	49.2		61.4	22.6		66.1	35.6	
Incremental Delay *(d_2)*, s/veh	6.6	6.6	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.1	3.1	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	83.3	68.5		89.0	49.5		61.9	22.7		79.1	38.7	
Level of Service (LOS)	F	E		F	D		E	C		E	D	
Approach Delay, s/veh / LOS	68.8	E		60.7	E		51.2	D		53.2	D	
Intersection Delay s/veh / LOS	58.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	0.8	A	1.4	A	1.6	A

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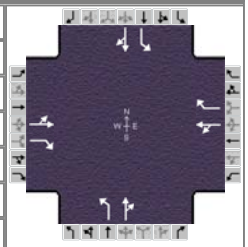
2010 HCS Signalized Intersection Results Summary

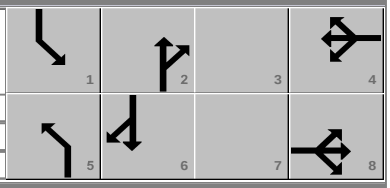
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 1B				



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	10	40	240	10	110	50	445	190	150	920	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	706	167	0	1033
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1768	1774	0	1859
Queue Service time *(g_s)*, s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	60.5	14.8	0.0	77.8
Cycle Queue Clearance Time *(g_c)*, s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	60.5	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		744	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	0.949	0.886	0.000	1.143
Available Capacity *(c_a)*, veh/h	49		562	44		562	225		744	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		24.4	6.9		93.0
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	60.3		34.1	80.0		35.9	76.0		36.8	70.6		28.3
Incremental Delay *(d_2)*, s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	3.9	3.9	0.0	258.7
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	97.1		34.2	9659.6		36.1	78.3		40.7	74.4		287.0
Level of Service (LOS)	F		C	F		D	E		D	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		43.4	D		257.5	F	
Intersection Delay s/veh / LOS	1244.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.7	A	2.5	B

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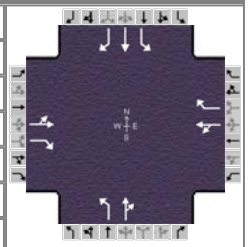
2010 HCS Signalized Intersection Results Summary

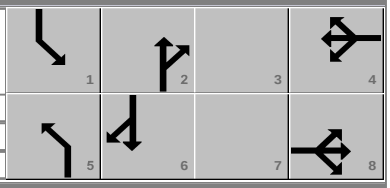
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 1B				



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	30	90	40	10	40	150	555	10	65	1110	140

Signal Information			
Cycle, s	160.0	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	8.3	2.8	73.8	50.4	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	56.9	56.9	56.9	56.9	23.3	88.8	14.4	79.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	51.1	51.1	51.1	51.1	16.8		8.4	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.96	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	44	167	0	628	72	1233	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	55	0	1579	43	0	1579	1774	0	1857	1774	1863	1579
Queue Service time *(g_s)*, s	1.4	0.0	7.5	1.4	0.0	3.2	14.8	0.0	29.9	6.4	74.9	9.3
Cycle Queue Clearance Time *(g_c)*, s	49.1	0.0	7.5	49.1	0.0	3.2	14.8	0.0	29.9	6.4	74.9	9.3
Capacity *(c)*, veh/h	56		484	54		484	191		972	92	872	739
Volume-to-Capacity Ratio *(X)*	2.193	0.000	0.207	1.034	0.000	0.092	0.875	0.000	0.646	0.789	1.415	0.211
Available Capacity *(c_a)*, veh/h	93		550	88		550	320		972	320	872	739
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.2		1.3	6.7		10.1	3.1	209.4	3.5
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	72.3		41.1	74.6		39.6	70.3		16.2	75.0	30.1	25.1
Incremental Delay *(d_2)*, s/veh	2206.0	0.0	0.3	201.5	0.0	0.1	1.5	0.0	0.3	7.3	750.4	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2278.3		41.3	276.1		39.7	71.8		16.5	82.3	780.5	25.4
Level of Service (LOS)	F		D	F		D	E		B	F	F	C
Approach Delay, s/veh / LOS	1271.7	F		171.0	F		28.1	C		665.6	F	
Intersection Delay s/veh / LOS	502.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.8	A	2.9	C

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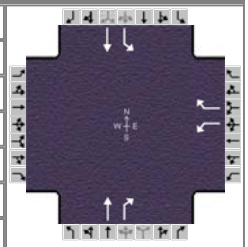
ALTERNATIVE 1B PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

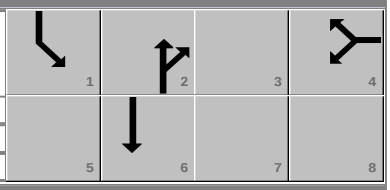
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		775	90	190	725	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.4	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	861	100	211	806	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	37.7	0.0
Cycle Queue Clearance Time (g_c), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	37.7	0.0
Capacity *(c)*, veh/h				646	0	575		702	595	238	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	1.227	0.168	0.888	0.783	0.000
Available Capacity (c_a), veh/h				646	0	575		702	595	322	1029	
Back of Queue *(Q)*, veh/ln				1.5		10.7		105.6	2.3	7.4	10.6	
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				29.4	0.0	36.8		43.6	29.0	59.6	13.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	2.5	0.0	422.7	0.6	2.5	0.6	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				29.5	0.0	39.4		466.3	29.7	62.1	13.8	
Level of Service (LOS)				C		D		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	420.9		F	23.8		C
Intersection Delay s/veh / LOS	184.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.1	B	2.2	B

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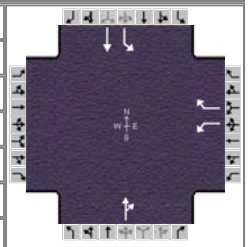
2010 HCS Signalized Intersection Results Summary

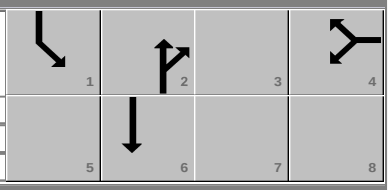
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 1B				



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		965	100	100	1015	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1183	111	0	1183
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1832	1774	0	1847
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			929	140		1158
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.274	0.791	0.000	1.022
Available Capacity (c_a), veh/h				520	0	462			929	374		1158
Back of Queue *(Q)*, veh/ln				2.9		3.0			150.7	3.9		28.0
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				37.3	0.0	37.7			23.8	63.3		12.2
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	493.2	2.0	0.0	44.5
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				37.6	0.0	38.0			516.9	65.3		56.6
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	516.9		F	57.4		E
Intersection Delay s/veh / LOS	257.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.6	B	2.6	B

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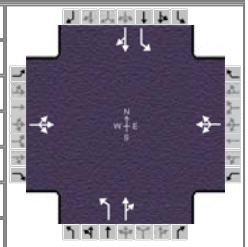
2010 HCS Signalized Intersection Results Summary

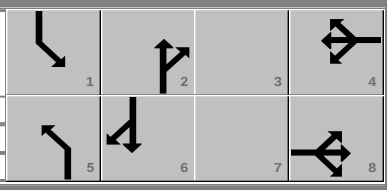
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 1B				



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	10	60	90	10	90	90	915	60	90	965	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, *(Y+Rc)*, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time *(g_e)*, s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1083	100	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1842	1774	0	1846
Queue Service time *(g_s)*, s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	78.7	7.8	0.0	83.4
Cycle Queue Clearance Time *(g_c)*, s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	78.7	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1097	125		1100
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	0.987	0.799	0.000	1.025
Available Capacity *(c_a)*, veh/h	450			396			619		1097	619		1100
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		20.6	3.5		34.5
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	47.4			53.3			64.1		14.8	64.1		15.1
Incremental Delay *(d_2)*, s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	8.4	1.1	0.0	51.2
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	48.2			59.9			65.2		23.1	65.2		66.3
Level of Service (LOS)	D			E			E		C	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		26.7	C		66.2	E	
Intersection Delay s/veh / LOS	47.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.4	B	2.5	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 1B
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1135	50	60	1155	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1261	55	66	1283	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		525		39				
v/c		0.13		3.10				
95% queue length		0.43		13.59				
Control Delay		12.8		1164				
LOS		B		F				
Approach Delay				1164				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 1B
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	955	100	100	655	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1061	111	111	727	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	796	596	21		253	13		394
v/c	0.04	0.19	2.10		0.40	4.23		0.03
95% queue length	0.13	0.68	5.75		1.79	7.87		0.09
Control Delay	9.7	12.4	894.4		28.2	2036		14.4
LOS	A	B	F		D	F		B
Approach Delay				292.9			1699	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	605	90	245	470	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	672	100	272	522	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

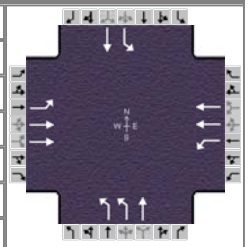
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	160	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	177	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	272		210			66	
C(m) (vph)	1035	843		148			84	
v/c	0.01	0.32		1.42			0.79	
95% queue length	0.03	1.40		13.56			3.98	
Control Delay	8.5	11.3		279.8			131.8	
LOS	A	B		F			F	
Approach Delay				279.8			131.8	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

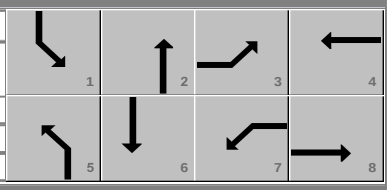
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 1B				



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	270		200	425		775	345		85	255	

Signal Information			
Cycle, s	140.0	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	9.5	26.9	35.2	3.5	9.7	17.1
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	23.6	26.4	40.0	48.6	74.3	15.6	41.3
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	2.9	13.4	19.2	18.4	33.2		9.3	
Green Extension Time (g_e), s	0.0	3.8	0.6	4.1	9.3	0.0	0.4	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.97	
Max Out Probability	0.00	0.02	0.03	0.00	0.07		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	300	0	222	472	0	861	383	0	94	283	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	0.9	11.4	0.0	17.2	16.4	0.0	31.2	14.0	0.0	7.3	18.8	0.0
Cycle Queue Clearance Time (g_c), s	0.9	11.4	0.0	17.2	16.4	0.0	31.2	14.0	0.0	7.3	18.8	0.0
Capacity (*c*), veh/h	44	434		251	848		1047	905		120	466	
Volume-to-Capacity Ratio (*X*)	0.250	0.692	0.000	0.884	0.557	0.000	0.823	0.423	0.000	0.785	0.609	0.000
Available Capacity (c_a), veh/h	380	850		380	1264		1598	905		823	466	
Back of Queue (*Q*), veh/ln	0.5	5.2		8.9	7.2		11.9	5.1		3.7	9.3	
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	67.0	58.9		58.9	46.8		38.3	15.1		64.3	46.4	
Incremental Delay (d_2), s/veh	6.2	2.4	0.0	19.2	0.7	0.0	0.4	0.1	0.0	13.8	6.0	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	73.2	61.3		78.1	47.5		38.6	15.3		78.0	52.4	
Level of Service (LOS)	E	E		E	D		D	B		E	D	
Approach Delay, s/veh / LOS	61.7	E		57.3	E		31.4	C		58.8	E	
Intersection Delay s/veh / LOS	45.8						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.1	A	2.5	B	1.1	A

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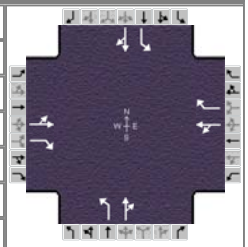
2010 HCS Signalized Intersection Results Summary

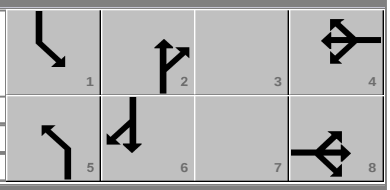
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 1B				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	775	200	60	575	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1083	67	0	661
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1796	1774	0	1852
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	41.3
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	41.3
Capacity *(c)*, veh/h	52		530	48		530	185		866	86		789
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.251	0.773	0.000	0.838
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		866	384		789
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		132.5	2.3		15.6
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	66.8		33.5	70.0		33.7	61.5		27.3	65.8		26.6
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	452.5	1.4	0.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	4858.1		33.7	9652.8		34.0	62.9		479.8	67.2		27.6
Level of Service (LOS)	F		C	F		C	E		F	E		C
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		427.4	F		31.2	C	
Intersection Delay s/veh / LOS	1613.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.5	B	1.7	A

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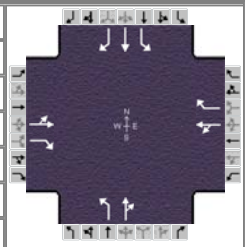
2010 HCS Signalized Intersection Results Summary

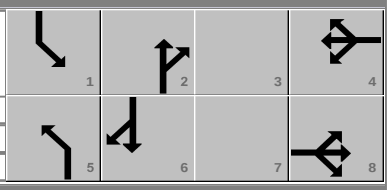
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 1B				



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	40	300	15	50	95	350	860	10	75	790	230

Signal Information			
Cycle, s	140.0	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	8.4	16.3	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	73.3	14.5	50.9
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	47.7	47.7	47.7	47.7	32.7		8.5	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.96	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	72	0	106	389	0	967	83	878	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	271	0	1579	1774	0	1859	1774	1863	1579
Queue Service time (g_s), s	0.0	0.0	25.2	0.0	0.0	6.8	30.7	0.0	67.0	6.5	44.6	18.4
Cycle Queue Clearance Time (g_c), s	45.7	0.0	25.2	45.7	0.0	6.8	30.7	0.0	67.0	6.5	44.6	18.4
Capacity *(c)*, veh/h	49		515	120		515	390		890	106	593	503
Volume-to-Capacity Ratio *(X)*	8.447	0.000	0.647	0.601	0.000	0.205	0.996	0.000	1.086	0.787	1.479	0.508
Available Capacity (c_a), veh/h	49		515	120		515	390		890	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	2.0		2.6	16.0		61.8	3.1	161.1	7.2
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	70.0		40.3	38.5		34.0	54.5		25.4	64.9	40.3	38.8
Incremental Delay (d_2), s/veh	13446.6	0.0	3.0	9.2	0.0	0.2	24.2	0.0	156.8	6.3	866.9	1.7
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	13516.6		43.3	47.6		34.3	78.7		182.2	71.2	907.2	40.5
Level of Service (LOS)	F		D	D		C	E		F	E	F	D
Approach Delay, s/veh / LOS	7483.8	F		39.7	D		152.5	F		667.9	F	
Intersection Delay s/veh / LOS	1888.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	0.8	A	2.7	B	2.5	B

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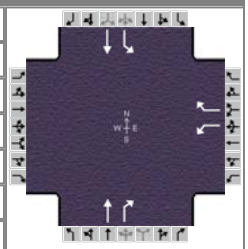
ALTERNATIVE 1C AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

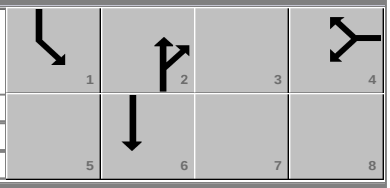
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 1B				



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		310		585	130	230	720	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	650	144	256	800	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	50.0	9.4	22.8	30.4	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	50.0	9.4	22.8	30.4	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.837	0.220	0.929	0.706	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		24.8	3.7	10.6	6.9	
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				38.1	0.0	47.5		41.8	30.0	66.7	8.8	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	11.5	0.8	6.3	0.3	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				38.2	0.0	51.6		53.3	30.7	73.0	9.2	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	49.2		D	24.6		C
Intersection Delay s/veh / LOS	37.7						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	2.2	B

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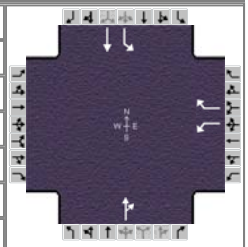
2010 HCS Signalized Intersection Results Summary

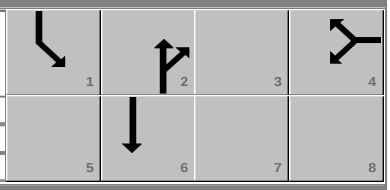
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 1B				



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		815	100	100	770	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1017	111	0	911
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1827	1774	0	1843
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	87.3	9.9	0.0	26.0
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	87.3	9.9	0.0	26.0
Capacity *(c)*, veh/h				455	0	405			1024	137		1241
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.992	0.810	0.000	0.734
Available Capacity (c_a), veh/h				455	0	405			1024	327		1241
Back of Queue *(Q)*, veh/ln				3.6		3.6			30.6	4.5		4.4
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				47.2	0.0	47.6			21.5	72.7		4.5
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	11.3	2.3	0.0	0.4
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				47.5	0.0	48.0			32.8	75.0		4.9
Level of Service (LOS)				D		D			C	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	32.8		C	12.5		B
Intersection Delay s/veh / LOS	25.1						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.2	B

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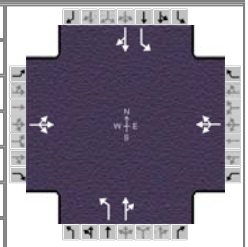
2010 HCS Signalized Intersection Results Summary

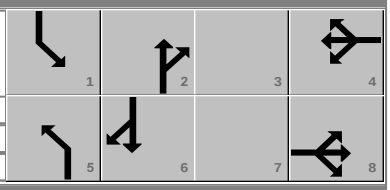
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 1B				



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	0	20	90	0	130	20	775	120	190	760	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	0	994	211	0	867
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	0	1819	1774	0	1854
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	29.4
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	29.4
Capacity *(c)*, veh/h	317			291			42		969	235		1190
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.027	0.897	0.000	0.728
Available Capacity (c_a), veh/h	390			365			355		969	355		1190
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9		43.3	8.5		5.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	48.8			60.2			77.2		25.1	68.3		6.5
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	53.6	2.2	0.0	0.4
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	49.0			75.0			78.2		78.6	70.5		6.9
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		78.6	E		19.3	B	
Intersection Delay s/veh / LOS	50.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.2	B	2.3	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 1B
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		635	130	230	765	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		705	144	255	850	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		789		189				
v/c		0.32		2.05				
95% queue length		1.40		29.76				
Control Delay		11.7		532.5				
LOS		B		F				
Approach Delay				532.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	625	40	80	1160	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	694	44	88	1288	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	508	868	26		430	24		191
v/c	0.02	0.10	1.27		0.10	0.46		0.06
95% queue length	0.07	0.34	3.98		0.34	1.38		0.18
Control Delay	12.2	9.6	491.7		14.3	247.1		25.0-
LOS	B	A	F		B	F		C
Approach Delay				218.9			136.1	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	590	110	255	440	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	655	122	283	488	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

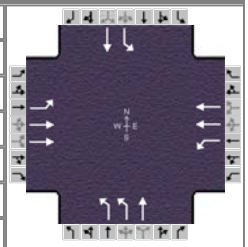
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	283		111			11	
C(m) (vph)	1065	839		233			575	
v/c	0.01	0.34		0.48			0.02	
95% queue length	0.03	1.49		2.36			0.06	
Control Delay	8.4	11.5		33.8			11.4	
LOS	A	B		D			B	
Approach Delay				33.8			11.4	
Approach LOS				D			B	

2010 HCS Signalized Intersection Results Summary

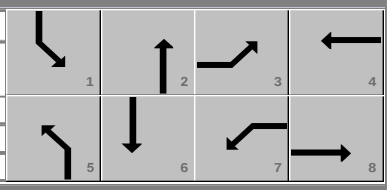
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 1B				



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	520		95	230		380	160		220	410	

Signal Information			
Cycle, s	160.0	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	24.7	0.1	67.4	3.9	1.1	30.8
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	37.3	18.2	45.0	30.9	73.6	30.8	73.5
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	27.1	11.4	11.4	20.6		23.6	
Green Extension Time *(g_e)*, s	0.0	3.7	0.3	4.6	4.3	0.0	1.1	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.10	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	578	0	106	256	0	422	178	0	244	456	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	25.1	0.0	9.4	9.4	0.0	18.6	7.7	0.0	21.6	30.0	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	25.1	0.0	9.4	9.4	0.0	18.6	7.7	0.0	21.6	30.0	0.0
Capacity *(c)*, veh/h	43	684		129	854		535	784		274	783	
Volume-to-Capacity Ratio *(X)*	0.257	0.845	0.000	0.820	0.299	0.000	0.789	0.227	0.000	0.891	0.582	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1603	784		826	783	
Back of Queue *(Q)*, veh/ln	0.5	11.7		4.8	4.2		7.7	3.2		10.6	14.1	
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	76.6	62.3		73.2	49.7		61.0	22.0		66.3	35.6	
Incremental Delay *(d_2)*, s/veh	6.6	6.2	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.2	3.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	83.3	68.5		89.0	49.9		61.5	22.1		79.5	38.8	
Level of Service (LOS)	F	E		F	D		E	C		E	D	
Approach Delay, s/veh / LOS	68.8	E		61.4	E		49.8	D		53.0	D	
Intersection Delay s/veh / LOS	57.6						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	0.8	A	1.5	A	1.6	A

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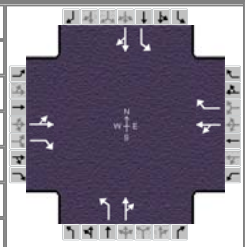
2010 HCS Signalized Intersection Results Summary

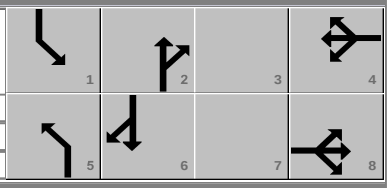
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 1B				



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	10	40	240	10	110	50	465	190	150	930	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	728	167	0	1044
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1770	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	64.2	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	64.2	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		745	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	0.977	0.886	0.000	1.155
Available Capacity (c_a), veh/h	49		562	44		562	225		745	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		26.6	6.9		98.6
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	60.3		34.1	80.0		35.9	76.0		37.6	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	7.8	3.9	0.0	280.7
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	97.1		34.2	9659.6		36.1	78.3		45.4	74.4		309.0
Level of Service (LOS)	F		C	F		D	E		D	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		47.7	D		276.7	F	
Intersection Delay s/veh / LOS	1239.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.8	A	2.5	B

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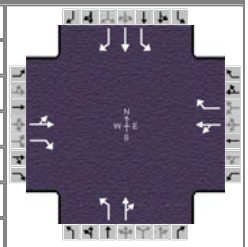
2010 HCS Signalized Intersection Results Summary

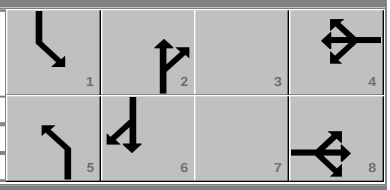
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 1B				



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	30	90	80	10	210	150	470	145	160	1095	140

Signal Information			
Cycle, s	160.0	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	17.0	1.0	67.5	55.7	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	2.0	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	62.2	62.2	62.2	62.2	23.1	73.8	24.1	74.7
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(gs)*, s	57.6	57.6	57.6	57.6	16.8		17.8	
Green Extension Time *(ge)*, s	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.97		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	100	0	233	167	0	683	178	1217	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	29	0	1579	12	0	1579	1774	0	1787	1774	1863	1579
Queue Service time *(gs)*, s	0.2	0.0	7.1	0.2	0.0	18.1	14.8	0.0	55.4	15.8	68.5	10.0
Cycle Queue Clearance Time *(gc)*, s	55.6	0.0	7.1	55.6	0.0	18.1	14.8	0.0	55.4	15.8	68.5	10.0
Capacity *(c)*, veh/h	49		549	47		549	188		754	199	797	676
Volume-to-Capacity Ratio *(X)*	2.497	0.000	0.182	2.146	0.000	0.425	0.884	0.000	0.906	0.892	1.526	0.230
Available Capacity *(ca)*, veh/h	49		550	47		550	232		754	232	797	676
Back of Queue *(Q)*, veh/ln	39.5		2.8	29.5		7.2	6.8		22.0	8.2	237.0	3.8
Overflow Queue *(Q3)*, 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 *(d1)*, s/veh	70.1		36.4	76.5		40.0	70.5		34.8	70.1	34.3	29.0
Incremental Delay *(d2)*, s/veh	2754.2	0.0	0.2	2131.9	0.0	0.6	3.6	0.0	2.1	20.1	949.9	0.4
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2824.3		36.5	2208.4		40.6	74.1		36.8	90.1	984.2	29.4
Level of Service (LOS)	F		D	F		D	E		D	F	F	C
Approach Delay, s/veh / LOS	1569.8	F		690.9	F		44.1	D		785.9	F	
Intersection Delay s/veh / LOS	620.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	1.0	A	1.9	A	3.0	C

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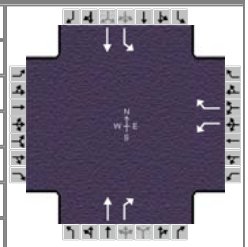
ALTERNATIVE 1C PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

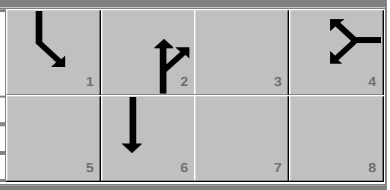
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	Alternative 1C 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				60		330		800	90	190	760	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.4	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	889	100	211	844	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	42.3	0.0
Cycle Queue Clearance Time (g_c), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	42.3	0.0
Capacity *(c)*, veh/h				646	0	575		702	595	238	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	1.267	0.168	0.888	0.821	0.000
Available Capacity (c_a), veh/h				646	0	575		702	595	322	1029	
Back of Queue *(Q)*, veh/ln				1.5		10.7		119.2	2.3	7.4	12.0	
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				29.4	0.0	36.8		43.6	29.0	59.6	13.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	2.5	0.0	492.4	0.6	2.5	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				29.5	0.0	39.4		536.0	29.7	62.1	14.6	
Level of Service (LOS)				C		D		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	484.8		F	24.1		C
Intersection Delay s/veh / LOS	210.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.1	B	2.2	B

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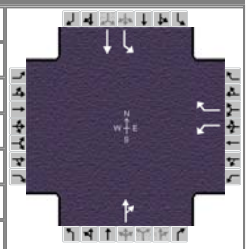
2010 HCS Signalized Intersection Results Summary

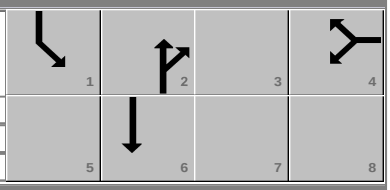
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 1C				



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		990	100	100	1050	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1211	111	0	1222
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1832	1774	0	1848
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			930	140		1159
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.303	0.791	0.000	1.055
Available Capacity (c_a), veh/h				520	0	462			930	374		1159
Back of Queue *(Q)*, veh/ln				2.9		3.0			164.4	3.9		46.2
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				37.3	0.0	37.7			23.7	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	546.0	2.0	0.0	101.2
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				37.6	0.0	38.0			569.8	65.3		113.4
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	569.8		F	109.4		F
Intersection Delay s/veh / LOS	305.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.7	B	2.7	B

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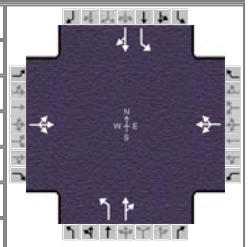
2010 HCS Signalized Intersection Results Summary

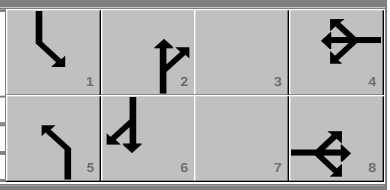
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 1C				



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	10	60	90	10	90	90	940	60	90	1000	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1111	100	0	1167
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1843	1774	0	1847
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1098	125		1100
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.012	0.799	0.000	1.061
Available Capacity (c_a), veh/h	450			396			619		1098	619		1100
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		28.5	3.5		52.8
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	47.4			53.3			64.1		15.2	64.1		15.1
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	30.8	1.1	0.0	111.5
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	48.2			59.9			65.2		46.0	65.2		126.5
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		47.6	D		121.7	F	
Intersection Delay s/veh / LOS	81.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.5	B	2.6	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 1C
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1160	50	60	1190	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1288	55	66	1322	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		513		36				
v/c		0.13		3.36				
95% queue length		0.44		13.89				
Control Delay		13.1		1295				
LOS		B		F				
Approach Delay				1295				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 1C
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	980	100	100	690	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1088	111	111	766	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	770	582	19		243	10		374
v/c	0.04	0.19	2.32		0.41	5.50		0.03
95% queue length	0.13	0.70	5.91		1.90	8.15		0.09
Control Delay	9.9	12.6	1024		29.8	2762		14.9
LOS	A	B	F		D	F		B
Approach Delay				333.7			2304	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: Alternative 1C PM
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	625	90	275	490	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	694	100	305	544	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

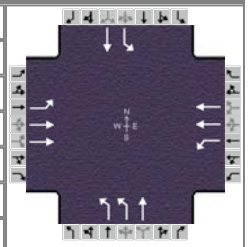
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	305		244			66	
C(m) (vph)	1015	827		133			60	
v/c	0.01	0.37		1.83			1.10	
95% queue length	0.03	1.71		18.75			5.36	
Control Delay	8.6	11.9		459.9			261.3	
LOS	A	B		F			F	
Approach Delay				459.9			261.3	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

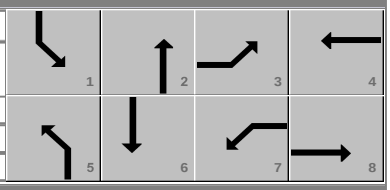
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 1C				



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	255		200	425		790	380		80	260	

Signal Information			
Cycle, s	140.0	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	9.0	28.2	35.1	3.5	9.7	16.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	22.9	26.4	39.3	49.4	75.5	15.1	41.2
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	2.9	12.7	19.2	18.5	33.7		8.9	
Green Extension Time (g_e), s	0.0	3.7	0.6	4.0	9.6	0.0	0.4	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.97	
Max Out Probability	0.00	0.02	0.03	0.00	0.07		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	283	0	222	472	0	878	422	0	89	289	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	0.9	10.7	0.0	17.2	16.5	0.0	31.7	15.5	0.0	6.9	19.3	0.0
Cycle Queue Clearance Time (g_c), s	0.9	10.7	0.0	17.2	16.5	0.0	31.7	15.5	0.0	6.9	19.3	0.0
Capacity (*c*), veh/h	44	416		251	830		1066	921		114	464	
Volume-to-Capacity Ratio (*X*)	0.250	0.680	0.000	0.884	0.569	0.000	0.824	0.458	0.000	0.780	0.622	0.000
Available Capacity (c_a), veh/h	380	850		380	1264		1615	921		831	464	
Back of Queue (*Q*), veh/ln	0.5	4.9		8.9	7.2		12.1	5.4		3.5	9.6	
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	67.0	59.3		58.9	47.4		37.7	14.7		64.5	46.7	
Incremental Delay (d_2), s/veh	6.2	2.4	0.0	19.2	0.7	0.0	0.4	0.1	0.0	14.1	6.3	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	73.2	61.7		78.1	48.1		38.1	14.8		78.6	53.0	
Level of Service (LOS)	E	E		E	D		D	B		E	D	
Approach Delay, s/veh / LOS	62.1	E		57.7	E		30.5	C		59.0	E	
Intersection Delay s/veh / LOS	45.1						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.1	A	2.6	B	1.1	A

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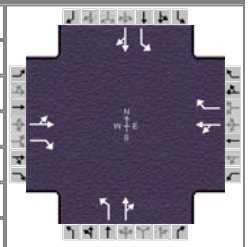
2010 HCS Signalized Intersection Results Summary

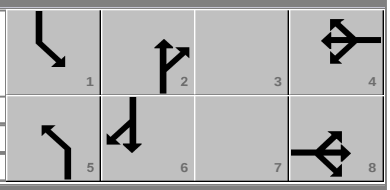
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 1C				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	800	200	60	610	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1111	67	0	700
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1798	1774	0	1852
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	46.2
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	46.2
Capacity *(c)*, veh/h	52		530	48		530	185		867	86		789
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.282	0.773	0.000	0.887
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		867	384		789
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		146.0	2.3		17.5
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	66.8		33.5	70.0		33.7	61.5		27.3	65.8		27.6
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	508.1	1.4	0.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	4858.1		33.7	9652.8		34.0	62.9		535.3	67.2		29.2
Level of Service (LOS)	F		C	F		C	E		F	E		C
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		477.3	F		32.5	C	
Intersection Delay s/veh / LOS	1602.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.6	B	1.8	A

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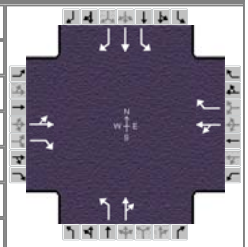
2010 HCS Signalized Intersection Results Summary

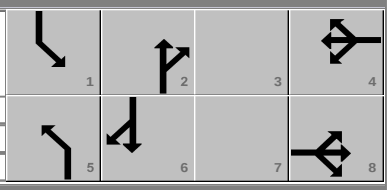
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 1C				



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	40	300	105	50	240	350	695	230	200	760	230

Signal Information			
Cycle, s	140.0	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	19.7	5.0	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	62.0	25.8	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	5.0	5.0	5.0	5.0	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.7		19.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	172	0	267	389	0	1028	222	844	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	39	0	1579	1774	0	1783	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	19.2	30.7	0.0	55.7	17.2	44.6	18.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	19.2	30.7	0.0	55.7	17.2	44.6	18.4
Capacity *(c)*, veh/h	49		515	56		515	390		709	250	593	503
Volume-to-Capacity Ratio *(X)*	8.449	0.000	0.647	3.086	0.000	0.517	0.996	0.000	1.450	0.888	1.423	0.508
Available Capacity *(c_a)*, veh/h	49		515	56		515	390		709	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	60.9		7.6	16.0		180.9	8.2	144.5	7.2
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	70.0		40.3	59.7		38.2	54.5		35.2	59.0	40.3	38.8
Incremental Delay *(d_2)*, s/veh	13450.0	0.0	3.0	3801.8	0.0	1.1	24.2	0.0	810.9	8.4	766.2	1.7
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	13520.0		43.3	3861.5		39.3	78.7		846.1	67.4	806.5	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.7	F		1539.1	F		635.5	F		534.2	F	
Intersection Delay s/veh / LOS	2002.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.2	A	2.8	C	2.7	B

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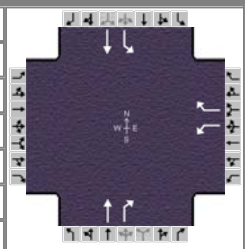
ALTERNATIVE 2+3 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

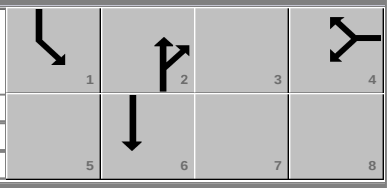
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 2+3				



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		310		585	130	230	710	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	650	144	256	789	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	50.0	9.4	22.8	29.4	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	50.0	9.4	22.8	29.4	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.837	0.220	0.929	0.696	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		24.8	3.7	10.6	6.7	
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				38.1	0.0	47.5		41.8	30.0	66.7	8.7	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	11.5	0.8	6.3	0.3	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				38.2	0.0	51.6		53.3	30.7	73.0	9.0	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	49.2		D	24.7		C
Intersection Delay s/veh / LOS	37.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	2.2	B

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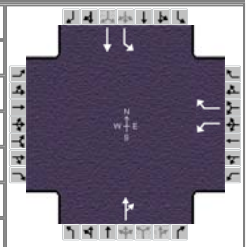
2010 HCS Signalized Intersection Results Summary

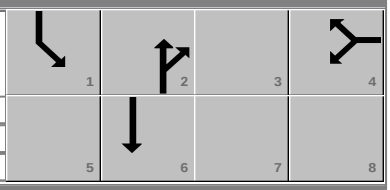
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 2+3				



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		725	100	100	755	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	917	111	0	894
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1823	1774	0	1842
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	63.2	9.9	0.0	24.8
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	63.2	9.9	0.0	24.8
Capacity *(c)*, veh/h				455	0	405			1022	137		1241
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.897	0.810	0.000	0.721
Available Capacity (c_a), veh/h				455	0	405			1022	327		1241
Back of Queue *(Q)*, veh/ln				3.6		3.6			20.3	4.5		4.3
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				47.2	0.0	47.6			18.4	72.7		4.4
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	1.4	2.3	0.0	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
Control Delay *(d)*, s/veh				47.5	0.0	48.0			19.7	75.0		4.8
Level of Service (LOS)				D		D			B	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	19.7		B	12.5		B
Intersection Delay s/veh / LOS	19.3						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.2	B	2.1	B

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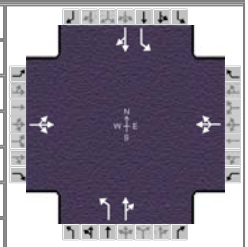
2010 HCS Signalized Intersection Results Summary

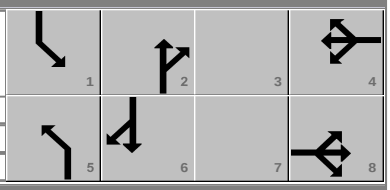
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 2+3				



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	0	20	45	0	100	20	745	60	110	790	20

Signal Information			
Cycle, s	160.0	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	3.8	3.1	106.9	22.6	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	27.3	27.3	27.3	27.3	10.1	113.2	19.5	122.6
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.8	4.8	21.9	21.9	4.0		12.9	
Green Extension Time (g_e), s	0.8	0.8	0.7	0.7	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	161	0	0	22	0	894	122	0	900
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1182	0	0	1261	0	0	1774	0	1838	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	16.5	0.0	0.0	2.0	0.0	27.0	10.9	0.0	8.0
Cycle Queue Clearance Time (g_c), s	2.8	0.0	0.0	19.9	0.0	0.0	2.0	0.0	27.0	10.9	0.0	8.0
Capacity *(c)*, veh/h	197			208			42		1228	146		1348
Volume-to-Capacity Ratio *(X)*	0.169	0.000	0.000	0.775	0.000	0.000	0.532	0.000	0.728	0.836	0.000	0.668
Available Capacity (c_a), veh/h	368			389			506		1228	506		1348
Back of Queue *(Q)*, veh/ln	1.2			6.8			0.9		4.8	4.9		1.2
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	60.2			67.0			77.2		5.0	72.3		1.0
Incremental Delay (d_2), s/veh	0.4	0.0	0.0	6.3	0.0	0.0	1.0	0.0	0.4	1.2	0.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	60.6			73.3			78.2		5.4	73.6		1.2
Level of Service (LOS)	E			E			E		A	E		A
Approach Delay, s/veh / LOS	60.6	E		73.3	E		7.2	A		9.8	A	
Intersection Delay s/veh / LOS	14.3						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.8	A	2.0	B	2.2	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2+3
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		695	190	230	785	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		772	211	255	872	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		50			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		55			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		110				
C(m) (vph)		703		54				
v/c		0.36		2.04				
95% queue length		1.66		10.81				
Control Delay		13.0		644.9				
LOS		B		F				
Approach Delay				644.9				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2+3
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	685	40	80	1155	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	761	44	88	1283	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	510	819	23		394	21		193
v/c	0.02	0.11	1.43		0.11	0.52		0.06
95% queue length	0.07	0.36	4.20		0.37	1.50		0.18
Control Delay	12.2	9.9	592.0		15.3	297.1		24.8
LOS	B	A	F		C	F		C
Approach Delay				262.4			160.9	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2+3
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	235	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	261	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

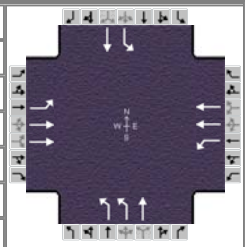
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	40	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	44	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	261		55			11	
C(m) (vph)	1021	774		136			539	
v/c	0.01	0.34		0.40			0.02	
95% queue length	0.03	1.49		1.74			0.06	
Control Delay	8.6	12.0		48.4			11.8	
LOS	A	B		E			B	
Approach Delay				48.4			11.8	
Approach LOS				E			B	

2010 HCS Signalized Intersection Results Summary

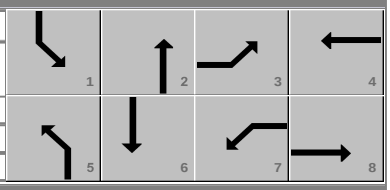
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 2+3				



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	530		95	245		410	145		230	400	

Signal Information			
Cycle, s	160.0	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	25.8	0.9	65.1	3.9	1.1	31.4
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	37.9	18.2	45.6	32.7	72.0	31.9	71.2
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	27.6	11.4	12.1	22.0		24.6	
Green Extension Time *(g_e)*, s	0.0	3.8	0.3	4.8	4.6	0.0	1.2	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.12	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	589	0	106	272	0	456	161	0	256	444	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	25.6	0.0	9.4	10.1	0.0	20.0	7.1	0.0	22.6	29.8	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	25.6	0.0	9.4	10.1	0.0	20.0	7.1	0.0	22.6	29.8	0.0
Capacity *(c)*, veh/h	43	696		129	867		573	765		286	755	
Volume-to-Capacity Ratio *(X)*	0.257	0.846	0.000	0.820	0.314	0.000	0.795	0.210	0.000	0.895	0.588	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1591	765		819	755	
Back of Queue *(Q)*, veh/ln	0.5	12.0		4.8	4.5		8.3	3.0		11.1	14.1	
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	76.6	62.0		73.2	49.5		59.7	22.9		65.8	37.1	
Incremental Delay *(d_2)*, s/veh	6.6	6.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.0	3.4	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	83.3	68.4		89.0	49.7		60.2	23.0		78.8	40.5	
Level of Service (LOS)	F	E		F	D		E	C		E	D	
Approach Delay, s/veh / LOS	68.7	E		60.7	E		50.5	D		54.5	D	
Intersection Delay s/veh / LOS	58.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	0.8	A	1.5	A	1.6	A

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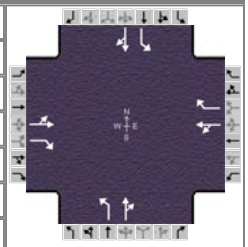
2010 HCS Signalized Intersection Results Summary

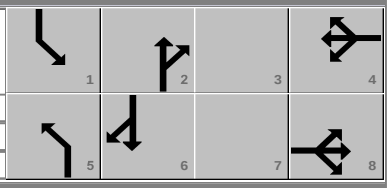
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 2+3				



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	10	40	240	10	110	50	525	190	150	925	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	794	167	0	1039
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1778	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		748	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	1.062	0.886	0.000	1.149
Available Capacity (c_a), veh/h	49		562	44		562	225		748	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		50.2	6.9		95.8
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	60.3		34.1	80.0		35.9	76.0		38.1	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	115.1	3.9	0.0	269.7
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	97.1		34.2	9659.6		36.1	78.3		153.2	74.4		298.0
Level of Service (LOS)	F		C	F		D	E		F	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		148.3	F		267.1	F	
Intersection Delay s/veh / LOS	1239.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.5	B

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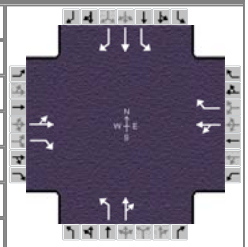
2010 HCS Signalized Intersection Results Summary

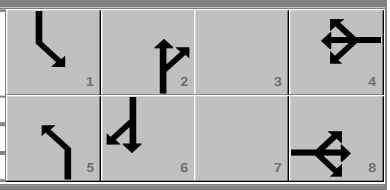
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 2+3				



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	30	90	40	10	80	150	545	30	130	1045	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	639	144	1161	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1845	1774	1863	1579
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	38.3	12.8	73.8	9.4
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	38.3	12.8	73.8	9.4
Capacity *(c)*, veh/h	56		495	54		495	190		875	168	859	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.731	0.860	1.351	0.214
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		875	308	859	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		14.2	6.1	179.4	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	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	72.1		40.3	74.5		40.0	70.4		23.0	71.4	30.8	25.8
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.5	6.5	636.1	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0		23.5	77.9	666.9	26.1
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.6	C		540.5	F	
Intersection Delay s/veh / LOS	424.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.8	A	2.9	C

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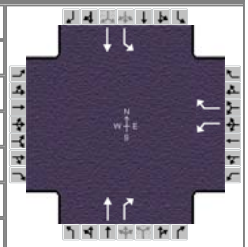
ALTERNATIVE 2+3 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

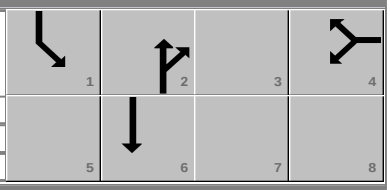
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 2+3				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		805	90	190	845	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, *(Y+Rc)*, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time *(g_s)*, s			53.0	53.0			18.4	
Green Extension Time *(g_e)*, s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	894	100	211	939	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time *(g_s)*, s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	56.8	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	56.8	0.0
Capacity *(c)*, veh/h				646	0	575		702	595	238	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	1.275	0.168	0.888	0.913	0.000
Available Capacity *(c_a)*, veh/h				646	0	575		702	595	322	1029	
Back of Queue *(Q)*, veh/ln				1.5		10.7		122.0	2.3	7.4	16.2	
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				29.4	0.0	36.8		43.6	29.0	59.6	15.8	
Incremental Delay *(d_2)*, s/veh	0.0			0.1	0.0	2.5	0.0	506.4	0.6	2.5	1.6	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				29.5	0.0	39.4		550.0	29.7	62.1	17.4	
Level of Service (LOS)				C		D		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	497.7		F	25.6		C
Intersection Delay s/veh / LOS	209.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.1	B	2.4	B

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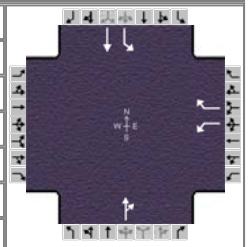
2010 HCS Signalized Intersection Results Summary

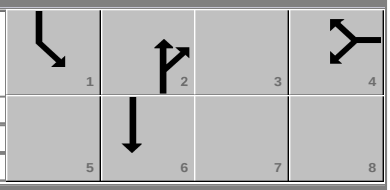
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 2+3				



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		895	100	100	1090	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1106	111	0	1267
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1830	1774	0	1848
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			928	140		1159
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.191	0.791	0.000	1.093
Available Capacity (c_a), veh/h				520	0	462			928	374		1159
Back of Queue *(Q)*, veh/ln				2.9		3.0			112.5	3.9		67.9
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				37.3	0.0	37.7			23.8	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	345.3	2.0	0.0	168.7
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				37.6	0.0	38.0			369.1	65.3		180.8
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	369.1		F	171.5		F
Intersection Delay s/veh / LOS	241.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.5	B	2.8	C

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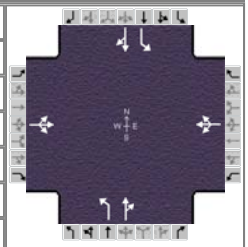
2010 HCS Signalized Intersection Results Summary

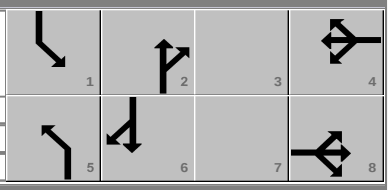
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 2+3				



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	10	60	45	10	120	90	875	30	50	1085	50

Signal Information			
Cycle, s	140.0	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	5.8	4.1	90.1	22.7	0.0	0.0
Yellow	4.3	0.0	4.3	3.1	0.0	0.0
Red	2.0	0.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	27.4	27.4	27.4	27.4	16.2	100.6	12.1	96.4
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	16.3	16.3	21.4	21.4	9.8		6.3	
Green Extension Time (g_e), s	1.3	1.3	1.2	1.2	0.3	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.88	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	194	0	0	100	0	1006	56	0	1261
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1081	0	0	1347	0	0	1774	0	1852	1774	0	1848
Queue Service time (g_s), s	0.0	0.0	0.0	5.2	0.0	0.0	7.8	0.0	29.6	4.3	0.0	90.1
Cycle Queue Clearance Time (g_c), s	14.3	0.0	0.0	19.4	0.0	0.0	7.8	0.0	29.6	4.3	0.0	90.1
Capacity *(c)*, veh/h	210			251			125		1247	73		1190
Volume-to-Capacity Ratio *(X)*	0.582	0.000	0.000	0.776	0.000	0.000	0.798	0.000	0.807	0.762	0.000	1.060
Available Capacity (c_a), veh/h	399			463			705		1247	705		1190
Back of Queue *(Q)*, veh/ln	4.2			7.0			3.5		4.0	2.0		45.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	54.3			56.8			64.1		4.1	66.4		10.6
Incremental Delay (d_2), s/veh	2.6	0.0	0.0	5.3	0.0	0.0	1.1	0.0	0.5	1.5	0.0	110.2
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	56.9			62.1			65.2		4.7	68.0		120.8
Level of Service (LOS)	E			E			E		A	E		F
Approach Delay, s/veh / LOS	56.9	E		62.1	E		10.1	B		118.6	F	
Intersection Delay s/veh / LOS	68.0						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.3	B	2.7	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2+3
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1295	50	60	1280	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1438	55	66	1422	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		450		26				
v/c		0.15		4.65				
95% queue length		0.51		14.92				
Control Delay		14.4		1948				
LOS		B		F				
Approach Delay				1948				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2+3
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1115	100	100	780	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1238	111	111	866	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	706	510	9		199	5		327
v/c	0.05	0.22	4.89		0.50	11.00		0.03
95% queue length	0.15	0.82	6.80		2.52	8.64		0.10
Control Delay	10.3	14.0	2563		40.1	5912		16.4
LOS	B	B	F		E	F		C
Approach Delay				810.9			4929	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2+3
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	255	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	283	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

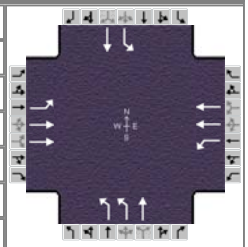
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	90	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	100	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	283		133			66	
C(m) (vph)	932	766		63			64	
v/c	0.01	0.37		2.11			1.03	
95% queue length	0.04	1.71		12.68			5.10	
Control Delay	8.9	12.4		653.9			230.0	
LOS	A	B		F			F	
Approach Delay				653.9			230.0	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

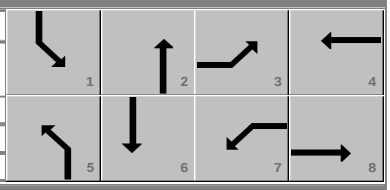
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 2+3				



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	230		200	340		860	390		70	270	

Signal Information			
Cycle, s	140.0	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	32.7	33.3	3.5	9.7	14.8
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	21.3	26.4	37.6	52.8	78.2	14.1	39.4
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	2.9	11.7	19.2	15.0	36.2		8.1	
Green Extension Time (g_e), s	0.0	3.1	0.6	3.3	10.6	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.95	
Max Out Probability	0.00	0.00	0.03	0.00	0.11		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	256	0	222	378	0	956	433	0	78	300	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	0.9	9.7	0.0	17.2	13.0	0.0	34.2	14.9	0.0	6.1	20.5	0.0
Cycle Queue Clearance Time (g_c), s	0.9	9.7	0.0	17.2	13.0	0.0	34.2	14.9	0.0	6.1	20.5	0.0
Capacity (*c*), veh/h	44	375		251	789		1150	956		101	441	
Volume-to-Capacity Ratio (*X*)	0.250	0.682	0.000	0.884	0.479	0.000	0.831	0.453	0.000	0.770	0.681	0.000
Available Capacity (c_a), veh/h	380	850		380	1264		1655	956		852	441	
Back of Queue (*Q*), veh/ln	0.5	4.4		8.9	5.7		12.8	5.1		3.1	10.4	
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	67.0	60.3		58.9	47.4		35.3	13.1		65.1	48.6	
Incremental Delay (d_2), s/veh	6.2	2.7	0.0	19.2	0.5	0.0	0.4	0.1	0.0	15.0	8.6	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	73.2	63.0		78.1	47.9		35.7	13.2		80.1	57.2	
Level of Service (LOS)	E	E		E	D		D	B		F	E	
Approach Delay, s/veh / LOS	63.4	E		59.1	E		28.7	C		61.9	E	
Intersection Delay s/veh / LOS	43.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.8	C	1.1	A

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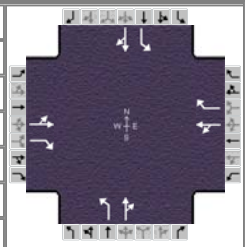
2010 HCS Signalized Intersection Results Summary

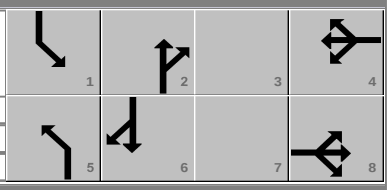
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 2+3				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	935	200	60	700	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1261	67	0	800
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1805	1774	0	1853
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Capacity *(c)*, veh/h	52		530	48		530	185		870	86		790
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.449	0.773	0.000	1.013
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		870	384		790
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		219.1	2.3		29.6
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	66.8		33.5	70.0		33.7	61.5		27.0	65.8		30.5
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	808.5	1.4	0.0	34.0
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	4858.1		33.7	9652.8		34.0	62.9		835.4	67.2		64.5
Level of Service (LOS)	F		C	F		C	E		F	E		F
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		750.6	F		64.7	E	
Intersection Delay s/veh / LOS	1632.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.8	C	1.9	A

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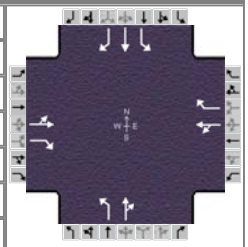
2010 HCS Signalized Intersection Results Summary

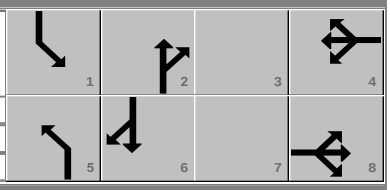
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 2+3				



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	40	300	50	50	190	350	905	40	150	770	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	111	0	211	389	0	1050	167	856	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1849	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Capacity *(c)*, veh/h	49		515	65		515	390		793	194	593	503
Volume-to-Capacity Ratio *(X)*	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.000	1.324	0.858	1.442	0.508
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		793	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	26.4		5.7	16.0		150.8	6.0	150.0	7.2
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	70.0		40.3	51.8		36.7	54.5		30.4	61.3	40.3	38.8
Incremental Delay *(d_2)*, s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.0	583.6	5.6	799.8	1.7
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	13519.0		43.3	1383.5		37.3	78.7		613.9	66.8	840.0	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		469.3	F		579.3	F	
Intersection Delay s/veh / LOS	1889.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	2.9	C	2.6	B

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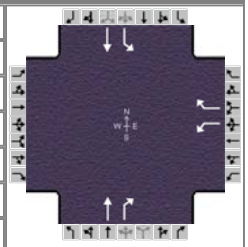
ALTERNATIVE 2A-1 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

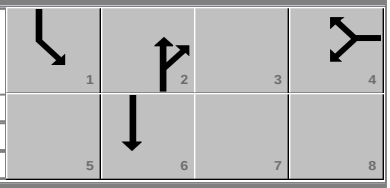
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				40		310		580	130	230	730	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	644	144	256	811	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	49.4	9.4	22.8	31.4	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	49.4	9.4	22.8	31.4	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.830	0.220	0.929	0.716	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		24.4	3.7	10.6	7.2	
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				38.1	0.0	47.5		41.6	30.0	66.7	8.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	10.9	0.8	6.3	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				38.2	0.0	51.6		52.5	30.7	73.0	9.3	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	48.5		D	24.5		C
Intersection Delay s/veh / LOS	37.4						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	2.2	B

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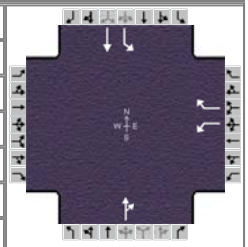
2010 HCS Signalized Intersection Results Summary

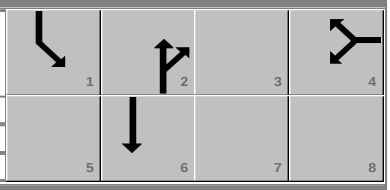
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				100		100		695	100	100	820	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	883	111	0	967
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1822	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	57.3	9.9	0.0	30.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	57.3	9.9	0.0	30.9
Capacity *(c)*, veh/h				455	0	405			1022	137		1242
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.865	0.810	0.000	0.778
Available Capacity (c_a), veh/h				455	0	405			1022	327		1242
Back of Queue *(Q)*, veh/ln				3.6		3.6			18.4	4.5		4.7
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				47.2	0.0	47.6			17.6	72.7		4.8
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	1.0	2.3	0.0	0.5
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				47.5	0.0	48.0			18.6	75.0		5.2
Level of Service (LOS)				D		D			B	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	18.6		B	12.4		B
Intersection Delay s/veh / LOS	18.5						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.1	B	2.3	B

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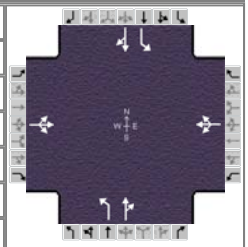
2010 HCS Signalized Intersection Results Summary

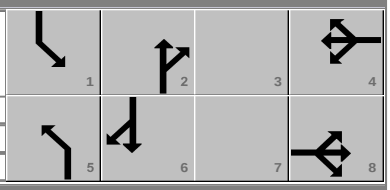
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	0	20	90	0	130	20	770	120	190	810	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	0	989	211	0	922
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	0	1819	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	34.9
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	34.9
Capacity *(c)*, veh/h	317			291			42		969	235		1190
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.021	0.897	0.000	0.775
Available Capacity (c_a), veh/h	390			365			355		969	355		1190
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9		40.9	8.5		6.2
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	48.8			60.2			77.2		25.1	68.3		6.9
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	44.6	2.2	0.0	0.5
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	49.0			75.0			78.2		69.7	70.5		7.4
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		69.9	E		19.1	B	
Intersection Delay s/veh / LOS	46.4						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.2	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2C-1
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		725	95	165	955	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		805	105	183	1061	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25		25			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	27		27			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		183		54				
C(m) (vph)		748		59				
v/c		0.24		0.92				
95% queue length		0.96		4.20				
Control Delay		11.4		206.6				
LOS		B		F				
Approach Delay				206.6				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2C-1
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	690	40	80	1100	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	766	44	88	1222	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	538	816	26		391	23		209
v/c	0.02	0.11	1.27		0.11	0.48		0.05
95% queue length	0.06	0.36	3.98		0.38	1.42		0.17
Control Delay	11.8	9.9	491.7		15.4	262.0		23.2
LOS	B	A	F		C	F		C
Approach Delay				219.5			142.6	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 2C-1
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	580	120	270	470	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	644	133	300	522	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

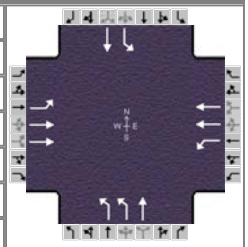
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	80	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	88	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	300		99			11	
C(m) (vph)	1035	839		204			550	
v/c	0.01	0.36		0.49			0.02	
95% queue length	0.03	1.63		2.39			0.06	
Control Delay	8.5	11.7		38.2			11.7	
LOS	A	B		E			B	
Approach Delay				38.2			11.7	
Approach LOS				E			B	

2010 HCS Signalized Intersection Results Summary

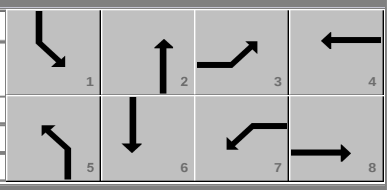
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	590		95	220		390	150		260	370	

Signal Information			
Cycle, s	160.0	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	25.4	3.4	59.9	3.9	1.1	34.1
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	2.0	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	40.6	18.2	48.3	31.5	66.2	35.0	69.7
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(gs)*, s	3.0	30.5	11.4	10.7	21.1		27.5	
Green Extension Time *(ge)*, s	0.0	3.6	0.3	5.1	4.4	0.0	1.3	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.24	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	656	0	106	244	0	433	167	0	289	411	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(gs)*, s	1.0	28.5	0.0	9.4	8.7	0.0	19.1	8.1	0.0	25.5	27.4	0.0
Cycle Queue Clearance Time *(gc)*, s	1.0	28.5	0.0	9.4	8.7	0.0	19.1	8.1	0.0	25.5	27.4	0.0
Capacity *(c)*, veh/h	43	756		129	927		547	698		320	738	
Volume-to-Capacity Ratio *(X)*	0.257	0.867	0.000	0.820	0.264	0.000	0.792	0.239	0.000	0.903	0.557	0.000
Available Capacity *(ca)*, veh/h	333	926		333	1097		1533	698		789	738	
Back of Queue *(Q)*, veh/ln	0.5	13.5		4.8	3.9		7.9	3.5		12.5	12.9	
Overflow Queue *(Q3)*, 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 *(d1)*, s/veh	76.6	60.8		73.2	46.9		60.5	27.1		64.2	37.4	
Incremental Delay *(d2)*, s/veh	6.6	8.5	0.0	15.9	0.2	0.0	0.5	0.1	0.0	12.7	3.1	0.0
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	83.3	69.3		89.0	47.1		61.1	27.2		76.9	40.5	
Level of Service (LOS)	F	E		F	D		E	C		E	D	
Approach Delay, s/veh / LOS	69.5	E		59.7	E		51.6	D		55.5	E	
Intersection Delay s/veh / LOS	59.2						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	0.8	A	1.5	A	1.6	A

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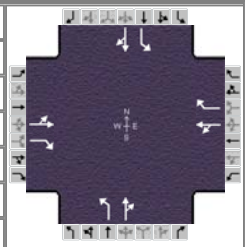
2010 HCS Signalized Intersection Results Summary

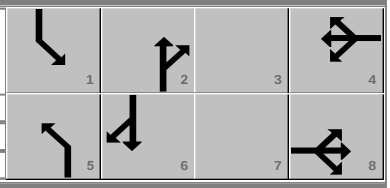
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	10	40	240	10	110	50	530	190	150	840	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	800	167	0	944
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1778	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		748	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	1.069	0.886	0.000	1.045
Available Capacity (c_a), veh/h	49		562	44		562	225		748	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		52.8	6.9		49.3
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	60.3		34.1	80.0		35.9	76.0		38.1	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	127.5	3.9	0.0	84.7
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	97.1		34.2	9659.6		36.1	78.3		165.6	74.4		112.9
Level of Service (LOS)	F		C	F		D	E		F	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		160.0	F		107.2	F	
Intersection Delay s/veh / LOS	1206.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.3	B

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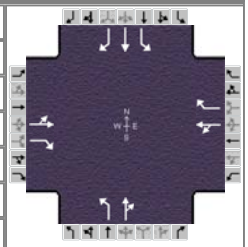
2010 HCS Signalized Intersection Results Summary

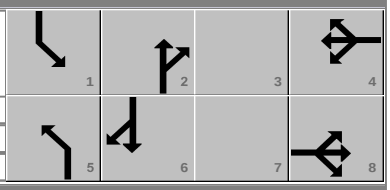
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	30	90	40	10	80	150	550	30	130	960	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	644	144	1067	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1846	1774	1863	1579
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	38.9	12.8	73.8	9.4
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	38.9	12.8	73.8	9.4
Capacity *(c)*, veh/h	56		495	54		495	190		875	168	859	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.737	0.860	1.241	0.214
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		875	308	859	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		14.5	6.1	132.5	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	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	72.1		40.3	74.5		40.0	70.4		23.2	71.4	30.8	25.8
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.5	6.5	439.5	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0		23.7	77.9	470.3	26.1
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.6	C		378.3	F	
Intersection Delay s/veh / LOS	332.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.8	A	2.7	B

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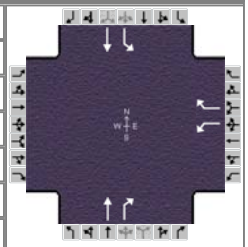
ALTERNATIVE 2A-1 PM

HCS ANALYSIS

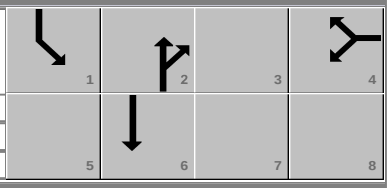
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.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				44		243		640	66	140	620	

Signal Information													
Cycle, s	140.0	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	No	Simult. Gap E/W	On	Green	14.4	57.1	51.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.3	4.3	3.0	0.0	0.0	0.0			
				Red	1.5	1.8	2.6	0.0	0.0	0.0			



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	119.8	20.2	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			14.1	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			49	0	270	0	711	73	156	689	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.5	51.0	18.4	0.0	51.2	4.0	12.1	26.9	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.5	51.0	18.4	0.0	51.2	4.0	12.1	26.9	0.0
Capacity *(c)*, veh/h				646	0	575		760	644	182	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.076	0.000	0.470	0.000	0.936	0.114	0.853	0.670	0.000
Available Capacity (c_a), veh/h				646	0	575		760	644	322	1029	
Back of Queue *(Q)*, veh/ln				1.1		7.2		28.3	1.6	5.4	7.6	
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				29.1	0.0	34.1		39.7	25.7	61.8	11.8	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	0.7	0.0	27.9	0.4	1.2	0.3	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				29.2	0.0	34.8		67.6	26.1	63.0	12.1	
Level of Service (LOS)				C		C		E	C	E	B	
Approach Delay, s/veh / LOS	0.0			34.0		C	63.7		E	21.5		C
Intersection Delay s/veh / LOS	40.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	1.9	A

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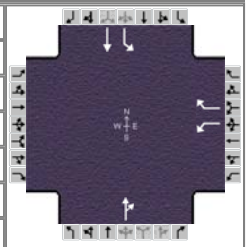
2010 HCS Signalized Intersection Results Summary

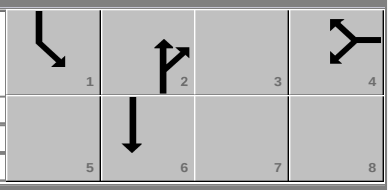
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				100		100		1110	100	100	1155	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1344	111	0	1339
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1835	1774	0	1849
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			931	140		1160
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.444	0.791	0.000	1.155
Available Capacity (c_a), veh/h				520	0	462			931	374		1160
Back of Queue *(Q)*, veh/ln				2.9		3.0			230.2	3.9		103.5
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				37.3	0.0	37.7			23.6	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	799.8	2.0	0.0	279.4
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				37.6	0.0	38.0			823.5	65.3		291.5
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	823.5		F	274.2		F
Intersection Delay s/veh / LOS	501.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.9	C	2.9	C

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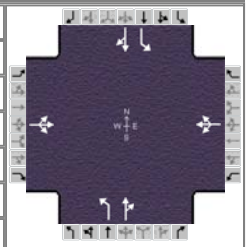
2010 HCS Signalized Intersection Results Summary

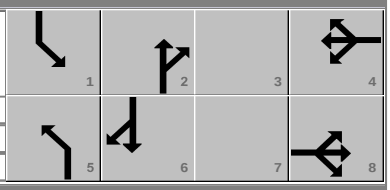
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	10	60	90	10	90	90	1020	60	90	1105	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	122	0	0	211	0	0	100	0	1200	100	0	1283
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1327	0	0	1093	0	0	1774	0	1844	1774	0	1848
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity (*c*), veh/h	314			268			125		1099	125		1101
Volume-to-Capacity Ratio (*X*)	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.092	0.799	0.000	1.166
Available Capacity (c_a), veh/h	450			396			619		1099	619		1101
Back of Queue (*Q*), veh/ln	3.9			8.2			3.5		70.2	3.5		110.2
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	47.4			53.3			64.1		15.2	64.1		15.0
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	168.0	1.1	0.0	299.3
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	0.0	0.0	0.0
Control Delay (*d*), s/veh	48.2			59.9			65.2		183.2	65.2		314.3
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		174.1	F		296.3	F	
Intersection Delay s/veh / LOS	217.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.6	B	2.8	C

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2C-1
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	25	30	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	27	33	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25		30			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	27		33			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		33		60				
C(m) (vph)		474		30				
v/c		0.07		2.00				
95% queue length		0.22		6.98				
Control Delay		13.2		748.3				
LOS		B		F				
Approach Delay				748.3				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2C-1
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1055	100	100	790	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1172	111	111	877	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	699	541	12		217	6		323
v/c	0.05	0.21	3.67		0.46	9.17		0.03
95% queue length	0.15	0.76	6.53		2.23	8.54		0.11
Control Delay	10.4	13.4	1830		35.0+	4861		16.5
LOS	B	B	F		E	F		C
Approach Delay				583.4			4054	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 2C-1
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	685	90	290	565	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	761	100	322	627	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

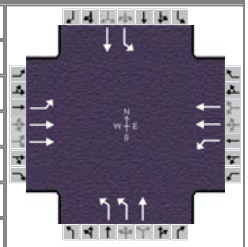
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	185	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	205	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	322		238			66	
C(m) (vph)	946	781		91			42	
v/c	0.01	0.41		2.62			1.57	
95% queue length	0.04	2.03		22.37			6.70	
Control Delay	8.9	12.8		830.7			497.0	
LOS	A	B		F			F	
Approach Delay				830.7			497.0	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

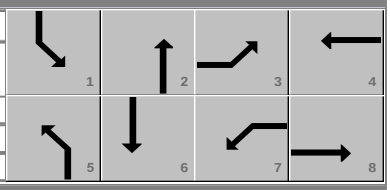
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	220		200	360		840	370		70	270	

Signal Information			
Cycle, s	140.0	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	31.8	34.6	3.5	9.7	14.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	20.9	26.4	37.3	51.9	78.5	14.1	40.7
Change Period, $(Y+R_c)$, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	2.9	11.3	19.2	15.9	35.5		8.1	
Green Extension Time (g_e), s	0.0	3.1	0.6	3.4	10.4	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.95	
Max Out Probability	0.00	0.00	0.03	0.00	0.09		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	244	0	222	400	0	933	411	0	78	300	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	0.9	9.3	0.0	17.2	13.9	0.0	33.5	13.7	0.0	6.1	20.3	0.0
Cycle Queue Clearance Time (g_c), s	0.9	9.3	0.0	17.2	13.9	0.0	33.5	13.7	0.0	6.1	20.3	0.0
Capacity *(c)*, veh/h	44	366		251	780		1128	961		101	457	
Volume-to-Capacity Ratio *(X)*	0.250	0.668	0.000	0.884	0.513	0.000	0.828	0.428	0.000	0.770	0.656	0.000
Available Capacity (c_a), veh/h	380	850		380	1264		1664	961		857	457	
Back of Queue *(Q)*, veh/ln	0.5	4.2		8.9	6.1		12.6	4.7		3.1	10.2	
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	67.0	60.5		58.9	48.0		36.0	12.7		65.1	47.5	
Incremental Delay (d_2), s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.4	0.1	0.0	15.0	7.4	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.0		78.1	48.7		36.3	12.8		80.1	54.9	
Level of Service (LOS)	E	E		E	D		D	B		F	D	
Approach Delay, s/veh / LOS	63.5	E		59.2	E		29.1	C		60.1	E	
Intersection Delay s/veh / LOS	44.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.7	B	1.1	A

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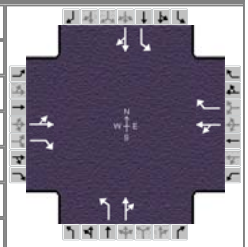
2010 HCS Signalized Intersection Results Summary

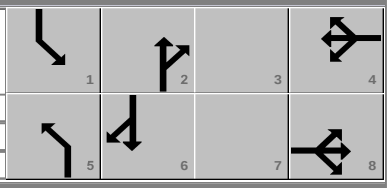
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	880	200	60	710	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1200	67	0	811
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1803	1774	0	1854
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Capacity *(c)*, veh/h	52		530	48		530	185		869	86		790
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.381	0.773	0.000	1.027
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		869	384		790
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		189.2	2.3		34.3
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	66.8		33.5	70.0		33.7	61.5		27.1	65.8		30.5
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	686.0	1.4	0.0	55.1
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	4858.1		33.7	9652.8		34.0	62.9		713.1	67.2		85.6
Level of Service (LOS)	F		C	F		C	E		F	E		F
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		638.5	F		84.2	F	
Intersection Delay s/veh / LOS	1599.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.7	B	1.9	A

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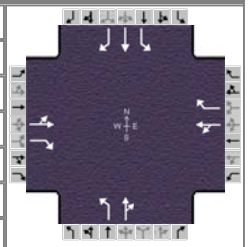
2010 HCS Signalized Intersection Results Summary

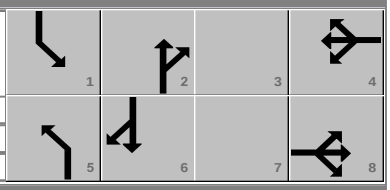
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	330	40	300	50	50	190	350	855	40	150	780	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	111	0	211	389	0	994	167	867	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1848	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Capacity *(c)*, veh/h	49		515	65		515	390		793	194	593	503
Volume-to-Capacity Ratio *(X)*	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.000	1.254	0.858	1.460	0.508
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		793	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	26.4		5.7	16.0		123.3	6.0	155.5	7.2
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	70.0		40.3	51.8		36.7	54.5		30.4	61.3	40.3	38.8
Incremental Delay *(d_2)*, s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.0	458.6	5.6	833.3	1.7
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	13519.0		43.3	1383.5		37.3	78.7		489.0	66.8	873.6	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		373.7	F		604.1	F	
Intersection Delay s/veh / LOS	1880.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	2.8	C	2.6	B

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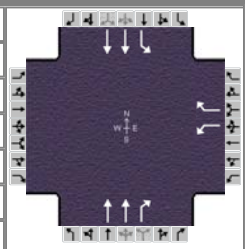
ALTERNATIVE 4 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

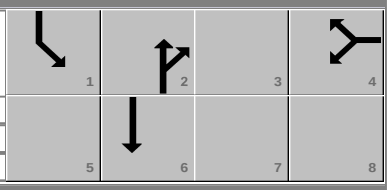
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 4				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1773	1579	1774	1773	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	25.0	9.4	22.8	10.5	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	25.0	9.4	22.8	10.5	0.0
Capacity *(c)*, veh/h				565	0	503		1478	658	275	2157	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.507	0.220	0.929	0.389	0.000
Available Capacity (c_a), veh/h				565	0	503		1478	658	282	2157	
Back of Queue *(Q)*, veh/ln				1.2		12.5		10.9	3.7	10.6	3.2	
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				38.1	0.0	47.5		34.5	30.0	66.7	6.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	1.3	0.8	6.3	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
Control Delay *(d)*, s/veh				38.2	0.0	51.6		35.8	30.7	73.0	7.0	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	34.9		C	22.4		C
Intersection Delay s/veh / LOS	31.6						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.2	A	1.4	A

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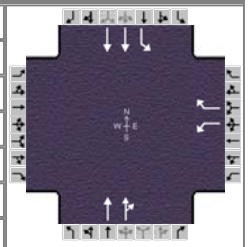
2010 HCS Signalized Intersection Results Summary

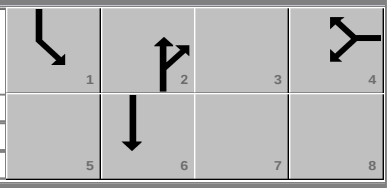
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 4				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	502	482	111	490	505
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1788	1774	1773	1827
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	17.0	19.2	9.9	7.1	8.7
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	17.0	19.2	9.9	7.1	8.7
Capacity *(c)*, veh/h				455	0	405		1045	1003	137	1195	1231
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.480	0.480	0.810	0.410	0.410
Available Capacity (c_a), veh/h				455	0	405		1045	1003	327	1195	1231
Back of Queue *(Q)*, veh/ln				3.6		3.6		5.5	6.4	4.5	1.9	2.4
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				47.2	0.0	47.6		11.0	13.2	72.7	3.0	3.8
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.1	0.1	2.3	0.1	0.1
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				47.5	0.0	48.0		11.1	13.4	75.0	3.1	3.9
Level of Service (LOS)				D		D		B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			47.8		D	12.2		B	10.7		B
Intersection Delay s/veh / LOS	14.9						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	1.4	A	1.4	A

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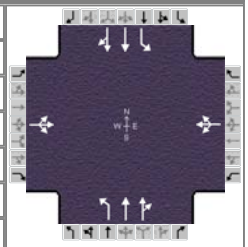
2010 HCS Signalized Intersection Results Summary

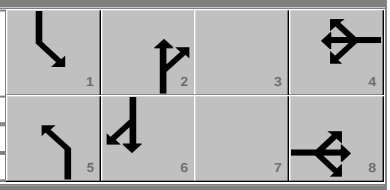
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 4				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	559	535	211	477	473
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	1863	1783	1774	1863	1847
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	23.2	25.7	18.7	9.0	9.5
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	23.2	25.7	18.7	9.0	9.5
Capacity (*c*), veh/h	317			291			42	992	950	235	1195	1185
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.563	0.564	0.897	0.399	0.399
Available Capacity (c_a), veh/h	390			365			355	992	950	355	1195	1185
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9	7.6	9.0	8.5	2.7	2.9
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	48.8			60.2			77.2	14.2	16.8	68.3	4.8	5.2
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.2	0.2	2.2	0.1	0.1
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	49.0			75.0			78.2	14.4	17.0	70.5	4.9	5.3
Level of Service (LOS)	D			E			E	B	B	E	A	A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		16.9	B		17.0	B	
Intersection Delay s/veh / LOS	22.9						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	1.4	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: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0	1	2	
Configuration		T	TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes		0	0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		755		272				
v/c		0.34		1.43				
95% queue length		1.49		21.32				
Control Delay		12.2		247.2				
LOS		B		F				
Approach Delay				247.2				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

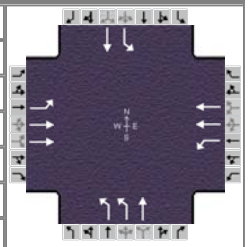
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

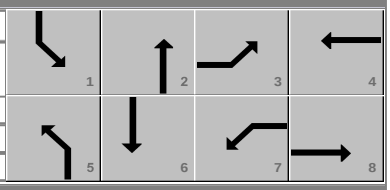
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 4				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time *(g_e)*, s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity *(c)*, veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio *(X)*	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue *(Q)*, veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay *(d_2)*, s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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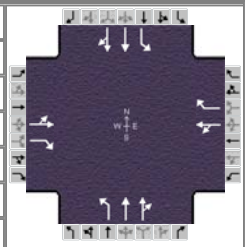
2010 HCS Signalized Intersection Results Summary

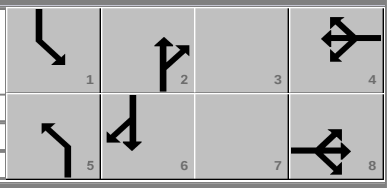
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 4				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	432	395	167	565	563
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	1863	1699	1774	1863	1856
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	23.6	26.2	14.8	28.6	28.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	23.6	26.2	14.8	28.6	28.8
Capacity *(c)*, veh/h	49		562	44		562	72	784	715	188	906	903
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.552	0.553	0.886	0.624	0.624
Available Capacity (c_a), veh/h	49		562	44		562	225	784	715	225	906	903
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3	9.3	10.2	6.9	10.4	10.5
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	60.3		34.1	80.0		35.9	76.0	25.5	30.5	70.6	19.5	19.7
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.3	0.3	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	97.1		34.2	9659.6		36.1	78.3	25.8	30.8	74.4	19.8	20.0
Level of Service (LOS)	F		C	F		D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		31.3	C		26.9	C	
Intersection Delay s/veh / LOS	1037.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.2	A	1.6	A

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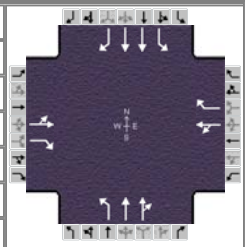
2010 HCS Signalized Intersection Results Summary

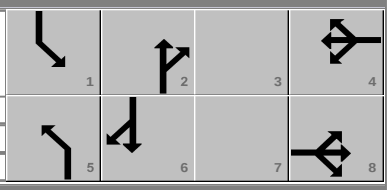
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Alternative 4	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 4				



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	30	100	40	10	80	160	565	30	130	1065	200

Signal Information			
Cycle, s	160.0	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	15.1	3.0	68.9	54.3	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	60.8	60.8	60.8	60.8	24.2	78.0	21.2	75.0
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	55.2	55.2	55.2	55.2	17.8		14.8	
Green Extension Time (g_e), s	0.1	0.1	0.1	0.1	0.2	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.33		0.02	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	133	0	111	56	0	89	178	333	328	144	1183	222
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	45	0	1579	37	0	1579	1774	1863	1829	1774	1773	1579
Queue Service time (g_s), s	1.3	0.0	8.1	1.3	0.0	6.4	15.8	14.8	15.3	12.8	40.3	14.8
Cycle Queue Clearance Time (g_c), s	53.2	0.0	8.1	53.2	0.0	6.4	15.8	14.8	15.3	12.8	40.3	14.8
Capacity *(c)*, veh/h	54		525	53		525	201	847	832	167	1546	688
Volume-to-Capacity Ratio *(X)*	2.461	0.000	0.212	1.052	0.000	0.169	0.886	0.393	0.394	0.863	0.765	0.323
Available Capacity (c_a), veh/h	68		550	65		550	271	847	832	271	1546	688
Back of Queue *(Q)*, veh/ln	42.6		3.2	6.2		2.5	7.2	5.7	5.9	6.2	15.1	5.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	72.3		38.3	74.1		37.7	69.9	20.1	21.0	71.4	27.3	29.6
Incremental Delay (d_2), s/veh	2684.3	0.0	0.2	275.5	0.0	0.2	2.9	0.1	0.1	8.2	1.8	0.6
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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2756.7		38.6	349.6		37.9	72.8	20.2	21.1	79.7	29.1	30.2
Level of Service (LOS)	F		D	F		D	E	C	C	E	C	C
Approach Delay, s/veh / LOS	1521.2	F		157.8	F		31.7	C		34.0	C	
Intersection Delay s/veh / LOS	170.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.2	A	1.8	A

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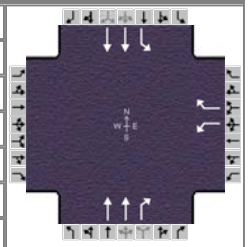
ALTERNATIVE 4 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

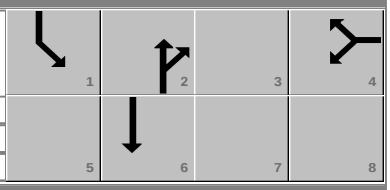
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 4				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		905	90	190	890	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.4	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	1006	100	211	989	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1773	1579	1774	1773	0
Queue Service time (g_s), s	0.0			3.5	51.0	26.9	0.0	34.5	5.9	16.4	16.4	0.0
Cycle Queue Clearance Time (g_c), s	0.0			3.5	51.0	26.9	0.0	34.5	5.9	16.4	16.4	0.0
Capacity *(c)*, veh/h				646	0	575		1336	595	238	1958	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	0.753	0.168	0.888	0.505	0.000
Available Capacity (c_a), veh/h				646	0	575		1336	595	322	1958	
Back of Queue *(Q)*, veh/ln				1.5		10.7		15.3	2.3	7.4	4.9	
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				29.4	0.0	36.8		38.0	29.0	59.6	10.4	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	2.5	0.0	4.1	0.6	2.5	0.1	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				29.5	0.0	39.4		42.0	29.7	62.1	10.5	
Level of Service (LOS)				C		D		D	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	40.9		D	19.6		B
Intersection Delay s/veh / LOS	31.1						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.4	A	1.5	A

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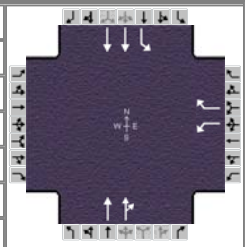
2010 HCS Signalized Intersection Results Summary

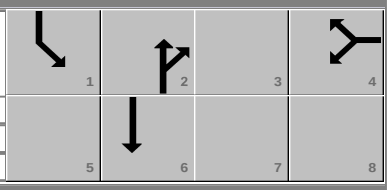
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 4				



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		1135	100	100	1180	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	694	678	111	671	696
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1809	1774	1773	1836
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	33.6	35.4	8.6	17.5	19.0
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	33.6	35.4	8.6	17.5	19.0
Capacity *(c)*, veh/h				520	0	462		945	918	140	1112	1152
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.735	0.738	0.791	0.603	0.604
Available Capacity (c_a), veh/h				520	0	462		945	918	374	1112	1152
Back of Queue *(Q)*, veh/ln				2.9		3.0		10.9	12.0	3.9	3.9	4.6
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				37.3	0.0	37.7		16.6	18.3	63.3	5.7	6.4
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.5	0.5	2.0	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
Control Delay *(d)*, s/veh				37.6	0.0	38.0		17.1	18.8	65.3	5.9	6.6
Level of Service (LOS)				D		D		B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			37.8		D	17.9		B	10.7		B
Intersection Delay s/veh / LOS	15.9						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	1.7	A	1.7	A

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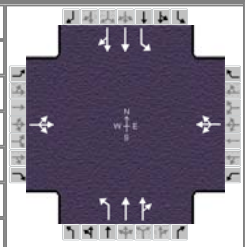
2010 HCS Signalized Intersection Results Summary

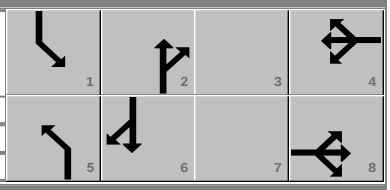
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 4				



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	10	60	90	10	90	90	1045	60	90	1130	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	619	608	100	660	651
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	1863	1827	1774	1863	1835
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	17.2	18.7	7.8	19.3	20.6
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	17.2	18.7	7.8	19.3	20.6
Capacity *(c)*, veh/h	314			268			125	1110	1088	125	1110	1093
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.558	0.559	0.799	0.595	0.596
Available Capacity (c_a), veh/h	450			396			619	1110	1088	619	1110	1093
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5	4.7	5.2	3.5	5.0	5.5
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	47.4			53.3			64.1	7.6	8.6	64.1	7.8	8.6
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.2	0.2	1.1	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	48.2			59.9			65.2	7.8	8.8	65.2	8.0	8.8
Level of Service (LOS)	D			E			E	A	A	E	A	A
Approach Delay, s/veh / LOS	48.2	D		59.9	E		12.6	B		12.4	B	
Intersection Delay s/veh / LOS	17.2						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	1.6	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: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0	1	2	
Configuration		T	TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No	/		/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		459		57				
v/c		0.14		2.12				
95% queue length		0.50		11.83				
Control Delay		14.2		673.1				
LOS		B		F				
Approach Delay				673.1				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 4
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

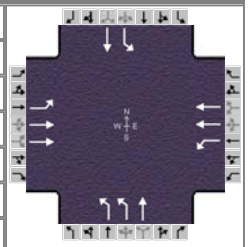
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

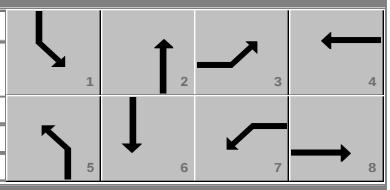
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 4				



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	200		200	340		860	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	33.4	34.6	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	53.0	80.2	13.5	40.7
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	36.1		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	10.7	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.09		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	956	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Capacity *(c)*, veh/h	44	339		251	753		1153	983		94	458	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.829	0.430	0.000	0.711	0.680	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	458	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		12.8	4.6		2.6	10.7	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	67.0	61.1		58.9	48.6		35.2	11.8		65.2	47.8	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.4	0.1	0.0	12.0	8.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.7		78.1	49.2		35.6	11.9		77.3	56.0	
Level of Service (LOS)	E	E		E	D		D	B		E	E	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		28.3	C		59.8	E	
Intersection Delay s/veh / LOS	43.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.8	C	1.1	A

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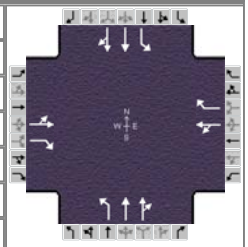
2010 HCS Signalized Intersection Results Summary

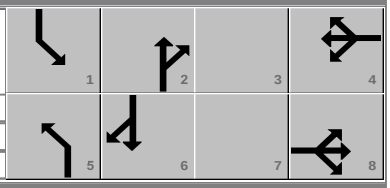
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 4				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	905	200	60	740	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	633	595	67	424	420
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	1863	1745	1774	1863	1845
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	31.0	33.9	5.2	19.8	20.0
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	31.0	33.9	5.2	19.8	20.0
Capacity *(c)*, veh/h	52		530	48		530	185	898	842	86	794	786
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.704	0.707	0.773	0.534	0.534
Available Capacity *(c_a)*, veh/h	52		530	48		530	384	898	842	384	794	786
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4	10.7	12.2	2.3	7.4	7.5
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	66.8		33.5	70.0		33.7	61.5	18.5	22.2	65.8	21.6	22.0
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.4	0.5	1.4	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	4858.1		33.7	9652.8		34.0	62.9	18.9	22.7	67.2	21.8	22.3
Level of Service (LOS)	F		C	F		C	E	B	C	E	C	C
Approach Delay, s/veh / LOS	2962.8		F	6693.1		F	25.5		C	25.4		C
Intersection Delay s/veh / LOS	1276.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	1.6	A	1.2	A

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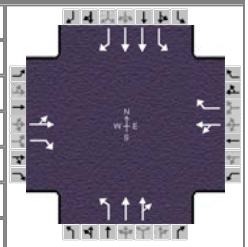
2010 HCS Signalized Intersection Results Summary

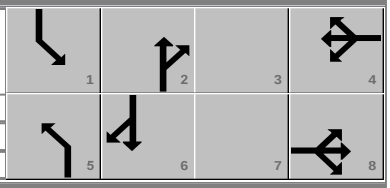
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 4				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	370	40	310	50	50	190	380	845	40	150	710	330

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.8		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	456	0	344	111	0	211	422	496	488	167	789	367
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	1863	1833	1774	1773	1579
Queue Service time *(g_s)*, s	0.0	0.0	26.3	0.0	0.0	14.6	30.8	24.7	25.1	12.9	25.5	28.9
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	26.3	45.7	0.0	14.6	30.8	24.7	25.1	12.9	25.5	28.9
Capacity *(c)*, veh/h	49		515	65		515	390	799	786	194	1130	503
Volume-to-Capacity Ratio *(X)*	9.310	0.000	0.668	1.705	0.000	0.410	1.082	0.620	0.620	0.858	0.698	0.729
Available Capacity *(c_a)*, veh/h	49		515	65		515	390	799	786	390	1130	503
Back of Queue *(Q)*, veh/ln	205.6		10.7	26.4		5.7	29.9	9.2	9.4	6.0	10.1	11.6
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	70.0		40.6	51.8		36.7	54.6	22.4	23.2	61.3	34.8	42.3
Incremental Delay *(d_2)*, s/veh	14998.9	0.0	3.6	1331.8	0.0	0.6	152.6	0.3	0.3	5.6	1.7	4.5
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	15068.9		44.2	1383.5		37.3	207.2	22.7	23.5	66.8	36.5	46.8
Level of Service (LOS)	F		D	F		D	F	C	C	E	D	D
Approach Delay, s/veh / LOS	8599.9	F		501.5	F		78.4	E		43.2	D	
Intersection Delay s/veh / LOS	1872.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.8	A	1.0	A	1.6	A	1.6	A

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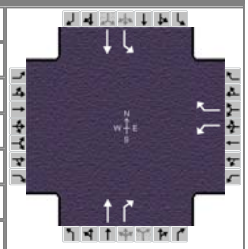
ALTERNATIVE 4C AM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

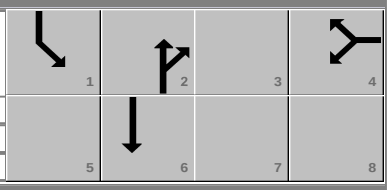
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Right Turns Alternative				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, *(Y+Rc)*, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time *(gs)*, s			53.0	53.0			24.8	
Green Extension Time *(ge)*, s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time *(gs)*, s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Cycle Queue Clearance Time *(gc)*, s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.966	0.220	0.929	0.741	0.000
Available Capacity *(ca)*, veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		36.7	3.7	10.6	7.8	
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				38.1	0.0	47.5		45.6	30.0	66.7	9.2	
Incremental Delay *(d2)*, s/veh	0.0			0.1	0.0	4.1	0.0	39.9	0.8	6.3	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				38.2	0.0	51.6		85.5	30.7	73.0	9.6	
Level of Service (LOS)				D		D		F	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	76.6		E	24.4		C
Intersection Delay s/veh / LOS	48.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.0	A	2.3	B

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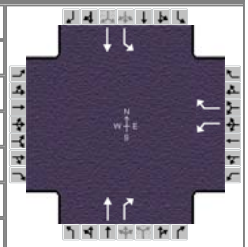
2010 HCS Signalized Intersection Results Summary

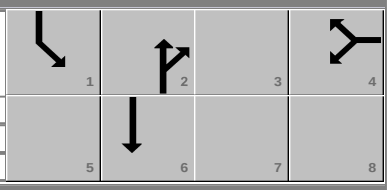
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Right Turns Alternative				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	872	111	111	0	994
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1533	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	50.3	5.5	9.9	0.0	33.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	50.3	5.5	9.9	0.0	33.9
Capacity *(c)*, veh/h				455	0	405		1045	860	137		1243
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.835	0.129	0.810	0.000	0.800
Available Capacity (c_a), veh/h				455	0	405		1045	860	327		1243
Back of Queue *(Q)*, veh/ln				3.6		3.6		15.2	1.9	4.5		4.9
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				47.2	0.0	47.6		15.2	16.6	72.7		4.9
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.8	0.0	2.3	0.0	0.5
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				47.5	0.0	48.0		16.0	16.7	75.0		5.4
Level of Service (LOS)				D		D		B	B	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	16.1		B	12.4		B
Intersection Delay s/veh / LOS	17.4						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.3	B

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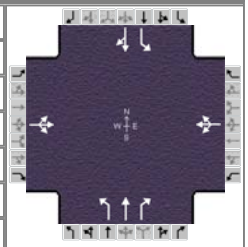
2010 HCS Signalized Intersection Results Summary

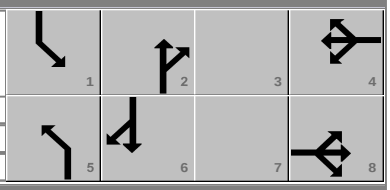
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Right Turns Alternative				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	3.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	961	133	211	0	950
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	1863	1533	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	76.7	7.1	18.7	0.0	38.1
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	76.7	7.1	18.7	0.0	38.1
Capacity *(c)*, veh/h	317			291			42	992	817	235		1190
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.969	0.163	0.897	0.000	0.798
Available Capacity (c_a), veh/h	390			365			355	992	817	355		1190
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9	26.3	2.5	8.5		6.4
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	48.8			60.2			77.2	22.0	19.1	68.3		7.1
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	4.7	0.0	2.2	0.0	0.5
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	49.0			75.0			78.2	26.6	19.2	70.5		7.7
Level of Service (LOS)	D			E			E	C	B	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		26.8	C		19.1	B	
Intersection Delay s/veh / LOS	28.2						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.3	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Right Turns Alternative
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?			No			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		759		194				
v/c		0.34		2.00				
95% queue length		1.48		29.23				
Control Delay		12.1		508.0				
LOS		B		F				
Approach Delay				508.0				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Right Turns Alternative
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	715	40	80	1235	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	794	44	88	1372	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?			No			No
Lanes	1	1	1	1	1	1
Configuration	L	T	R	L	T	R
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	472	796	19		388	18		179
v/c	0.02	0.11	1.74		0.11	0.61		0.06
95% queue length	0.07	0.37	4.50		0.38	1.64		0.19
Control Delay	12.8	10.1	779.3		15.5	367.8		26.4
LOS	B	B	F		C	F		D
Approach Delay				342.8			197.1	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period:
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?			No			
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal?		No			No	

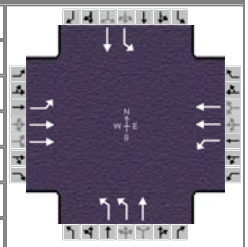
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		194			539	
v/c	0.01	0.40		0.57			0.02	
95% queue length	0.03	1.95		3.09			0.06	
Control Delay	8.6	12.7		45.8			11.8	
LOS	A	B		E			B	
Approach Delay				45.8			11.8	
Approach LOS				E			B	

2010 HCS Signalized Intersection Results Summary

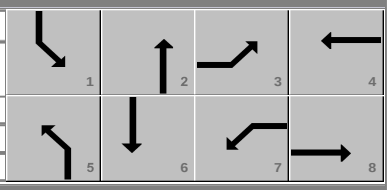
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Right Turns Alternative				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity (*c*), veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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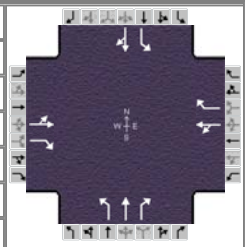
2010 HCS Signalized Intersection Results Summary

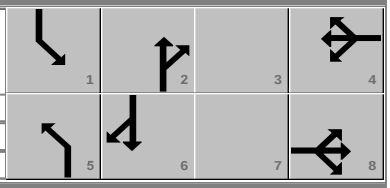
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Right Turns Alternative				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	3.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	617	211	167	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	1863	1533	1774	0	1859
Queue Service time *(g_s)*, s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	41.6	14.8	14.8	0.0	77.8
Cycle Queue Clearance Time *(g_c)*, s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	41.6	14.8	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72	784	645	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.787	0.327	0.886	0.000	1.247
Available Capacity *(c_a)*, veh/h	49		562	44		562	225	784	645	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3	16.5	5.5	6.9		140.0
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	60.3		34.1	80.0		35.9	76.0	29.5	31.1	70.6		28.3
Incremental Delay *(d_2)*, s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.8	0.1	3.9	0.0	445.9
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	97.1		34.2	9659.6		36.1	78.3	30.2	31.2	74.4		474.1
Level of Service (LOS)	F		C	F		D	E	C	C	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		33.5	C		422.7	F	
Intersection Delay s/veh / LOS	1231.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.6	B

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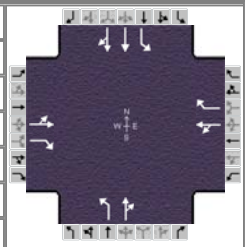
2010 HCS Signalized Intersection Results Summary

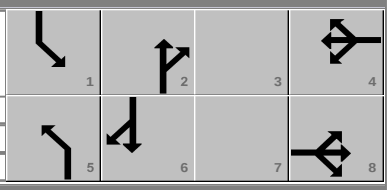
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Right Turns Alternative				



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	30	90	40	10	80	150	575	30	130	1125	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	672	144	714	692
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1846	1774	1863	1790
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	42.1	12.8	48.3	50.5
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	42.1	12.8	48.3	50.5
Capacity *(c)*, veh/h	56		495	54		495	190		875	168	859	826
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.768	0.860	0.831	0.837
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		875	308	859	826
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		15.7	6.1	19.2	20.2
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	72.1		40.3	74.5		40.0	70.4		23.7	71.4	25.9	28.7
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.6	6.5	4.8	5.2
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	2268.3		40.5	283.8		40.2	72.0		24.3	77.9	30.7	33.8
Level of Service (LOS)	F		D	F		D	E		C	E	C	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.8	C		36.5	D	
Intersection Delay s/veh / LOS	139.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.9	A	1.8	A

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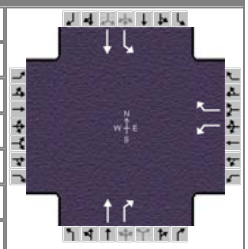
ALTERNATIVE 4C PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

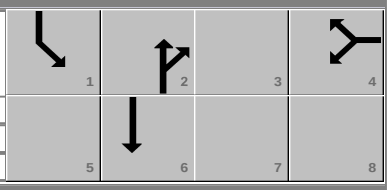
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Right Turns Alternative				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.966	0.220	0.929	0.741	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		36.7	3.7	10.6	7.8	
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				38.1	0.0	47.5		45.6	30.0	66.7	9.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	39.9	0.8	6.3	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				38.2	0.0	51.6		85.5	30.7	73.0	9.6	
Level of Service (LOS)				D		D		F	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	76.6		E	24.4		C
Intersection Delay s/veh / LOS	48.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.0	A	2.3	B

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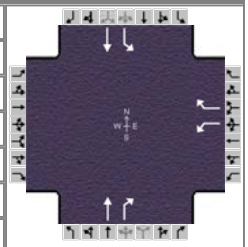
2010 HCS Signalized Intersection Results Summary

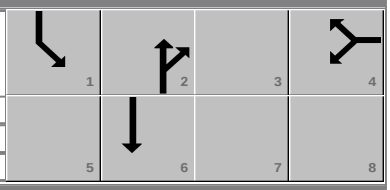
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Right Turns Alternative				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	872	111	111	0	994
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1533	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	50.3	5.5	9.9	0.0	33.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	50.3	5.5	9.9	0.0	33.9
Capacity *(c)*, veh/h				455	0	405		1045	860	137		1243
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.835	0.129	0.810	0.000	0.800
Available Capacity (c_a), veh/h				455	0	405		1045	860	327		1243
Back of Queue *(Q)*, veh/ln				3.6		3.6		15.2	1.9	4.5		4.9
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				47.2	0.0	47.6		15.2	16.6	72.7		4.9
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.8	0.0	2.3	0.0	0.5
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				47.5	0.0	48.0		16.0	16.7	75.0		5.4
Level of Service (LOS)				D		D		B	B	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	16.1		B	12.4		B
Intersection Delay s/veh / LOS	17.4						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.3	B

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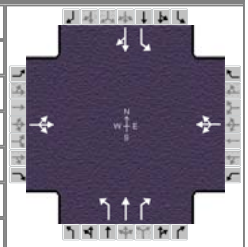
2010 HCS Signalized Intersection Results Summary

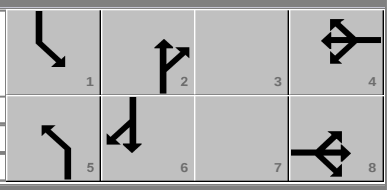
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Right Turns Alternative				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	3.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	961	133	211	0	950
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	1863	1533	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	76.7	7.1	18.7	0.0	38.1
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	76.7	7.1	18.7	0.0	38.1
Capacity (*c*), veh/h	317			291			42	992	817	235		1190
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.969	0.163	0.897	0.000	0.798
Available Capacity (c_a), veh/h	390			365			355	992	817	355		1190
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9	26.3	2.5	8.5		6.4
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	48.8			60.2			77.2	22.0	19.1	68.3		7.1
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	4.7	0.0	2.2	0.0	0.5
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	49.0			75.0			78.2	26.6	19.2	70.5		7.7
Level of Service (LOS)	D			E			E	C	B	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		26.8	C		19.1	B	
Intersection Delay s/veh / LOS	28.2						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.3	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Right Turns Alternative
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?			No			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		463		26				
v/c		0.14		4.65				
95% queue length		0.49		14.92				
Control Delay		14.1		1948				
LOS		B		F				
Approach Delay				1948				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Right Turns Alternative
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1085	100	100	820	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1205	111	111	911	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?			No			No
Lanes	1	1	1	1	1	1
Configuration	L	T	R	L	T	R
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	679	525	10		224	6		332
v/c	0.05	0.21	4.40		0.45	9.17		0.03
95% queue length	0.15	0.79	6.71		2.13	8.54		0.10
Control Delay	10.6	13.7	2269		33.4	4861		16.2
LOS	B	B	F		D	F		C
Approach Delay				716.6			4054	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Right Turns Alternative
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?			No			
Lanes	1	1	1	1	1	0
Configuration	L	T	R	L		TR
Upstream Signal?		No			No	

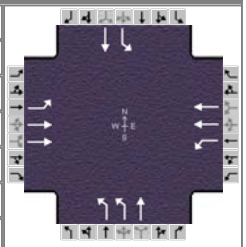
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		84			37	
v/c	0.01	0.43		2.90			1.78	
95% queue length	0.04	2.22		23.84			7.11	
Control Delay	8.9	13.3		966.0			609.1	
LOS	A	B		F			F	
Approach Delay				966.0			609.1	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

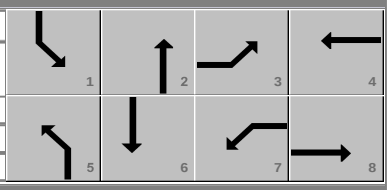
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Right Turns Alternative				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time *(g_e)*, s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity *(c)*, veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio *(X)*	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue *(Q)*, veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay *(d_2)*, s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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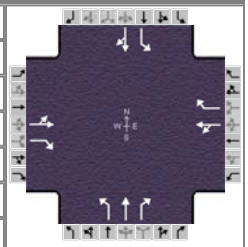
2010 HCS Signalized Intersection Results Summary

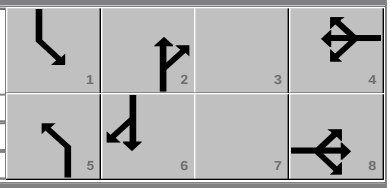
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Right Turns Alternative				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	3.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	617	211	167	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	1863	1533	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	41.6	14.8	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	41.6	14.8	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72	784	645	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.787	0.327	0.886	0.000	1.247
Available Capacity (c_a), veh/h	49		562	44		562	225	784	645	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3	16.5	5.5	6.9		140.0
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	60.3		34.1	80.0		35.9	76.0	29.5	31.1	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.8	0.1	3.9	0.0	445.9
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	97.1		34.2	9659.6		36.1	78.3	30.2	31.2	74.4		474.1
Level of Service (LOS)	F		C	F		D	E	C	C	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		33.5	C		422.7	F	
Intersection Delay s/veh / LOS	1231.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.6	B

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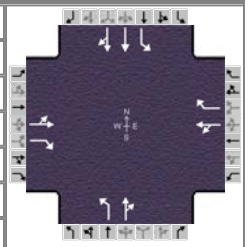
2010 HCS Signalized Intersection Results Summary

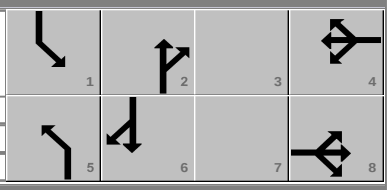
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Right Turns Alternative				



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	30	90	40	10	80	150	575	30	130	1125	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	672	144	714	692
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1846	1774	1863	1790
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	42.1	12.8	48.3	50.5
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	42.1	12.8	48.3	50.5
Capacity *(c)*, veh/h	56		495	54		495	190		875	168	859	826
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.768	0.860	0.831	0.837
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		875	308	859	826
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		15.7	6.1	19.2	20.2
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	72.1		40.3	74.5		40.0	70.4		23.7	71.4	25.9	28.7
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.6	6.5	4.8	5.2
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	2268.3		40.5	283.8		40.2	72.0		24.3	77.9	30.7	33.8
Level of Service (LOS)	F		D	F		D	E		C	E	C	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.8	C		36.5	D	
Intersection Delay s/veh / LOS	139.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.9	A	1.8	A

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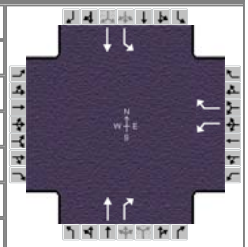
ALTERNATIVE 4D AM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

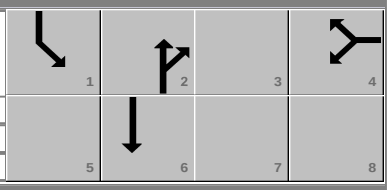
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 4D				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.966	0.220	0.929	0.741	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		36.7	3.7	10.6	7.8	
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				38.1	0.0	47.5		45.6	30.0	66.7	9.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	39.9	0.8	6.3	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				38.2	0.0	51.6		85.5	30.7	73.0	9.6	
Level of Service (LOS)				D		D		F	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	76.6		E	24.4		C
Intersection Delay s/veh / LOS	48.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.0	A	2.3	B

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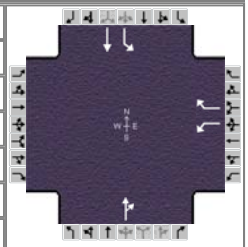
2010 HCS Signalized Intersection Results Summary

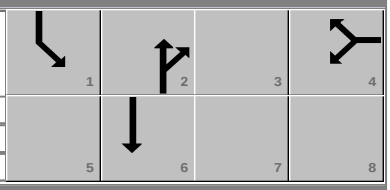
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 4D				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	983	111	0	994
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1826	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Capacity *(c)*, veh/h				455	0	405			1024	137		1243
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.960	0.810	0.000	0.800
Available Capacity (c_a), veh/h				455	0	405			1024	327		1243
Back of Queue *(Q)*, veh/ln				3.6		3.6			25.6	4.5		4.9
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				47.2	0.0	47.6			20.3	72.7		4.9
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	3.7	2.3	0.0	0.5
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				47.5	0.0	48.0			23.9	75.0		5.4
Level of Service (LOS)				D		D			C	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	23.9		C	12.4		B
Intersection Delay s/veh / LOS	20.7						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.3	B

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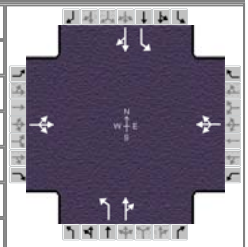
2010 HCS Signalized Intersection Results Summary

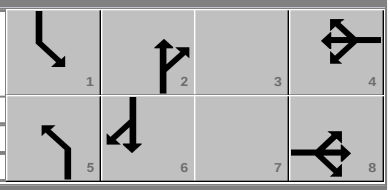
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 4D				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	0	1094	211	0	950
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	0	1823	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Capacity (*c*), veh/h	317			291			42		971	235		1190
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.127	0.897	0.000	0.798
Available Capacity (c_a), veh/h	390			365			355		971	355		1190
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9		91.0	8.5		6.4
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	48.8			60.2			77.2		24.9	68.3		7.1
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	230.7	2.2	0.0	0.5
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	49.0			75.0			78.2		255.6	70.5		7.7
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		252.1	F		19.1	B	
Intersection Delay s/veh / LOS	126.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.3	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 4D
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		759		175				
v/c		0.34		2.22				
95% queue length		1.48		31.28				
Control Delay		12.1		608.5				
LOS		B		F				
Approach Delay				608.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 4D
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

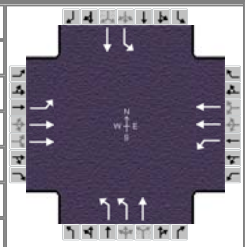
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

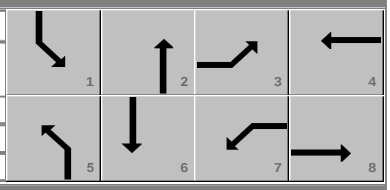
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 4D				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity (*c*), veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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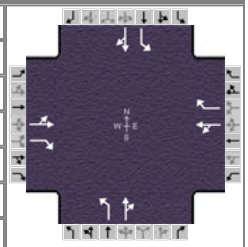
2010 HCS Signalized Intersection Results Summary

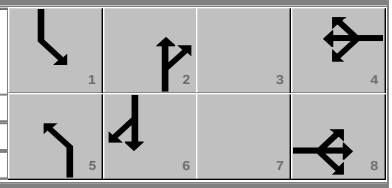
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 4D				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	828	167	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1781	1774	0	1859
Queue Service time *(g_s)*, s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Cycle Queue Clearance Time *(g_c)*, s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		749	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	1.104	0.886	0.000	1.247
Available Capacity *(c_a)*, veh/h	49		562	44		562	225		749	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		65.9	6.9		140.0
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	60.3		34.1	80.0		35.9	76.0		38.0	70.6		28.3
Incremental Delay *(d_2)*, s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	190.3	3.9	0.0	445.9
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	97.1		34.2	9659.6		36.1	78.3		228.3	74.4		474.1
Level of Service (LOS)	F		C	F		D	E		F	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		218.9	F		422.7	F	
Intersection Delay s/veh / LOS	1292.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.6	B

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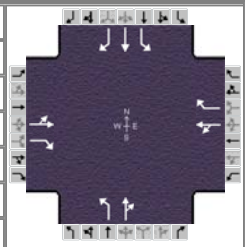
2010 HCS Signalized Intersection Results Summary

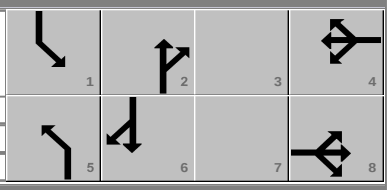
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 4D				



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	30	100	40	10	80	160	565	30	130	1065	200

Signal Information			
Cycle, s	160.0	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	15.1	3.0	68.9	54.3	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	60.8	60.8	60.8	60.8	24.2	78.0	21.2	75.0
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	55.2	55.2	55.2	55.2	17.8		14.8	
Green Extension Time *(g_e)*, s	0.1	0.1	0.1	0.1	0.2	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.33		0.02	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	133	0	111	56	0	89	178	0	661	144	1183	222
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	45	0	1579	37	0	1579	1774	0	1846	1774	1863	1579
Queue Service time *(g_s)*, s	1.3	0.0	8.1	1.3	0.0	6.4	15.8	0.0	43.5	12.8	69.8	14.8
Cycle Queue Clearance Time *(g_c)*, s	53.2	0.0	8.1	53.2	0.0	6.4	15.8	0.0	43.5	12.8	69.8	14.8
Capacity *(c)*, veh/h	54		525	53		525	201		840	167	812	688
Volume-to-Capacity Ratio *(X)*	2.461	0.000	0.212	1.052	0.000	0.169	0.886	0.000	0.787	0.863	1.457	0.323
Available Capacity *(c_a)*, veh/h	68		550	65		550	271		840	271	812	688
Back of Queue *(Q)*, veh/ln	42.6		3.2	6.2		2.5	7.2		16.6	6.2	213.2	5.7
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	72.3		38.3	74.1		37.7	69.9		26.2	71.4	33.5	29.6
Incremental Delay *(d_2)*, s/veh	2684.3	0.0	0.2	275.5	0.0	0.2	2.9	0.0	0.7	8.2	825.7	0.6
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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2756.7		38.6	349.6		37.9	72.8		26.9	79.7	859.2	30.2
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1521.2	F		157.8	F		36.7	D		667.7	F	
Intersection Delay s/veh / LOS	525.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.9	A	3.0	C

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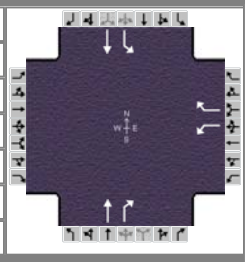
ALTERNATIVE 4D PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

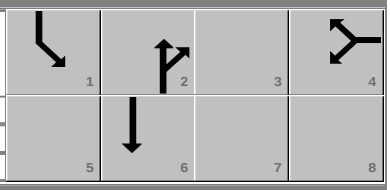
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 4D				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				44		243		665	66	140	654	

Signal Information			
Cycle, s	140.0	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	14.4	57.1	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	119.8	20.2	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			14.1	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			49	0	270	0	739	73	156	727	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.5	51.0	18.4	0.0	54.5	4.0	12.1	30.0	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.5	51.0	18.4	0.0	54.5	4.0	12.1	30.0	0.0
Capacity *(c)*, veh/h				646	0	575		760	644	182	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.076	0.000	0.470	0.000	0.973	0.114	0.853	0.707	0.000
Available Capacity (c_a), veh/h				646	0	575		760	644	322	1029	
Back of Queue *(Q)*, veh/ln				1.1		7.2		33.2	1.6	5.4	8.4	
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				29.1	0.0	34.1		40.7	25.7	61.8	12.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	0.7	0.0	44.3	0.4	1.2	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				29.2	0.0	34.8		84.9	26.1	63.0	12.6	
Level of Service (LOS)				C		C		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			34.0		C	79.6		E	21.5		C
Intersection Delay s/veh / LOS	46.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	1.9	A

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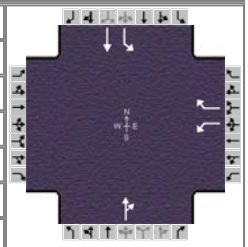
2010 HCS Signalized Intersection Results Summary

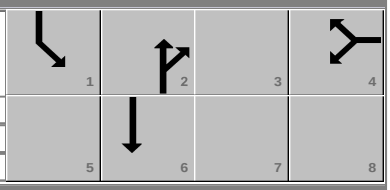
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 4D				



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		1135	100	100	1180	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1372	111	0	1367
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1836	1774	0	1849
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			931	140		1160
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.473	0.791	0.000	1.178
Available Capacity (c_a), veh/h				520	0	462			931	374		1160
Back of Queue *(Q)*, veh/ln				2.9		3.0			244.0	3.9		117.2
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				37.3	0.0	37.7			23.6	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	852.7	2.0	0.0	322.1
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				37.6	0.0	38.0			876.3	65.3		334.2
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	876.3		F	314.0		F
Intersection Delay s/veh / LOS	545.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.9	C	2.9	C

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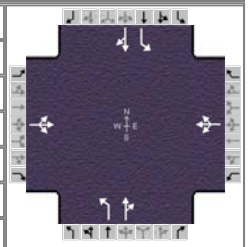
2010 HCS Signalized Intersection Results Summary

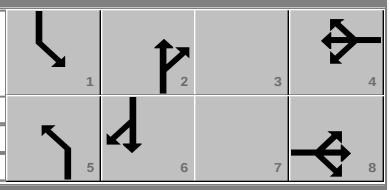
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 4D				



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	10	60	90	10	90	90	1045	60	90	1130	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, *(Y+Rc)*, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time *(g_e)*, s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1228	100	0	1311
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1845	1774	0	1849
Queue Service time *(g_s)*, s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time *(g_c)*, s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1099	125		1101
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.117	0.799	0.000	1.191
Available Capacity *(c_a)*, veh/h	450			396			619		1099	619		1101
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		83.9	3.5		123.9
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	47.4			53.3			64.1		15.2	64.1		15.0
Incremental Delay *(d_2)*, s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	212.7	1.1	0.0	344.2
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	48.2			59.9			65.2		227.9	65.2		359.2
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		215.6	F		338.4	F	
Intersection Delay s/veh / LOS	254.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.7	B	2.8	C

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 4D
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No	/		/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		463		24				
v/c		0.14		5.04				
95% queue length		0.49		15.13				
Control Delay		14.1		2145				
LOS		B		F				
Approach Delay				2145				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 4D
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

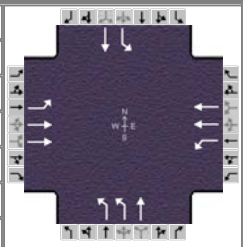
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

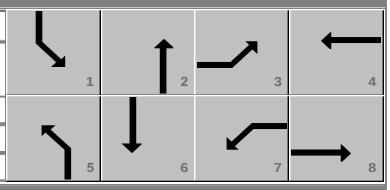
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 4D				



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	200		200	340		860	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	33.4	34.6	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	53.0	80.2	13.5	40.7
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	36.1		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	10.7	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.09		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	956	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Capacity *(c)*, veh/h	44	339		251	753		1153	983		94	458	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.829	0.430	0.000	0.711	0.680	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	458	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		12.8	4.6		2.6	10.7	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	67.0	61.1		58.9	48.6		35.2	11.8		65.2	47.8	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.4	0.1	0.0	12.0	8.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.7		78.1	49.2		35.6	11.9		77.3	56.0	
Level of Service (LOS)	E	E		E	D		D	B		E	E	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		28.3	C		59.8	E	
Intersection Delay s/veh / LOS	43.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.8	C	1.1	A

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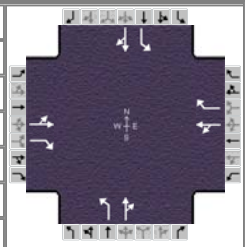
2010 HCS Signalized Intersection Results Summary

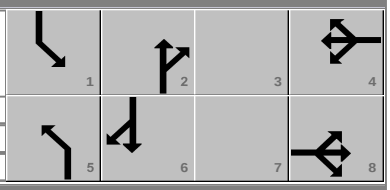
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 4D				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	905	200	60	740	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1228	67	0	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1804	1774	0	1854
Queue Service time (g_s), s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Cycle Queue Clearance Time (g_c), s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Capacity *(c)*, veh/h	52		530	48		530	185		870	86		790
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.412	0.773	0.000	1.069
Available Capacity (c_a), veh/h	52		530	48		530	384		870	384		790
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		202.8	2.3		50.0
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	66.8		33.5	70.0		33.7	61.5		27.0	65.8		30.5
Incremental Delay (d_2), s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	741.7	1.4	0.0	126.9
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	4858.1		33.7	9652.8		34.0	62.9		768.7	67.2		157.4
Level of Service (LOS)	F		C	F		C	E		F	E		F
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		689.4	F		150.8	F	
Intersection Delay s/veh / LOS	1616.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.8	C	2.0	A

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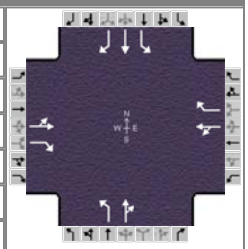
2010 HCS Signalized Intersection Results Summary

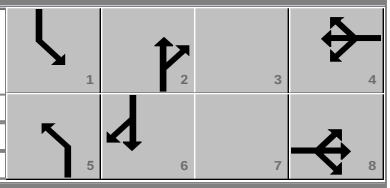
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 4D				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	370	40	310	50	50	190	380	845	40	150	710	330

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.8		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	456	0	344	111	0	211	422	0	983	167	789	367
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1848	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	26.3	0.0	0.0	14.6	30.8	0.0	60.1	12.9	44.6	28.9
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	26.3	45.7	0.0	14.6	30.8	0.0	60.1	12.9	44.6	28.9
Capacity *(c)*, veh/h	49		515	65		515	390		793	194	593	503
Volume-to-Capacity Ratio *(X)*	9.310	0.000	0.668	1.705	0.000	0.410	1.082	0.000	1.240	0.858	1.329	0.729
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		793	390	593	503
Back of Queue *(Q)*, veh/ln	205.6		10.7	26.4		5.7	29.9		117.7	6.0	116.8	11.6
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	70.0		40.6	51.8		36.7	54.6		30.4	61.3	40.3	42.3
Incremental Delay *(d_2)*, s/veh	14998.9	0.0	3.6	1331.8	0.0	0.6	152.6	0.0	433.6	5.6	598.6	4.5
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	15068.9		44.2	1383.5		37.3	207.2		464.0	66.8	638.9	46.8
Level of Service (LOS)	F		D	F		D	F		F	E	F	D
Approach Delay, s/veh / LOS	8599.9	F		501.5	F		386.9	F		402.6	F	
Intersection Delay s/veh / LOS	2108.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.8	A	1.0	A	2.8	C	2.7	B

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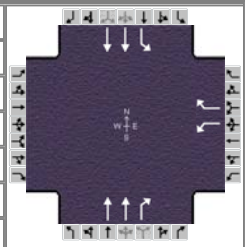
ALTERNATIVE 5 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

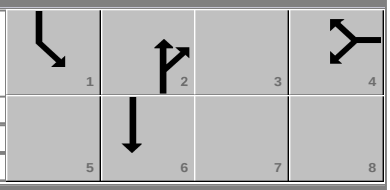
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 5				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1773	1579	1774	1773	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	25.0	9.4	22.8	10.5	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	25.0	9.4	22.8	10.5	0.0
Capacity *(c)*, veh/h				565	0	503		1478	658	275	2157	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.507	0.220	0.929	0.389	0.000
Available Capacity (c_a), veh/h				565	0	503		1478	658	282	2157	
Back of Queue *(Q)*, veh/ln				1.2		12.5		10.9	3.7	10.6	3.2	
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				38.1	0.0	47.5		34.5	30.0	66.7	6.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	1.3	0.8	6.3	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
Control Delay *(d)*, s/veh				38.2	0.0	51.6		35.8	30.7	73.0	7.0	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	34.9		C	22.4		C
Intersection Delay s/veh / LOS	31.6						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.2	A	1.4	A

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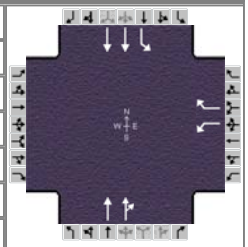
2010 HCS Signalized Intersection Results Summary

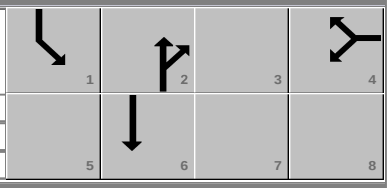
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 5				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	502	482	111	490	505
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1788	1774	1773	1827
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	17.0	19.2	9.9	7.1	8.7
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	17.0	19.2	9.9	7.1	8.7
Capacity *(c)*, veh/h				455	0	405		1045	1003	137	1195	1231
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.480	0.480	0.810	0.410	0.410
Available Capacity (c_a), veh/h				455	0	405		1045	1003	327	1195	1231
Back of Queue *(Q)*, veh/ln				3.6		3.6		5.5	6.4	4.5	1.9	2.4
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				47.2	0.0	47.6		11.0	13.2	72.7	3.0	3.8
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.1	0.1	2.3	0.1	0.1
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				47.5	0.0	48.0		11.1	13.4	75.0	3.1	3.9
Level of Service (LOS)				D		D		B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			47.8		D	12.2		B	10.7		B
Intersection Delay s/veh / LOS	14.9						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	1.4	A	1.4	A

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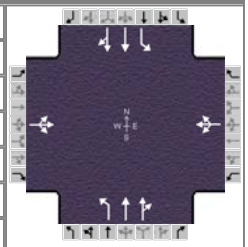
2010 HCS Signalized Intersection Results Summary

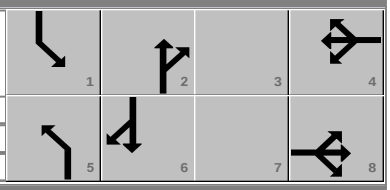
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 5				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	559	535	211	477	473
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	1863	1783	1774	1863	1847
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	23.2	25.7	18.7	9.0	9.5
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	23.2	25.7	18.7	9.0	9.5
Capacity (*c*), veh/h	317			291			42	992	950	235	1195	1185
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.563	0.564	0.897	0.399	0.399
Available Capacity (c_a), veh/h	390			365			355	992	950	355	1195	1185
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9	7.6	9.0	8.5	2.7	2.9
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	48.8			60.2			77.2	14.2	16.8	68.3	4.8	5.2
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.2	0.2	2.2	0.1	0.1
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	49.0			75.0			78.2	14.4	17.0	70.5	4.9	5.3
Level of Service (LOS)	D			E			E	B	B	E	A	A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		16.9	B		17.0	B	
Intersection Delay s/veh / LOS	22.9						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	1.4	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: 11/14/2011
Analysis Time Period: AM Alternative 5
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0	1	2	
Configuration		T	TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		755		272				
v/c		0.34		1.43				
95% queue length		1.49		21.32				
Control Delay		12.2		247.2				
LOS		B		F				
Approach Delay				247.2				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 5
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	715	40	80	1235	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	794	44	88	1372	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	468	792	53		632	29		427
v/c	0.02	0.11	0.62		0.07	0.38		0.03
95% queue length	0.07	0.37	2.48		0.22	1.20		0.08
Control Delay	12.9	10.1	150.0		11.1	191.2		13.7
LOS	B	B	F		B	F		B
Approach Delay				70.6			102.4	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 5
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

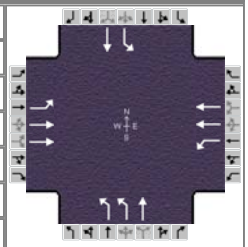
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1017	770		250			763	
v/c	0.01	0.40		0.44			0.01	
95% queue length	0.03	1.97		2.13			0.04	
Control Delay	8.6	12.8		30.4			9.8	
LOS	A	B		D			A	
Approach Delay				30.4			9.8	
Approach LOS				D			A	

2010 HCS Signalized Intersection Results Summary

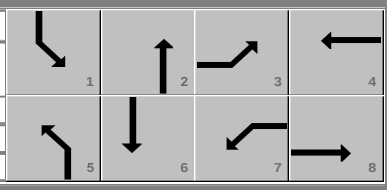
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 5				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity (*c*), veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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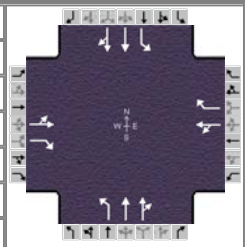
2010 HCS Signalized Intersection Results Summary

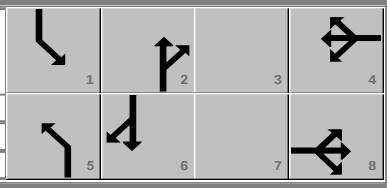
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 5				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	432	395	167	565	563
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	1863	1699	1774	1863	1856
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	23.6	26.2	14.8	28.6	28.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	23.6	26.2	14.8	28.6	28.8
Capacity *(c)*, veh/h	49		562	44		562	72	784	715	188	906	903
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.552	0.553	0.886	0.624	0.624
Available Capacity (c_a), veh/h	49		562	44		562	225	784	715	225	906	903
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3	9.3	10.2	6.9	10.4	10.5
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	60.3		34.1	80.0		35.9	76.0	25.5	30.5	70.6	19.5	19.7
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.3	0.3	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	97.1		34.2	9659.6		36.1	78.3	25.8	30.8	74.4	19.8	20.0
Level of Service (LOS)	F		C	F		D	E	C	C	E	B	B
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		31.3	C		26.9	C	
Intersection Delay s/veh / LOS	1037.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.2	A	1.6	A

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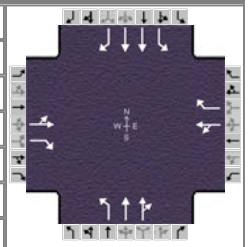
2010 HCS Signalized Intersection Results Summary

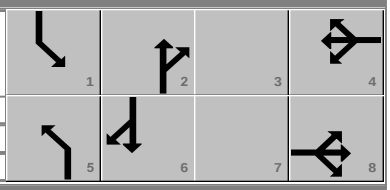
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 5				



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	30	90	40	10	80	150	575	30	130	1125	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time (g_e), s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	339	333	144	1250	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	1863	1830	1774	1773	1579
Queue Service time (g_s), s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	14.1	14.7	12.8	41.0	9.4
Cycle Queue Clearance Time (g_c), s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	14.1	14.7	12.8	41.0	9.4
Capacity *(c)*, veh/h	56		495	54		495	190	883	867	168	1636	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.384	0.384	0.860	0.764	0.214
Available Capacity (c_a), veh/h	87		550	83		550	308	883	867	308	1636	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7	5.4	5.6	6.1	14.9	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	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	72.1		40.3	74.5		40.0	70.4	18.1	19.0	71.4	24.5	25.8
Incremental Delay (d_2), s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.1	0.1	6.5	1.7	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0	18.2	19.1	77.9	26.1	26.1
Level of Service (LOS)	F		D	F		D	E	B	B	E	C	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		29.3	C		31.0	C	
Intersection Delay s/veh / LOS	135.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.2	A	1.8	A

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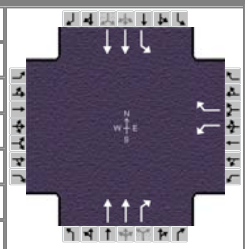
ALTERNATIVE 5 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

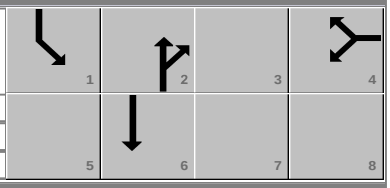
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 5				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		905	90	190	890	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.4	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	1006	100	211	989	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1773	1579	1774	1773	0
Queue Service time (g_s), s	0.0			3.5	51.0	26.9	0.0	34.5	5.9	16.4	16.4	0.0
Cycle Queue Clearance Time (g_c), s	0.0			3.5	51.0	26.9	0.0	34.5	5.9	16.4	16.4	0.0
Capacity *(c)*, veh/h				646	0	575		1336	595	238	1958	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	0.753	0.168	0.888	0.505	0.000
Available Capacity (c_a), veh/h				646	0	575		1336	595	322	1958	
Back of Queue *(Q)*, veh/ln				1.5		10.7		15.3	2.3	7.4	4.9	
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				29.4	0.0	36.8		38.0	29.0	59.6	10.4	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	2.5	0.0	4.1	0.6	2.5	0.1	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				29.5	0.0	39.4		42.0	29.7	62.1	10.5	
Level of Service (LOS)				C		D		D	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	40.9		D	19.6		B
Intersection Delay s/veh / LOS	31.1						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.4	A	1.5	A

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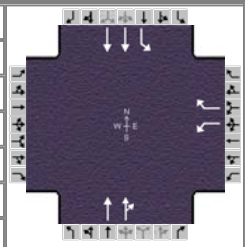
2010 HCS Signalized Intersection Results Summary

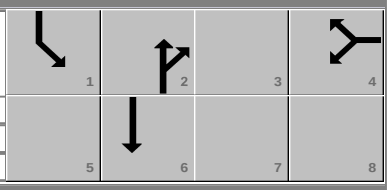
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 5				



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		1135	100	100	1180	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	694	678	111	671	696
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1809	1774	1773	1836
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	33.6	35.4	8.6	17.5	19.0
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	33.6	35.4	8.6	17.5	19.0
Capacity *(c)*, veh/h				520	0	462		945	918	140	1112	1152
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.735	0.738	0.791	0.603	0.604
Available Capacity (c_a), veh/h				520	0	462		945	918	374	1112	1152
Back of Queue *(Q)*, veh/ln				2.9		3.0		10.9	12.0	3.9	3.9	4.6
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				37.3	0.0	37.7		16.6	18.3	63.3	5.7	6.4
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.5	0.5	2.0	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
Control Delay *(d)*, s/veh				37.6	0.0	38.0		17.1	18.8	65.3	5.9	6.6
Level of Service (LOS)				D		D		B	B	E	A	A
Approach Delay, s/veh / LOS	0.0			37.8		D	17.9		B	10.7		B
Intersection Delay s/veh / LOS	15.9						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	1.7	A	1.7	A

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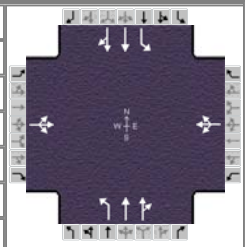
2010 HCS Signalized Intersection Results Summary

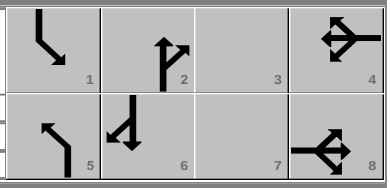
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 5				



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	10	60	90	10	90	90	1045	60	90	1130	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	619	608	100	660	651
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	1863	1827	1774	1863	1835
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	17.2	18.7	7.8	19.3	20.6
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	17.2	18.7	7.8	19.3	20.6
Capacity *(c)*, veh/h	314			268			125	1110	1088	125	1110	1093
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.558	0.559	0.799	0.595	0.596
Available Capacity (c_a), veh/h	450			396			619	1110	1088	619	1110	1093
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5	4.7	5.2	3.5	5.0	5.5
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	47.4			53.3			64.1	7.6	8.6	64.1	7.8	8.6
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.2	0.2	1.1	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	48.2			59.9			65.2	7.8	8.8	65.2	8.0	8.8
Level of Service (LOS)	D			E			E	A	A	E	A	A
Approach Delay, s/veh / LOS	48.2	D		59.9	E		12.6	B		12.4	B	
Intersection Delay s/veh / LOS	17.2						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	1.6	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: 11/14/2011
Analysis Time Period: PM Alternative 5
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0	1	2	
Configuration		T	TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No	/		/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		459		57				
v/c		0.14		2.12				
95% queue length		0.50		11.83				
Control Delay		14.2		673.1				
LOS		B		F				
Approach Delay				673.1				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 5
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1085	100	100	820	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1205	111	111	911	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	675	521	16		462	17		561
v/c	0.05	0.21	2.75		0.22	3.24		0.02
95% queue length	0.15	0.80	6.17		0.81	7.50		0.06
Control Delay	10.6	13.8	1282		14.9	1469		11.5
LOS	B	B	F		B	F		B
Approach Delay				402.1			1226	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 5
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

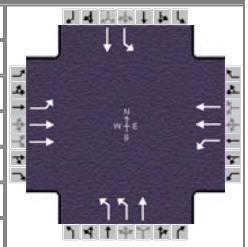
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	928	762		117			67	
v/c	0.01	0.44		2.09			0.99	
95% queue length	0.04	2.24		20.37			4.91	
Control Delay	8.9	13.3		577.5			209.7	
LOS	A	B		F			F	
Approach Delay				577.5			209.7	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

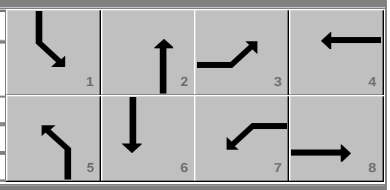
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 5				



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	200		200	340		860	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	33.4	34.6	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	53.0	80.2	13.5	40.7
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	36.1		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	10.7	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.09		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	956	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Capacity *(c)*, veh/h	44	339		251	753		1153	983		94	458	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.829	0.430	0.000	0.711	0.680	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	458	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		12.8	4.6		2.6	10.7	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	67.0	61.1		58.9	48.6		35.2	11.8		65.2	47.8	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.4	0.1	0.0	12.0	8.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.7		78.1	49.2		35.6	11.9		77.3	56.0	
Level of Service (LOS)	E	E		E	D		D	B		E	E	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		28.3	C		59.8	E	
Intersection Delay s/veh / LOS	43.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.8	C	1.1	A

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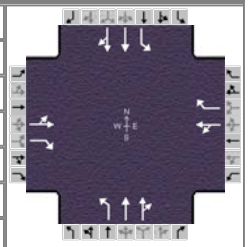
2010 HCS Signalized Intersection Results Summary

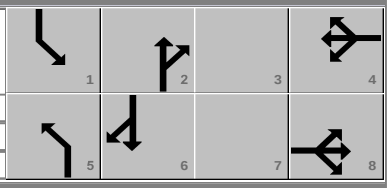
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 5				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	905	200	60	740	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	633	595	67	424	420
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	1863	1745	1774	1863	1845
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	31.0	33.9	5.2	19.8	20.0
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	31.0	33.9	5.2	19.8	20.0
Capacity *(c)*, veh/h	52		530	48		530	185	898	842	86	794	786
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.704	0.707	0.773	0.534	0.534
Available Capacity *(c_a)*, veh/h	52		530	48		530	384	898	842	384	794	786
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4	10.7	12.2	2.3	7.4	7.5
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	66.8		33.5	70.0		33.7	61.5	18.5	22.2	65.8	21.6	22.0
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.4	0.5	1.4	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	4858.1		33.7	9652.8		34.0	62.9	18.9	22.7	67.2	21.8	22.3
Level of Service (LOS)	F		C	F		C	E	B	C	E	C	C
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		25.5	C		25.4	C	
Intersection Delay s/veh / LOS	1276.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	1.6	A	1.2	A

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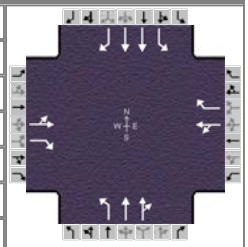
2010 HCS Signalized Intersection Results Summary

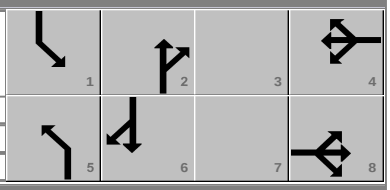
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 5				



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	40	300	50	50	190	350	885	40	150	810	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	111	0	211	389	518	510	167	900	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	1863	1834	1774	1773	1579
Queue Service time (g_s), s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	26.5	26.9	12.9	30.9	18.4
Cycle Queue Clearance Time (g_c), s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	26.5	26.9	12.9	30.9	18.4
Capacity *(c)*, veh/h	49		515	65		515	390	799	787	194	1130	503
Volume-to-Capacity Ratio *(X)*	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.648	0.648	0.858	0.797	0.508
Available Capacity (c_a), veh/h	49		515	65		515	390	799	787	390	1130	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	26.4		5.7	16.0	9.9	10.1	6.0	12.4	7.2
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	70.0		40.3	51.8		36.7	54.5	22.8	23.5	61.3	36.3	38.8
Incremental Delay (d_2), s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.4	0.4	5.6	2.9	1.7
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	13519.0		43.3	1383.5		37.3	78.7	23.1	23.9	66.8	39.2	40.5
Level of Service (LOS)	F		D	F		D	E	C	C	E	D	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		38.7	D		43.0	D	
Intersection Delay s/veh / LOS	1536.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.7	A	1.6	A

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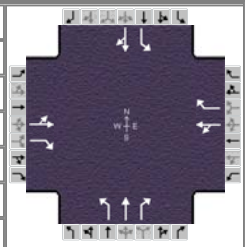
ALTERNATIVE 6 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

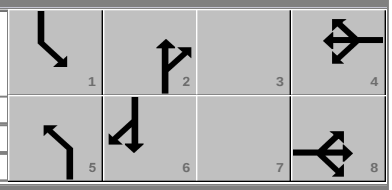
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 6				



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	60	200	40	30	310	70	630	90	230	550	100

Signal Information			
Cycle, s	160.0	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	9.0	9.5	66.7	51.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.0	1.5	1.8	2.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	3.0	2.0	4.0
Phase Duration, s	56.6	56.6	56.6	56.6	15.3	72.8	30.6	88.1
Change Period, *(Y+Rc)*, s	5.6	5.6	5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	4.6	4.6	4.6	4.6	4.0	0.0	4.2	0.0
Queue Clearance Time *(g_s)*, s	53.0	53.0	53.0	53.0	9.1		24.8	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.97		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	178	0	222	78	0	344	78	700	100	256	0	722
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	43	0	1533	54	0	1579	1723	1863	1579	1774	0	1813
Queue Service time *(g_s)*, s	0.0	0.0	18.5	0.0	0.0	30.4	7.1	56.2	6.3	22.8	0.0	44.7
Cycle Queue Clearance Time *(g_c)*, s	51.0	0.0	18.5	51.0	0.0	30.4	7.1	56.2	6.3	22.8	0.0	44.7
Capacity *(c)*, veh/h	50		489	52		503	97	776	658	275		929
Volume-to-Capacity Ratio *(X)*	3.532	0.000	0.455	1.482	0.000	0.685	0.803	0.902	0.152	0.929	0.000	0.777
Available Capacity *(c_a)*, veh/h	50		489	53		503	268	776	658	282		929
Back of Queue *(Q)*, veh/ln	66.5		7.2	16.2		12.5	3.5	29.2	2.5	10.6		15.9
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	66.4		43.4	63.8		47.5	74.6	43.6	29.1	66.7		21.0
Incremental Delay *(d_2)*, s/veh	4607.4	0.0	0.7	961.8	0.0	4.1	15.6	19.2	0.5	6.3	0.0	0.6
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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	4673.8		44.1	1025.5		51.6	90.2	62.8	29.5	73.0		21.6
Level of Service (LOS)	F		D	F		D	F	E	C	E		C
Approach Delay, s/veh / LOS	2101.7		F	231.0		F	61.4		E	35.1		D
Intersection Delay s/veh / LOS	383.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.1	A	1.2	A	1.9	A	2.1	B

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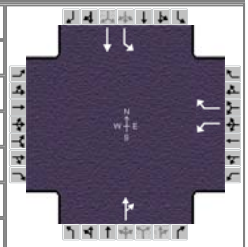
2010 HCS Signalized Intersection Results Summary

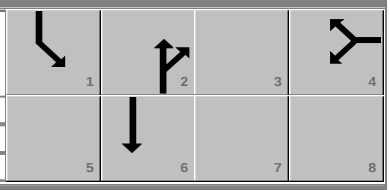
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 6				



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		905	100	100	590	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1117	111	0	711
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1830	1774	0	1837
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	89.7	9.9	0.0	14.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	89.7	9.9	0.0	14.9
Capacity *(c)*, veh/h				455	0	405			1026	137		1238
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	1.088	0.810	0.000	0.575
Available Capacity (c_a), veh/h				455	0	405			1026	327		1238
Back of Queue *(Q)*, veh/ln				3.6		3.6			73.8	4.5		3.4
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				47.2	0.0	47.6			21.7	72.7		4.0
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	160.5	2.3	0.0	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
Control Delay *(d)*, s/veh				47.5	0.0	48.0			182.2	75.0		4.2
Level of Service (LOS)				D		D			F	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	182.2		F	13.7		B
Intersection Delay s/veh / LOS	104.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.5	B	1.8	A

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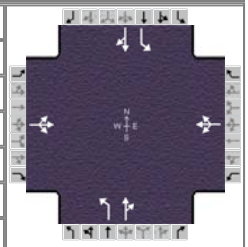
2010 HCS Signalized Intersection Results Summary

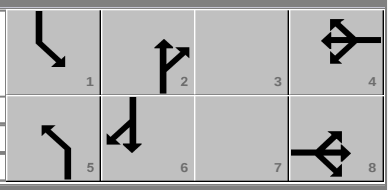
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 6				



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	0	20	90	0	130	20	765	120	190	580	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	0	983	211	0	667
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	0	1818	1774	0	1852
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	16.7
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	16.7
Capacity *(c)*, veh/h	317			291			42		968	235		1188
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.015	0.897	0.000	0.561
Available Capacity (c_a), veh/h	390			365			355		968	355		1188
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9		38.6	8.5		4.2
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	48.8			60.2			77.2		25.1	68.3		5.6
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	36.1	2.2	0.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	49.0			75.0			78.2		61.2	70.5		5.8
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		61.6	E		21.3	C	
Intersection Delay s/veh / LOS	46.6						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.1	B	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: 11/14/2011
Analysis Time Period: AM Alternative 6
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		625	190	230	700	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		694	211	255	777	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		752		189				
v/c		0.34		2.05				
95% queue length		1.50		29.76				
Control Delay		12.2		532.5				
LOS		B		F				
Approach Delay				532.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 6
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	615	40	80	980	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	683	44	88	1088	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	605	876	37		436	34		251
v/c	0.02	0.10	0.89		0.10	0.32		0.04
95% queue length	0.06	0.33	3.28		0.33	1.05		0.14
Control Delay	11.1	9.6	277.1		14.2	155.1		20.0
LOS	B	A	F		B	F		C
Approach Delay				126.9			87.5	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 6
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

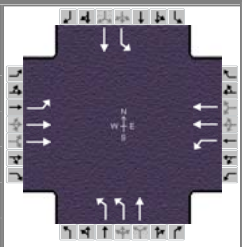
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

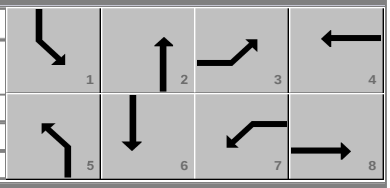
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 6				



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	480		95	200		310	160		200	430	

Signal Information			
Cycle, s	160.0	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	20.7	2.0	71.5	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	2.0	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	26.8	77.8	28.8	79.8
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	17.3		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	3.4	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	344	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	15.3	7.1	0.0	19.7	29.8	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	15.3	7.1	0.0	19.7	29.8	0.0
Capacity (*c*), veh/h	43	636		129	807		445	832		251	856	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.774	0.214	0.000	0.884	0.558	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	856	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		6.4	2.9		9.7	13.8	
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	76.6	63.4		73.2	50.9		64.0	19.3		67.4	31.4	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.6	0.1	0.0	13.4	2.7	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	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	83.3	68.7		89.0	51.1		64.6	19.4		80.7	34.1	
Level of Service (LOS)	F	E		F	D		E	B		F	C	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		49.2	D		48.9	D	
Intersection Delay s/veh / LOS	56.5						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.3	A	1.6	A

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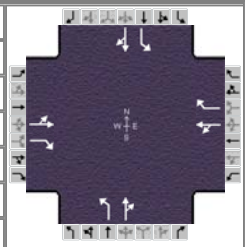
2010 HCS Signalized Intersection Results Summary

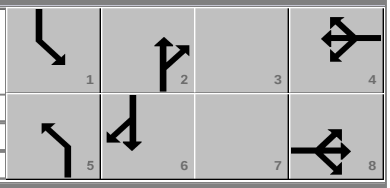
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 6				



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	10	40	240	10	110	50	455	190	150	750	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	717	167	0	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1769	1774	0	1858
Queue Service time *(g_s)*, s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	62.3	14.8	0.0	64.9
Cycle Queue Clearance Time *(g_c)*, s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	62.3	14.8	0.0	64.9
Capacity *(c)*, veh/h	49		562	44		562	72		744	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	0.963	0.886	0.000	0.934
Available Capacity *(c_a)*, veh/h	49		562	44		562	225		744	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		25.4	6.9		24.0
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	60.3		34.1	80.0		35.9	76.0		37.2	70.6		26.0
Incremental Delay *(d_2)*, s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	5.2	3.9	0.0	2.5
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	97.1		34.2	9659.6		36.1	78.3		42.4	74.4		28.5
Level of Service (LOS)	F		C	F		D	E		D	E		C
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		45.0	D		36.1	D	
Intersection Delay s/veh / LOS	1222.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.8	A	2.2	B

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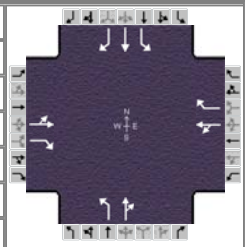
2010 HCS Signalized Intersection Results Summary

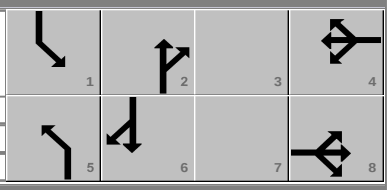
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 6				



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	30	90	40	10	80	150	475	30	130	870	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	561	144	967	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1843	1774	1863	1579
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	30.6	12.8	73.8	9.4
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	30.6	12.8	73.8	9.4
Capacity *(c)*, veh/h	56		495	54		495	190		873	168	859	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.642	0.860	1.125	0.214
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		873	308	859	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		11.4	6.1	83.3	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	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	72.1		40.3	74.5		40.0	70.4		21.7	71.4	30.8	25.8
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.3	6.5	233.6	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0		22.0	77.9	264.4	26.1
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.5	C		213.8	F	
Intersection Delay s/veh / LOS	252.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.7	A	2.6	B

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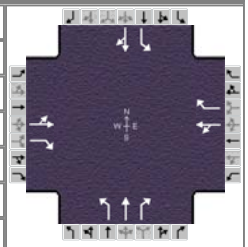
ALTERNATIVE 6 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

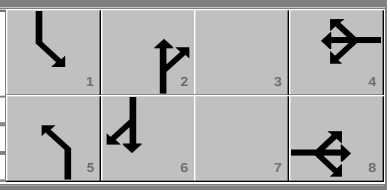
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 6				



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	40	180	60	40	330	100	790	90	190	700	100

Signal Information			
Cycle, s	140.0	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	11.0	1.5	52.7	51.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.0	1.5	1.8	2.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	3.0	2.0	4.0
Phase Duration, s	56.6	56.6	56.6	56.6	17.3	58.8	24.6	66.1
Change Period, *(Y+Rc)*, s	5.6	5.6	5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	4.6	4.6	4.6	4.6	4.0	0.0	4.2	0.0
Queue Clearance Time *(g_s)*, s	53.0	53.0	53.0	53.0	10.9		18.4	
Green Extension Time *(g_e)*, s	0.0	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	0.99		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.00		0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	156	0	200	111	0	367	111	878	100	211	0	889
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	29	0	1533	48	0	1579	1723	1863	1579	1774	0	1822
Queue Service time *(g_s)*, s	0.1	0.0	13.4	0.1	0.0	26.9	8.9	52.7	5.9	16.4	0.0	60.0
Cycle Queue Clearance Time *(g_c)*, s	51.0	0.0	13.4	51.0	0.0	26.9	8.9	52.7	5.9	16.4	0.0	60.0
Capacity *(c)*, veh/h	55		558	59		575	135	702	595	238		781
Volume-to-Capacity Ratio *(X)*	2.838	0.000	0.358	1.890	0.000	0.638	0.822	1.251	0.168	0.887	0.000	1.138
Available Capacity *(c_a)*, veh/h	55		559	59		575	307	702	595	322		781
Back of Queue *(Q)*, veh/ln	53.1		5.0	29.3		10.7	4.3	113.7	2.3	7.4		76.5
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	60.5		32.5	55.2		36.9	63.5	43.6	29.0	59.6		31.2
Incremental Delay *(d_2)*, s/veh	3358.0	0.0	0.4	1664.8	0.0	2.5	12.8	464.0	0.6	2.5	0.0	249.8
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	3418.5		32.9	1720.0		39.4	76.3	507.6	29.6	62.1		281.0
Level of Service (LOS)	F		C	F		D	E	F	C	E		F
Approach Delay, s/veh / LOS	1514.1	F		430.2	F		419.7	F		239.0	F	
Intersection Delay s/veh / LOS	484.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.1	A	1.3	A	2.3	B	2.3	B

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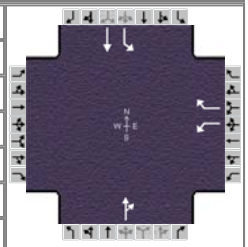
2010 HCS Signalized Intersection Results Summary

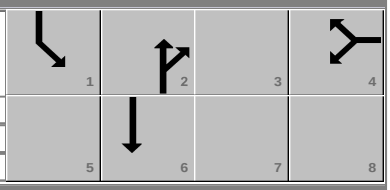
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 6				



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		805	100	100	960	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1006	111	0	1122
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1826	1774	0	1846
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	74.2
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	74.2
Capacity *(c)*, veh/h				520	0	462			926	140		1158
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.085	0.791	0.000	0.969
Available Capacity (c_a), veh/h				520	0	462			926	374		1158
Back of Queue *(Q)*, veh/ln				2.9		3.0			63.6	3.9		13.0
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				37.3	0.0	37.7			24.0	63.3		11.0
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	155.9	2.0	0.0	4.1
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				37.6	0.0	38.0			179.8	65.3		15.1
Level of Service (LOS)				D		D			F	E		B
Approach Delay, s/veh / LOS	0.0			37.8		D	179.8		F	19.6		B
Intersection Delay s/veh / LOS	86.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.5	B

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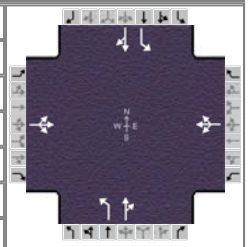
2010 HCS Signalized Intersection Results Summary

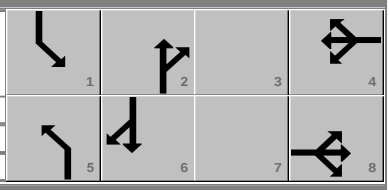
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 6				



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	10	60	90	10	90	90	905	60	90	910	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, *(Y+Rc)*, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time *(g_e)*, s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1072	100	0	1067
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1842	1774	0	1845
Queue Service time *(g_s)*, s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	75.3	7.8	0.0	73.1
Cycle Queue Clearance Time *(g_c)*, s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	75.3	7.8	0.0	73.1
Capacity *(c)*, veh/h	314			268			125		1097	125		1099
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	0.977	0.799	0.000	0.970
Available Capacity *(c_a)*, veh/h	450			396			619		1097	619		1099
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		19.0	3.5		17.9
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	47.4			53.3			64.1		14.4	64.1		14.0
Incremental Delay *(d_2)*, s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	5.6	1.1	0.0	4.5
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	48.2			59.9			65.2		20.0	65.2		18.5
Level of Service (LOS)	D			E			E		B	E		B
Approach Delay, s/veh / LOS	48.2	D		59.9	E		23.8	C		22.5	C	
Intersection Delay s/veh / LOS	27.2						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.4	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 6
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1125	50	60	1100	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1250	55	66	1222	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		530		45				
v/c		0.12		2.69				
95% queue length		0.42		12.99				
Control Delay		12.8		956.1				
LOS		B		F				
Approach Delay				956.1				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 6
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	945	100	100	600	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1050	111	111	666	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	839	602	25		256	15		427
v/c	0.04	0.18	1.76		0.39	3.67		0.03
95% queue length	0.12	0.67	5.42		1.76	7.68		0.08
Control Delay	9.5	12.3	698.5		27.8	1714		13.7
LOS	A	B	F		D	F		B
Approach Delay				232.7			1431	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 6
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

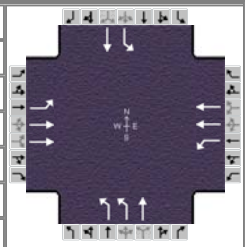
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

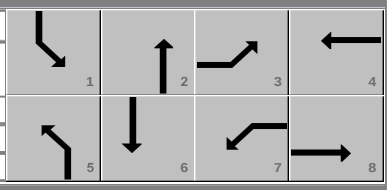
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 6				



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	200		200	340		720	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	26.5	41.4	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	46.1	80.2	13.5	47.5
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	31.1		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	8.9	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.02		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	800	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	29.1	13.5	0.0	5.2	19.8	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	29.1	13.5	0.0	5.2	19.8	0.0
Capacity *(c)*, veh/h	44	339		251	753		985	983		94	549	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.812	0.430	0.000	0.711	0.567	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	549	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		11.2	4.6		2.6	9.6	
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	67.0	61.1		58.9	48.6		40.0	11.8		65.2	41.8	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.3	0.1	0.0	12.0	4.3	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	73.2	63.7		78.1	49.2		40.3	11.9		77.3	46.1	
Level of Service (LOS)	E	E		E	D		D	B		E	D	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		30.5	C		51.6	D	
Intersection Delay s/veh / LOS	44.3						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.5	B	1.1	A

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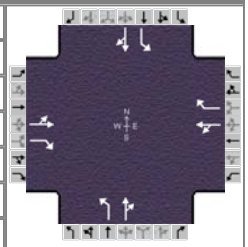
2010 HCS Signalized Intersection Results Summary

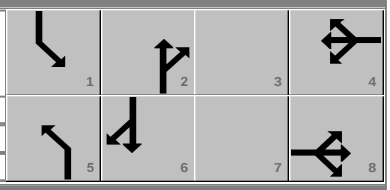
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 6				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	765	200	60	520	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1072	67	0	600
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1796	1774	0	1850
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	34.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	34.7
Capacity *(c)*, veh/h	52		530	48		530	185		866	86		789
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.238	0.773	0.000	0.761
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		866	384		789
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		127.1	2.3		13.0
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	66.8		33.5	70.0		33.7	61.5		27.3	65.8		25.1
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	430.2	1.4	0.0	0.7
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	4858.1		33.7	9652.8		34.0	62.9		457.6	67.2		25.8
Level of Service (LOS)	F		C	F		C	E		F	E		C
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		407.6	F		29.9	C	
Intersection Delay s/veh / LOS	1645.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.5	B	1.6	A

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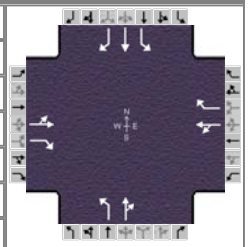
2010 HCS Signalized Intersection Results Summary

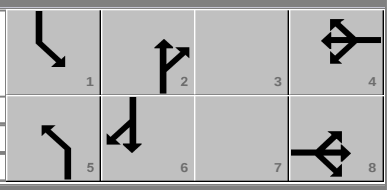
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 6				



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	40	300	50	50	190	350	745	40	150	590	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	111	0	211	389	0	872	167	656	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1846	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Capacity *(c)*, veh/h	49		515	65		515	390		792	194	593	503
Volume-to-Capacity Ratio *(X)*	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.000	1.101	0.858	1.105	0.508
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		792	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	26.4		5.7	16.0		62.9	6.0	51.6	7.2
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	70.0		40.3	51.8		36.7	54.5		30.5	61.3	40.3	38.8
Incremental Delay *(d_2)*, s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.0	184.5	5.6	202.5	1.7
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	13519.0		43.3	1383.5		37.3	78.7		215.0	66.8	242.7	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		173.0	F		167.6	F	
Intersection Delay s/veh / LOS	1800.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	2.6	B	2.3	B

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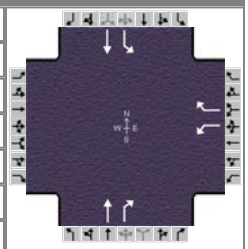
ALTERNATIVE 7 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

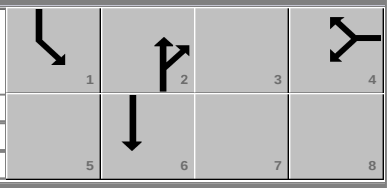
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 7				



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		310		595	130	230	585	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, *(Y+Rc)*, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time *(g_s)*, s			53.0	53.0			24.8	
Green Extension Time *(g_e)*, s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	661	144	256	650	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time *(g_s)*, s	0.0			2.8	51.0	30.4	0.0	51.3	9.4	22.8	19.8	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.0			2.8	51.0	30.4	0.0	51.3	9.4	22.8	19.8	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.852	0.220	0.929	0.574	0.000
Available Capacity *(c_a)*, veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		25.6	3.7	10.6	5.3	
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				38.1	0.0	47.5		42.2	30.0	66.7	7.8	
Incremental Delay *(d_2)*, s/veh	0.0			0.1	0.0	4.1	0.0	12.7	0.8	6.3	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				38.2	0.0	51.6		54.9	30.7	73.0	8.0	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	50.5		D	26.3		C
Intersection Delay s/veh / LOS	40.0						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	2.0	A

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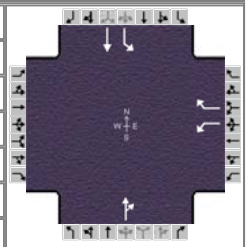
2010 HCS Signalized Intersection Results Summary

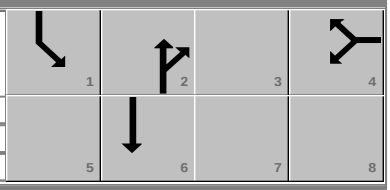
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 7				



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		825	100	100	675	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1028	111	0	806
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1827	1774	0	1840
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	89.7	9.9	0.0	19.3
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	89.7	9.9	0.0	19.3
Capacity *(c)*, veh/h				455	0	405			1025	137		1240
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	1.003	0.810	0.000	0.650
Available Capacity (c_a), veh/h				455	0	405			1025	327		1240
Back of Queue *(Q)*, veh/ln				3.6		3.6			33.8	4.5		3.8
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				47.2	0.0	47.6			21.8	72.7		4.2
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	19.8	2.3	0.0	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
Control Delay *(d)*, s/veh				47.5	0.0	48.0			41.6	75.0		4.4
Level of Service (LOS)				D		D			F	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	41.6		D	13.0		B
Intersection Delay s/veh / LOS	30.1						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.0	B

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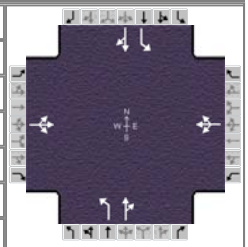
2010 HCS Signalized Intersection Results Summary

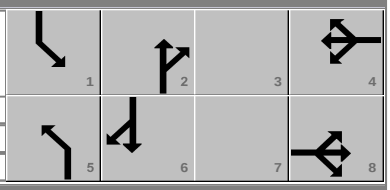
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 7				



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	0	20	90	0	130	20	785	120	190	665	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, ($Y+R_c$), s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway (*MAH*), s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	0	0	244	0	0	22	0	1006	211	0	761
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1266	0	0	1145	0	0	1774	0	1819	1774	0	1853
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	21.7
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	21.7
Capacity (*c*), veh/h	317			291			42		969	235		1189
Volume-to-Capacity Ratio (*X*)	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.038	0.897	0.000	0.640
Available Capacity (c_a), veh/h	390			365			355		969	355		1189
Back of Queue (*Q*), veh/ln	1.1			10.9			0.9		48.3	8.5		4.9
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	48.8			60.2			77.2		25.1	68.3		5.9
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	72.3	2.2	0.0	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	0.0	0.0	0.0
Control Delay (*d*), s/veh	49.0			75.0			78.2		97.3	70.5		6.2
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		96.9	F		20.1	C	
Intersection Delay s/veh / LOS	61.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.2	B	2.1	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 7
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		645	130	230	655	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		716	144	255	727	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		781		201				
v/c		0.33		1.93				
95% queue length		1.42		28.48				
Control Delay		11.8		475.9				
LOS		B		F				
Approach Delay				475.9				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 7
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	635	40	80	1065	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	705	44	88	1183	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	557	860	30		424	28		221
v/c	0.02	0.10	1.10		0.10	0.39		0.05
95% queue length	0.06	0.34	3.71		0.34	1.23		0.16
Control Delay	11.6	9.7	392.3		14.5	200.4		22.1
LOS	B	A	F		B	F		C
Approach Delay				176.4			111.3	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 7
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

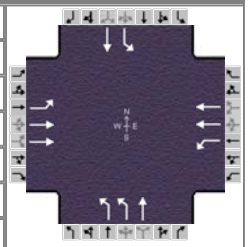
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

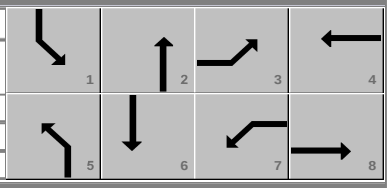
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 7				



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	480		95	200		330	160		200	430	

Signal Information			
Cycle, s	160.0	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	21.9	0.8	71.5	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	2.0	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	28.0	77.8	28.8	78.6
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	18.2		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	3.6	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	367	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	16.2	7.1	0.0	19.7	30.3	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	16.2	7.1	0.0	19.7	30.3	0.0
Capacity (*c*), veh/h	43	636		129	807		471	832		251	842	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.779	0.214	0.000	0.884	0.568	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	842	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		6.8	2.9		9.7	14.0	
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	76.6	63.4		73.2	50.9		63.1	19.3		67.4	32.3	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.6	0.1	0.0	13.4	2.8	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	83.3	68.7		89.0	51.1		63.7	19.4		80.7	35.1	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		49.2	D		49.6	D	
Intersection Delay s/veh / LOS	56.6						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.4	A	1.6	A

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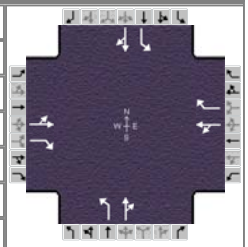
2010 HCS Signalized Intersection Results Summary

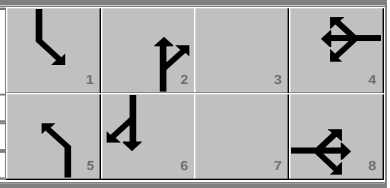
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 7				



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	10	40	240	10	110	50	475	190	150	935	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	739	167	0	1050
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1772	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	66.1	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	66.1	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		746	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	0.991	0.886	0.000	1.161
Available Capacity (c_a), veh/h	49		562	44		562	225		746	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		28.5	6.9		101.3
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	60.3		34.1	80.0		35.9	76.0		38.0	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	13.2	3.9	0.0	291.7
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	97.1		34.2	9659.6		36.1	78.3		51.3	74.4		320.0
Level of Service (LOS)	F		C	F		D	E		D	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		53.2	D		286.3	F	
Intersection Delay s/veh / LOS	1238.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.8	A	2.5	B

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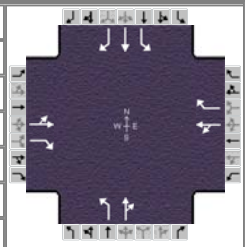
2010 HCS Signalized Intersection Results Summary

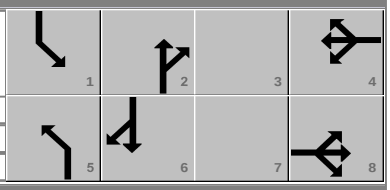
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 7				



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	30	90	40	10	80	150	495	30	130	955	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	583	144	1061	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1844	1774	1863	1579
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	32.7	12.8	73.8	9.4
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	32.7	12.8	73.8	9.4
Capacity *(c)*, veh/h	56		495	54		495	190		874	168	859	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.668	0.860	1.235	0.214
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		874	308	859	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		12.1	6.1	129.7	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	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	72.1		40.3	74.5		40.0	70.4		22.0	71.4	30.8	25.8
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.4	6.5	428.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0		22.4	77.9	458.8	26.1
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.4	C		368.9	F	
Intersection Delay s/veh / LOS	334.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.7	A	2.7	B

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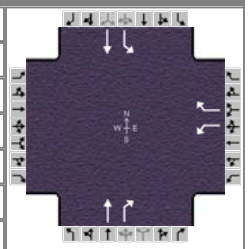
ALTERNATIVE 7 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

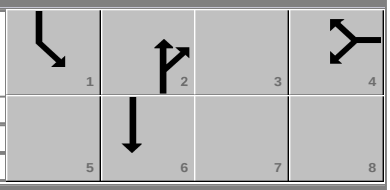
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 7				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		795	90	190	750	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.4	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	883	100	211	833	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	40.9	0.0
Cycle Queue Clearance Time (g_c), s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	40.9	0.0
Capacity *(c)*, veh/h				646	0	575		702	595	238	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	1.259	0.168	0.888	0.810	0.000
Available Capacity (c_a), veh/h				646	0	575		702	595	322	1029	
Back of Queue *(Q)*, veh/ln				1.5		10.7		116.5	2.3	7.4	11.6	
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				29.4	0.0	36.8		43.6	29.0	59.6	13.7	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	2.5	0.0	478.4	0.6	2.5	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				29.5	0.0	39.4		522.1	29.7	62.1	14.3	
Level of Service (LOS)				C		D		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			37.9		D	472.0		F	24.0		C
Intersection Delay s/veh / LOS	205.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.1	B	2.2	B

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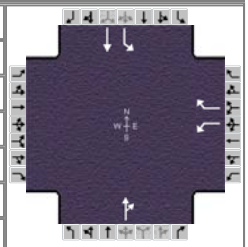
2010 HCS Signalized Intersection Results Summary

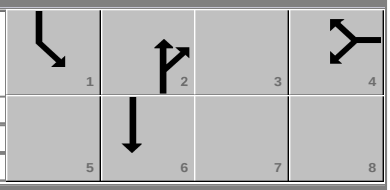
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 7				



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		985	100	100	1040	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1206	111	0	1211
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1832	1774	0	1847
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			929	140		1159
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.297	0.791	0.000	1.045
Available Capacity (c_a), veh/h				520	0	462			929	374		1159
Back of Queue *(Q)*, veh/ln				2.9		3.0			161.7	3.9		40.9
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				37.3	0.0	37.7			23.7	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	535.4	2.0	0.0	84.6
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				37.6	0.0	38.0			559.2	65.3		96.8
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	559.2		F	94.1		F
Intersection Delay s/veh / LOS	293.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.6	B	2.7	B

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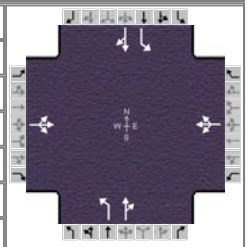
2010 HCS Signalized Intersection Results Summary

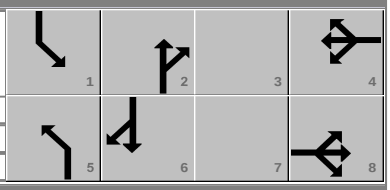
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 7				



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	10	60	90	10	90	90	935	60	90	990	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1106	100	0	1156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1843	1774	0	1847
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1098	125		1100
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.007	0.799	0.000	1.051
Available Capacity (c_a), veh/h	450			396			619		1098	619		1100
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		26.4	3.5		47.5
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	47.4			53.3			64.1		15.2	64.1		15.1
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	24.1	1.1	0.0	93.9
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	48.2			59.9			65.2		39.4	65.2		109.0
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		41.5	D		105.5	F	
Intersection Delay s/veh / LOS	71.9						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.5	B	2.6	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 7
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1155	50	60	1180	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1283	55	66	1311	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		515		37				
v/c		0.13		3.27				
95% queue length		0.44		13.79				
Control Delay		13.0		1249				
LOS		B		F				
Approach Delay				1249				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 7
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	975	100	100	680	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1083	111	111	755	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	777	585	19		245	12		380
v/c	0.04	0.19	2.32		0.41	4.58		0.03
95% queue length	0.13	0.69	5.91		1.88	7.96		0.09
Control Delay	9.8	12.6	1024		29.5	2238		14.8
LOS	A	B	F		D	F		B
Approach Delay				333.5			1867	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 7
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

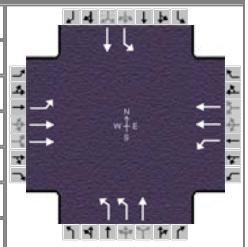
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

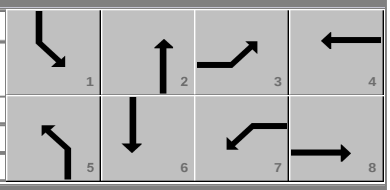
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 7				



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	200		200	340		750	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	28.0	39.9	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	47.6	80.2	13.5	46.0
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	32.2		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	9.3	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.03		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	833	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	30.2	13.5	0.0	5.2	20.1	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	30.2	13.5	0.0	5.2	20.1	0.0
Capacity *(c)*, veh/h	44	339		251	753		1022	983		94	529	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.816	0.430	0.000	0.711	0.588	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	529	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		11.6	4.6		2.6	9.8	
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	67.0	61.1		58.9	48.6		38.9	11.8		65.2	43.1	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.3	0.1	0.0	12.0	4.8	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	73.2	63.7		78.1	49.2		39.2	11.9		77.3	47.9	
Level of Service (LOS)	E	E		E	D		D	B		E	D	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		30.1	C		53.1	D	
Intersection Delay s/veh / LOS	44.1						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.6	B	1.1	A

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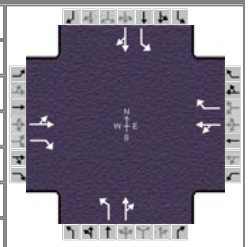
2010 HCS Signalized Intersection Results Summary

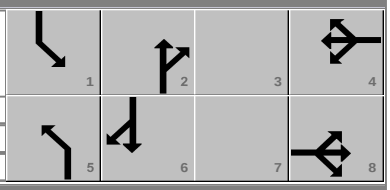
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 7				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	795	200	60	600	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1106	67	0	689
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1798	1774	0	1852
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	44.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	44.7
Capacity *(c)*, veh/h	52		530	48		530	185		867	86		789
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.276	0.773	0.000	0.873
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		867	384		789
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		143.3	2.3		16.9
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	66.8		33.5	70.0		33.7	61.5		27.3	65.8		27.3
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	496.9	1.4	0.0	1.4
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	4858.1		33.7	9652.8		34.0	62.9		524.2	67.2		28.7
Level of Service (LOS)	F		C	F		C	E		F	E		C
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		467.3	F		32.1	C	
Intersection Delay s/veh / LOS	1606.5						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.6	B	1.7	A

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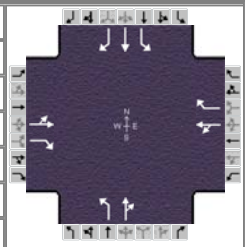
2010 HCS Signalized Intersection Results Summary

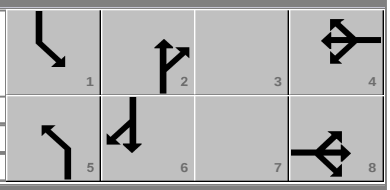
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 7				



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	40	300	50	50	190	350	775	40	150	670	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	411	0	333	111	0	211	389	0	906	167	744	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1846	1774	1863	1579
Queue Service time (g_s), s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time (g_c), s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Capacity *(c)*, veh/h	49		515	65		515	390		792	194	593	503
Volume-to-Capacity Ratio *(X)*	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.000	1.143	0.858	1.255	0.508
Available Capacity (c_a), veh/h	49		515	65		515	390		792	390	593	503
Back of Queue *(Q)*, veh/ln	183.5		10.2	26.4		5.7	16.0		79.3	6.0	94.8	7.2
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	70.0		40.3	51.8		36.7	54.5		30.4	61.3	40.3	38.8
Incremental Delay (d_2), s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.0	259.0	5.6	465.0	1.7
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	13519.0		43.3	1383.5		37.3	78.7		289.5	66.8	505.3	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		226.2	F		340.8	F	
Intersection Delay s/veh / LOS	1821.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	2.6	B	2.4	B

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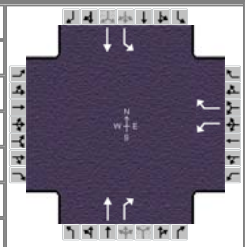
ALTERNATIVE 8 AM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

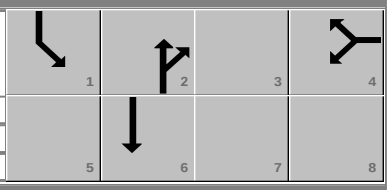
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Alternative 8				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.966	0.220	0.929	0.741	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		36.7	3.7	10.6	7.8	
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				38.1	0.0	47.5		45.6	30.0	66.7	9.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	39.9	0.8	6.3	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				38.2	0.0	51.6		85.5	30.7	73.0	9.6	
Level of Service (LOS)				D		D		F	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	76.6		E	24.4		C
Intersection Delay s/veh / LOS	48.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.0	A	2.3	B

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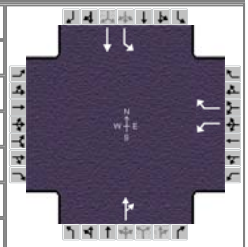
2010 HCS Signalized Intersection Results Summary

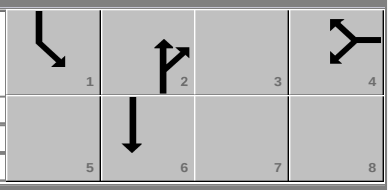
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Alternative 8				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	983	111	0	994
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1826	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Capacity *(c)*, veh/h				455	0	405			1024	137		1243
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.960	0.810	0.000	0.800
Available Capacity (c_a), veh/h				455	0	405			1024	327		1243
Back of Queue *(Q)*, veh/ln				3.6		3.6			25.6	4.5		4.9
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				47.2	0.0	47.6			20.3	72.7		4.9
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	3.7	2.3	0.0	0.5
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				47.5	0.0	48.0			23.9	75.0		5.4
Level of Service (LOS)				D		D			C	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	23.9		C	12.4		B
Intersection Delay s/veh / LOS	20.7						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.3	B

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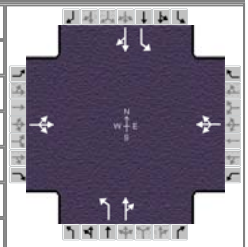
2010 HCS Signalized Intersection Results Summary

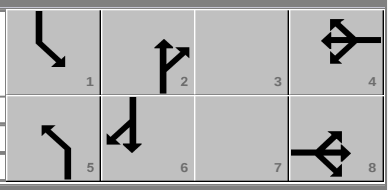
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Alternative 8				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	0	1094	211	0	950
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	0	1823	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Capacity *(c)*, veh/h	317			291			42		971	235		1190
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.127	0.897	0.000	0.798
Available Capacity (c_a), veh/h	390			365			355		971	355		1190
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9		91.0	8.5		6.4
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	48.8			60.2			77.2		24.9	68.3		7.1
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	230.7	2.2	0.0	0.5
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	49.0			75.0			78.2		255.6	70.5		7.7
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		252.1	F		19.1	B	
Intersection Delay s/veh / LOS	126.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.3	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 8
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		759		175				
v/c		0.34		2.22				
95% queue length		1.48		31.28				
Control Delay		12.1		608.5				
LOS		B		F				
Approach Delay				608.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 8
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	715	40	80	1235	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	794	44	88	1372	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	472	796	19		377	17		171
v/c	0.02	0.11	1.74		0.12	0.65		0.06
95% queue length	0.07	0.37	4.50		0.39	1.69		0.20
Control Delay	12.8	10.1	779.3		15.8	398.1		27.5
LOS	B	B	F		C	F		D
Approach Delay				343.0			212.8	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Alternative 8
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

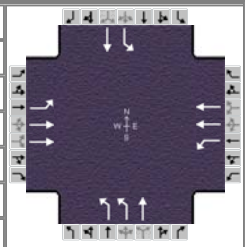
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

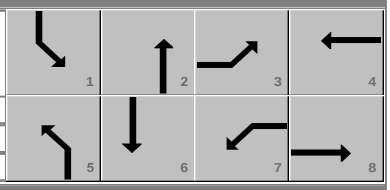
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Alternative 8				



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	480		95	200		345	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	71.5	3.9	1.1	28.7	0.0
Yellow	4.3	4.3	5.0	5.0	5.0	0.0
Red	1.8	2.0	1.6	1.6	1.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	28.9	77.8	28.8	77.7
Change Period, *(Y+R_c)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	3.0	25.2	11.4	10.3	18.9		21.7	
Green Extension Time *(g_e)*, s	0.0	3.5	0.3	4.1	3.8	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	533	0	106	222	0	383	178	0	222	478	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	1.0	23.2	0.0	9.4	8.3	0.0	16.9	7.1	0.0	19.7	30.6	0.0
Cycle Queue Clearance Time *(g_c)*, s	1.0	23.2	0.0	9.4	8.3	0.0	16.9	7.1	0.0	19.7	30.6	0.0
Capacity *(c)*, veh/h	43	636		129	807		490	832		251	831	
Volume-to-Capacity Ratio *(X)*	0.257	0.838	0.000	0.820	0.275	0.000	0.782	0.214	0.000	0.884	0.575	0.000
Available Capacity *(c_a)*, veh/h	333	926		333	1097		1649	832		849	831	
Back of Queue *(Q)*, veh/ln	0.5	10.8		4.8	3.7		7.1	2.9		9.7	14.2	
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	76.6	63.4		73.2	50.9		62.5	19.3		67.4	33.0	
Incremental Delay *(d_2)*, s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	2.9	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	83.3	68.7		89.0	51.1		63.0	19.4		80.7	35.9	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		49.2	D		50.1	D	
Intersection Delay s/veh / LOS	56.7						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.4	A	1.6	A

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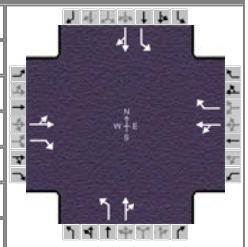
2010 HCS Signalized Intersection Results Summary

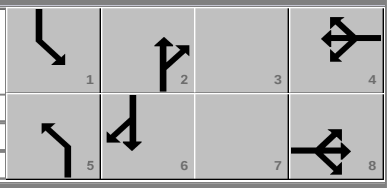
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Alternative 8				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	828	167	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1781	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		749	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	1.104	0.886	0.000	1.247
Available Capacity (c_a), veh/h	49		562	44		562	225		749	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		65.9	6.9		140.0
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	60.3		34.1	80.0		35.9	76.0		38.0	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	190.3	3.9	0.0	445.9
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	97.1		34.2	9659.6		36.1	78.3		228.3	74.4		474.1
Level of Service (LOS)	F		C	F		D	E		F	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		218.9	F		422.7	F	
Intersection Delay s/veh / LOS	1292.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.6	B

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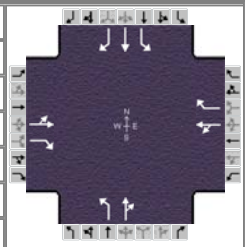
2010 HCS Signalized Intersection Results Summary

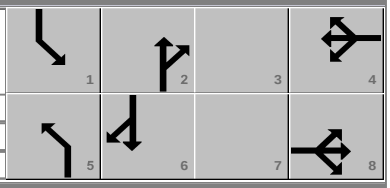
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Alternative 8				



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	70	90	40	35	55	150	575	30	90	1125	70

Signal Information			
Cycle, s	160.0	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	11.1	0.1	84.6	39.4	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	45.9	45.9	45.9	45.9	23.4	96.9	17.2	90.7
Change Period, $(Y+R_c)$, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.7	4.7	4.7	4.7	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	39.7	39.7	39.7	39.7	16.8		10.9	
Green Extension Time (g_e), s	1.5	1.5	1.5	1.5	0.5	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.99	
Max Out Probability	0.01	0.01	0.01	0.01	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	83	0	61	167	0	672	100	1250	78
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	231	0	1579	135	0	1579	1774	0	1846	1774	1863	1579
Queue Service time (g_s), s	1.8	0.0	8.3	1.8	0.0	4.9	14.8	0.0	26.8	8.9	86.1	3.8
Cycle Queue Clearance Time (g_c), s	37.7	0.0	8.3	37.7	0.0	4.9	14.8	0.0	26.8	8.9	86.1	3.8
Capacity *(c)*, veh/h	85		372	66		372	192		1066	123	1003	850
Volume-to-Capacity Ratio *(X)*	1.437	0.000	0.269	1.256	0.000	0.164	0.869	0.000	0.631	0.816	1.247	0.092
Available Capacity (c_a), veh/h	221		550	181		550	450		1066	450	1003	850
Back of Queue *(Q)*, veh/ln	22.6		3.3	11.8		2.0	6.7		7.8	4.2	152.5	1.4
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	62.6		49.9	68.5		48.6	70.2		11.3	73.5	22.6	17.9
Incremental Delay (d_2), s/veh	809.6	0.0	0.5	493.0	0.0	0.2	1.2	0.0	0.3	6.5	448.2	0.1
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	872.3		50.4	561.6		48.9	71.5		11.6	79.9	470.8	18.0
Level of Service (LOS)	F		D	F		D	E		B	E	F	B
Approach Delay, s/veh / LOS	502.4	F		344.7	F		23.5	C		418.8	F	
Intersection Delay s/veh / LOS	295.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.9	A	2.8	C

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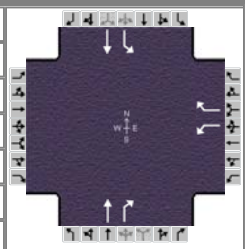
ALTERNATIVE 8 PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

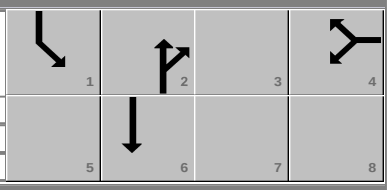
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Alternative 8				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				60		330		905	90	190	890	

Signal Information			
Cycle, s	140.0	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	18.8	52.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	115.4	24.6	140.0
Change Period, *(Y+Rc)*, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time *(g_s)*, s			53.0	53.0			18.4	
Green Extension Time *(g_e)*, s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.16	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			67	0	367	0	1006	100	211	989	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time *(g_s)*, s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	67.1	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.0			3.5	51.0	26.9	0.0	52.7	5.9	16.4	67.1	0.0
Capacity *(c)*, veh/h				646	0	575		702	595	238	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.103	0.000	0.638	0.000	1.433	0.168	0.888	0.961	0.000
Available Capacity *(c_a)*, veh/h				646	0	575		702	595	322	1029	
Back of Queue *(Q)*, veh/ln				1.5		10.7		176.9	2.3	7.4	19.7	
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				29.4	0.0	36.8		43.6	29.0	59.6	17.1	
Incremental Delay *(d_2)*, s/veh	0.0			0.1	0.0	2.5	0.0	788.2	0.6	2.5	3.7	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				29.5	0.0	39.4		831.9	29.7	62.1	20.9	
Level of Service (LOS)				C		D		F	C	E	C	
Approach Delay, s/veh / LOS	0.0			37.9		D	759.3		F	28.1		C
Intersection Delay s/veh / LOS	324.8						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.3	B	2.5	B

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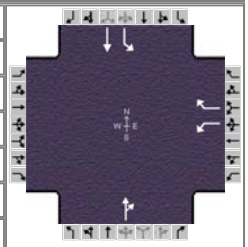
2010 HCS Signalized Intersection Results Summary

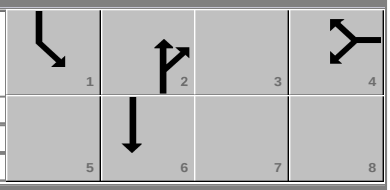
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Alternative 8				



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		1135	100	100	1180	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1372	111	0	1367
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1836	1774	0	1849
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			931	140		1160
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.473	0.791	0.000	1.178
Available Capacity (c_a), veh/h				520	0	462			931	374		1160
Back of Queue *(Q)*, veh/ln				2.9		3.0			244.0	3.9		117.2
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				37.3	0.0	37.7			23.6	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	852.7	2.0	0.0	322.1
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				37.6	0.0	38.0			876.3	65.3		334.2
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	876.3		F	314.0		F
Intersection Delay s/veh / LOS	545.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.9	C	2.9	C

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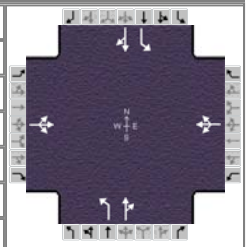
2010 HCS Signalized Intersection Results Summary

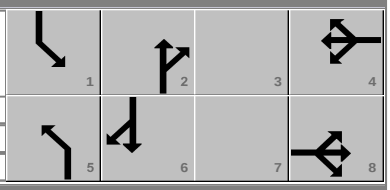
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Alternative 8				



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	10	60	90	10	90	90	1045	60	90	1130	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1228	100	0	1311
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1845	1774	0	1849
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1099	125		1101
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.117	0.799	0.000	1.191
Available Capacity (c_a), veh/h	450			396			619		1099	619		1101
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		83.9	3.5		123.9
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	47.4			53.3			64.1		15.2	64.1		15.0
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	212.7	1.1	0.0	344.2
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	48.2			59.9			65.2		227.9	65.2		359.2
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		215.6	F		338.4	F	
Intersection Delay s/veh / LOS	254.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.7	B	2.8	C

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 8
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		463		24				
v/c		0.14		5.04				
95% queue length		0.49		15.13				
Control Delay		14.1		2145				
LOS		B		F				
Approach Delay				2145				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 8
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1085	100	100	820	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1205	111	111	911	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	679	525	10		208	5		309
v/c	0.05	0.21	4.40		0.48	11.00		0.04
95% queue length	0.15	0.79	6.71		2.36	8.64		0.11
Control Delay	10.6	13.7	2269		37.4	5912		17.1
LOS	B	B	F		E	F		C
Approach Delay				719.3			4930	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Alternative 8
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

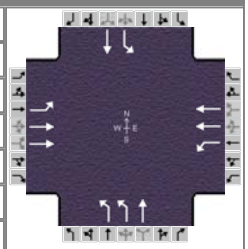
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

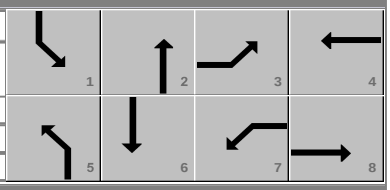
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Alternative 8				



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	200		200	340		640	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	22.5	45.5	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	42.1	80.2	13.5	51.6
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	28.2		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	7.7	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	711	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	26.2	13.5	0.0	5.2	19.0	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	26.2	13.5	0.0	5.2	19.0	0.0
Capacity *(c)*, veh/h	44	339		251	753		885	983		94	603	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.804	0.430	0.000	0.711	0.516	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	603	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		10.3	4.6		2.6	9.0	
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	67.0	61.1		58.9	48.6		42.8	11.8		65.2	38.5	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.3	0.1	0.0	12.0	3.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.7		78.1	49.2		43.2	11.9		77.3	41.6	
Level of Service (LOS)	E	E		E	D		D	B		E	D	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		31.5	C		47.9	D	
Intersection Delay s/veh / LOS	44.7						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.4	B	1.1	A

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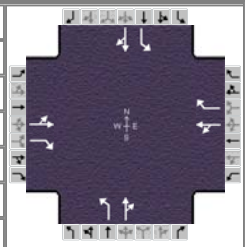
2010 HCS Signalized Intersection Results Summary

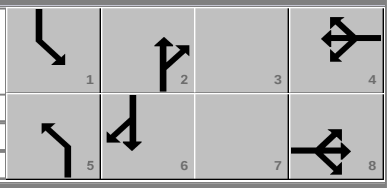
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Alternative 8				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	905	200	60	740	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1228	67	0	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1804	1774	0	1854
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Capacity *(c)*, veh/h	52		530	48		530	185		870	86		790
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.412	0.773	0.000	1.069
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		870	384		790
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		202.8	2.3		50.0
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	66.8		33.5	70.0		33.7	61.5		27.0	65.8		30.5
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	741.7	1.4	0.0	126.9
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	4858.1		33.7	9652.8		34.0	62.9		768.7	67.2		157.4
Level of Service (LOS)	F		C	F		C	E		F	E		F
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		689.4	F		150.8	F	
Intersection Delay s/veh / LOS	1616.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.8	C	2.0	A

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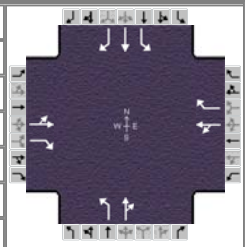
2010 HCS Signalized Intersection Results Summary

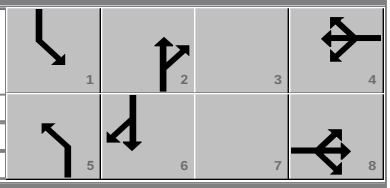
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Alternative 8				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	170	85	300	50	110	130	350	885	40	105	810	115

Signal Information			
Cycle, s	140.0	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	11.2	13.5	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	70.5	17.3	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.7		11.1	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.99	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	283	0	333	178	0	144	389	0	1028	117	900	128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	10	0	1579	179	0	1579	1774	0	1848	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	9.5	30.7	0.0	64.2	9.1	44.6	8.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	9.5	30.7	0.0	64.2	9.1	44.6	8.4
Capacity *(c)*, veh/h	46		515	92		515	390		847	142	593	503
Volume-to-Capacity Ratio *(X)*	6.147	0.000	0.647	1.926	0.000	0.280	0.996	0.000	1.213	0.819	1.517	0.254
Available Capacity *(c_a)*, veh/h	46		515	92		515	390		847	390	593	503
Back of Queue *(Q)*, veh/ln	120.9		10.2	46.0		3.7	16.0		113.5	4.2	172.2	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	66.8		40.3	42.4		35.0	54.5		27.7	63.4	40.3	35.4
Incremental Delay *(d_2)*, s/veh	9310.6	0.0	3.0	1706.9	0.0	0.4	24.2	0.0	385.1	5.7	934.1	0.6
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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	9377.4		43.3	1749.3		35.3	78.7		412.7	69.1	974.4	35.9
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	4332.0	F		981.0	F		321.0	F		777.3	F	
Intersection Delay s/veh / LOS	1237.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	1.0	A	2.8	C	2.4	B

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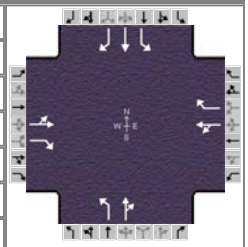
ALTERNATIVE WALMART MCLOUD AM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

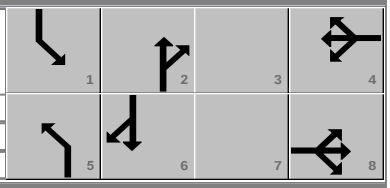
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	AM KY 321 & New Walmart (McCloud).xus				
Project Description	AM No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	181	30	90	40	10	80	268	537	30	130	1125	140

Signal Information			
Cycle, s	160.0	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	15.0	5.8	64.8	55.7	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	62.2	62.2	62.2	62.2	26.9	76.7	21.1	70.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	57.7	57.7	57.7	57.7	22.8		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		0.19	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	234	0	100	56	0	89	298	0	630	144	1250	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	17	0	1579	1774	0	1845	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	7.1	0.0	0.0	6.2	20.8	0.0	41.8	12.9	64.6	10.4
Cycle Queue Clearance Time *(g_c)*, s	55.7	0.0	7.1	55.7	0.0	6.2	20.8	0.0	41.8	12.9	64.6	10.4
Capacity *(c)*, veh/h	42		550	46		550	231		812	166	752	637
Volume-to-Capacity Ratio *(X)*	5.604	0.000	0.182	1.199	0.000	0.162	1.291	0.000	0.776	0.868	1.662	0.244
Available Capacity *(c_a)*, veh/h	42		550	46		550	231		812	231	752	637
Back of Queue *(Q)*, veh/ln	98.6		2.8	8.6		2.5	43.1		16.2	6.4	275.2	4.0
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	80.0		36.3	73.0		36.0	69.6		27.7	71.5	36.9	31.6
Incremental Delay *(d_2)*, s/veh	8340.0	0.0	0.2	519.5	0.0	0.2	527.0	0.0	0.7	13.1	1194.6	0.4
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	8420.0		36.5	592.6		36.2	596.6		28.4	84.6	1231.5	32.0
Level of Service (LOS)	F		D	F		D	F		C	F	F	C
Approach Delay, s/veh / LOS	5913.3	F		250.2	F		210.7	F		1004.3	F	
Intersection Delay s/veh / LOS	1273.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	0.7	A	2.0	B	3.0	C

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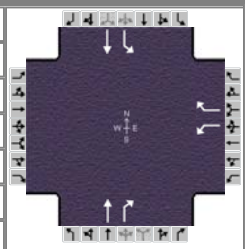
ALTERNATIVE EXISTING AM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

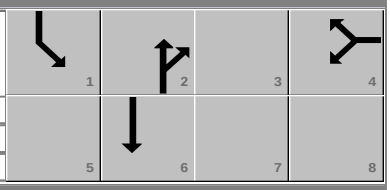
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				30		230		530	90	170	600	

Signal Information			
Cycle, s	160.0	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	19.1	72.4	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	135.1	24.9	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			18.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.3	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			0.19	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			33	0	256	0	589	100	189	667	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.1	51.0	21.1	0.0	40.5	5.9	16.8	20.7	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.1	51.0	21.1	0.0	40.5	5.9	16.8	20.7	0.0
Capacity *(c)*, veh/h				565	0	503		843	714	212	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.059	0.000	0.508	0.000	0.699	0.140	0.891	0.589	0.000
Available Capacity (c_a), veh/h				565	0	503		843	714	282	1133	
Back of Queue *(Q)*, veh/ln				0.9		8.4		19.0	2.3	7.7	5.5	
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				37.8	0.0	44.3		35.1	25.6	69.4	7.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	1.0	0.0	4.9	0.4	3.1	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				37.9	0.0	45.3		40.0	26.0	72.5	8.1	
Level of Service (LOS)				D		D		D	C	E	A	
Approach Delay, s/veh / LOS	0.0			44.4		D	38.0		D	22.3		C
Intersection Delay s/veh / LOS	31.7						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.6	A	1.9	A

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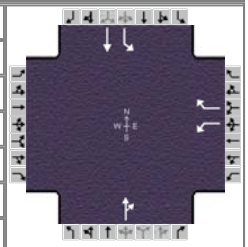
2010 HCS Signalized Intersection Results Summary

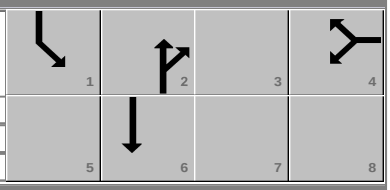
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM Existing				



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		660	100	100	640	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	844	111	0	767
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1820	1774	0	1839
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	51.2	9.9	0.0	17.3
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	51.2	9.9	0.0	17.3
Capacity *(c)*, veh/h				455	0	405			1020	137		1239
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.828	0.810	0.000	0.619
Available Capacity (c_a), veh/h				455	0	405			1020	327		1239
Back of Queue *(Q)*, veh/ln				3.6		3.6			16.4	4.5		3.6
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				47.2	0.0	47.6			16.8	72.7		4.1
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	0.8	2.3	0.0	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
Control Delay *(d)*, s/veh				47.5	0.0	48.0			17.6	75.0		4.3
Level of Service (LOS)				D		D			B	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	17.6		B	13.3		B
Intersection Delay s/veh / LOS	19.1						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.0	B	1.9	A

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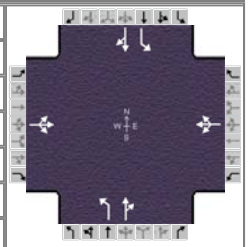
2010 HCS Signalized Intersection Results Summary

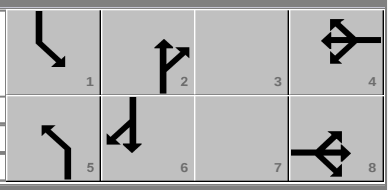
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM Existing				



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	0	20	70	0	100	20	670	100	150	650	20

Signal Information			
Cycle, s	160.0	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	3.8	7.2	97.1	28.3	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	33.0	33.0	33.0	33.0	10.1	103.4	23.6	117.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.7	4.7	27.5	27.5	4.0		16.8	
Green Extension Time (g_e), s	0.9	0.9	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	189	0	0	22	0	856	167	0	744
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1284	0	0	1158	0	0	1774	0	1820	1774	0	1853
Queue Service time (g_s), s	0.0	0.0	0.0	22.8	0.0	0.0	2.0	0.0	41.4	14.8	0.0	11.6
Cycle Queue Clearance Time (g_c), s	2.7	0.0	0.0	25.5	0.0	0.0	2.0	0.0	41.4	14.8	0.0	11.6
Capacity *(c)*, veh/h	257			236			42		1105	192		1281
Volume-to-Capacity Ratio *(X)*	0.130	0.000	0.000	0.799	0.000	0.000	0.532	0.000	0.774	0.870	0.000	0.581
Available Capacity (c_a), veh/h	387			365			444		1105	444		1281
Back of Queue *(Q)*, veh/ln	1.2			8.0			0.9		11.1	6.7		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	55.3			64.1			77.2		11.3	70.3		2.6
Incremental Delay (d_2), s/veh	0.2	0.0	0.0	7.2	0.0	0.0	1.0	0.0	0.5	1.2	0.0	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	55.6			71.3			78.2		11.8	71.5		2.8
Level of Service (LOS)	E			E			E		B	E		A
Approach Delay, s/veh / LOS	55.6	E		71.3	E		13.5	B		15.3	B	
Intersection Delay s/veh / LOS	20.5						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.8	A	1.9	A	2.0	A

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Existing
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		560	150	190	750	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		622	166	211	833	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		40			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		44			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		211		88				
C(m) (vph)		831		93				
v/c		0.25		0.95				
95% queue length		1.01		5.44				
Control Delay		10.8		160.6				
LOS		B		F				
Approach Delay				160.6				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Existing
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	550	30	60	970	50
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	5	611	33	66	1077	55
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	20	0	30	5	0	5
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	22	0	33	5	0	5
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	5	66	22		33	5		5
C(m) (vph)	617	941	51		483	46		257
v/c	0.01	0.07	0.43		0.07	0.11		0.02
95% queue length	0.02	0.23	1.58		0.22	0.34		0.06
Control Delay	10.9	9.1	121.1		13.0	92.6		19.3
LOS	B	A	F		B	F		C
Approach Delay				56.2			55.9	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM Existing
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	510	90	220	380	5
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	566	100	244	422	5
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

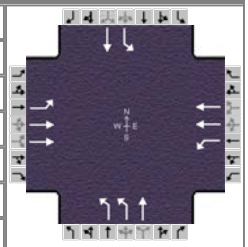
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	70	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	77	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	244		88			11	
C(m) (vph)	1132	923		282			630	
v/c	0.01	0.26		0.31			0.02	
95% queue length	0.03	1.06		1.29			0.05	
Control Delay	8.2	10.3		23.5			10.8	
LOS	A	B		C			B	
Approach Delay				23.5			10.8	
Approach LOS				C			B	

2010 HCS Signalized Intersection Results Summary

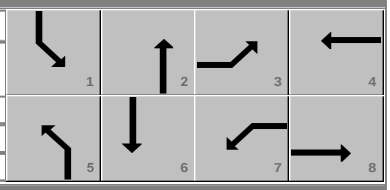
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM Existing				



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	330		70	140		320	130		160	340	

Signal Information			
Cycle, s	160.0	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	18.5	2.7	83.9	3.9	5.0	20.6
Yellow	4.3	0.0	4.3	5.0	0.0	5.0
Red	1.8	0.0	1.8	1.6	0.0	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	27.1	15.5	32.1	27.4	92.7	24.6	90.0
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	18.1	8.9	8.2	17.8		17.8	
Green Extension Time (g_e), s	0.0	2.6	0.2	2.7	3.5	0.0	0.8	0.0
Phase Call Probability	0.39	1.00	0.97	1.00	1.00		1.00	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	367	0	78	156	0	356	144	0	178	378	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	16.1	0.0	6.9	6.2	0.0	15.8	3.9	0.0	15.8	19.4	0.0
Cycle Queue Clearance Time (g_c), s	1.0	16.1	0.0	6.9	6.2	0.0	15.8	3.9	0.0	15.8	19.4	0.0
Capacity (*c*), veh/h	43	458		98	568		458	1006		206	974	
Volume-to-Capacity Ratio (*X*)	0.257	0.801	0.000	0.791	0.274	0.000	0.776	0.144	0.000	0.865	0.388	0.000
Available Capacity (c_a), veh/h	333	987		333	1097		1881	1006		969	974	
Back of Queue (*Q*), veh/ln	0.5	7.4		3.6	2.8		6.6	1.6		7.8	8.7	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	76.6	67.7		74.6	59.0		63.5	10.8		69.5	22.8	
Incremental Delay (d_2), s/veh	6.6	4.1	0.0	17.2	0.3	0.0	0.6	0.0	0.0	13.8	1.2	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	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	83.3	71.8		91.9	59.3		64.1	10.9		83.3	24.0	
Level of Service (LOS)	F	E		F	E		E	B		F	C	
Approach Delay, s/veh / LOS	72.1	E		70.2	E		48.7	D		43.0	D	
Intersection Delay s/veh / LOS	55.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.8	A	0.7	A	1.3	A	1.4	A

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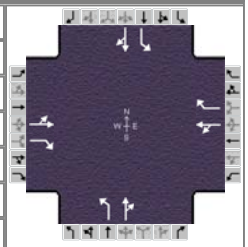
2010 HCS Signalized Intersection Results Summary

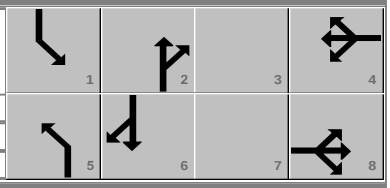
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM Existing				



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	10	30	190	10	90	40	420	150	120	780	10

Signal Information			
Cycle, s	160.0	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	5.2	1.8	70.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	12.2	76.3	21.0	85.1
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	6.0		13.9	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.86		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.00		0.12	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	33	222	0	100	44	0	633	133	0	878
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1779	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	2.2	0.0	0.0	7.0	4.0	0.0	46.4	11.9	0.0	69.7
Cycle Queue Clearance Time (g_c), s	57.0	0.0	2.2	57.0	0.0	7.0	4.0	0.0	46.4	11.9	0.0	69.7
Capacity *(c)*, veh/h	49		562	44		562	58		781	155		918
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.059	5.057	0.000	0.178	0.766	0.000	0.811	0.859	0.000	0.956
Available Capacity (c_a), veh/h	49		562	44		562	225		781	225		918
Back of Queue *(Q)*, veh/ln	1.9		0.9	91.6		2.7	1.8		18.0	5.4		25.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	60.3		33.9	80.0		35.4	76.8		30.8	72.0		25.8
Incremental Delay (d_2), s/veh	36.7	0.0	0.0	7352.8	0.0	0.2	2.8	0.0	0.9	2.3	0.0	3.6
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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	96.9		33.9	7432.8		35.6	79.6		31.7	74.3		29.5
Level of Service (LOS)	F		C	F		D	E		C	E		C
Approach Delay, s/veh / LOS	65.4	E		5137.1	F		34.8	C		35.4	D	
Intersection Delay s/veh / LOS	827.3						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.0	A	1.6	A	2.2	B

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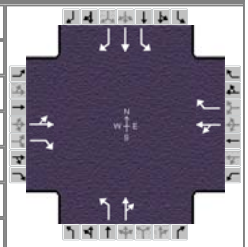
2010 HCS Signalized Intersection Results Summary

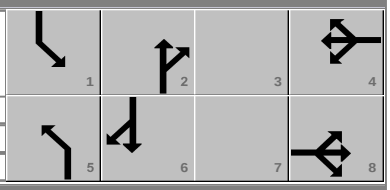
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60	20	70	30	10	60	120	440	20	100	880	110

Signal Information			
Cycle, s	160.0	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	12.1	2.1	89.1	37.9	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	44.4	44.4	44.4	44.4	20.3	97.3	18.2	95.2
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	38.4	38.4	38.4	38.4	13.8		11.9	
Green Extension Time *(g_e)*, s	1.1	1.1	1.1	1.1	0.4	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.99	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	89	0	78	44	0	67	133	0	511	111	978	122
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	74	0	1579	73	0	1579	1774	0	1848	1774	1863	1579
Queue Service time *(g_s)*, s	1.6	0.0	6.4	1.6	0.0	5.5	11.8	0.0	16.5	9.9	68.8	5.8
Cycle Queue Clearance Time *(g_c)*, s	36.4	0.0	6.4	36.4	0.0	5.5	11.8	0.0	16.5	9.9	68.8	5.8
Capacity *(c)*, veh/h	56		359	56		359	158		1070	134	1054	893
Volume-to-Capacity Ratio *(X)*	1.583	0.000	0.217	0.795	0.000	0.186	0.846	0.000	0.478	0.827	0.928	0.137
Available Capacity *(c_a)*, veh/h	164		550	161		550	462		1070	462	1054	893
Back of Queue *(Q)*, veh/ln	19.1		2.6	2.3		2.2	5.4		5.2	4.7	22.9	2.1
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	74.9		50.2	73.5		49.9	71.8		9.9	72.9	17.0	16.4
Incremental Delay *(d_2)*, s/veh	1076.4	0.0	0.4	30.1	0.0	0.3	1.2	0.0	0.1	6.4	9.6	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	1151.3		50.6	103.7		50.2	73.0		10.1	79.3	26.6	16.5
Level of Service (LOS)	F		D	F		D	E		B	E	C	B
Approach Delay, s/veh / LOS	637.6	F		71.6	E		23.1	C		30.4	C	
Intersection Delay s/veh / LOS	77.8						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.8	A	0.7	A	1.6	A	2.5	B

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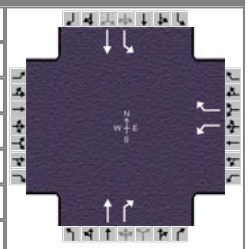
ALTERNATIVE EXISTING PM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

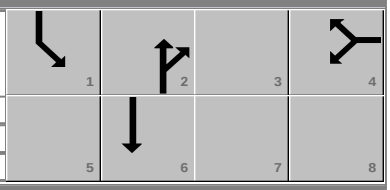
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM Existing				



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		250		710	60	140	700	

Signal Information			
Cycle, s	140.0	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	14.4	57.1	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	119.8	20.2	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			14.1	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	278	0	789	67	156	778	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.3	51.0	19.0	0.0	57.1	3.7	12.1	34.8	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.3	51.0	19.0	0.0	57.1	3.7	12.1	34.8	0.0
Capacity *(c)*, veh/h				646	0	575		760	644	182	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.069	0.000	0.483	0.000	1.038	0.104	0.853	0.756	0.000
Available Capacity (c_a), veh/h				646	0	575		760	644	322	1029	
Back of Queue *(Q)*, veh/ln				1.0		7.4		48.1	1.4	5.4	9.8	
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				29.0	0.0	34.3		41.4	25.6	61.8	12.9	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	0.8	0.0	109.5	0.3	1.2	0.5	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				29.1	0.0	35.1		150.9	25.9	63.0	13.3	
Level of Service (LOS)				C		D		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			34.3		C	141.2		F	21.6		C
Intersection Delay s/veh / LOS	72.0						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.9	A	2.0	B

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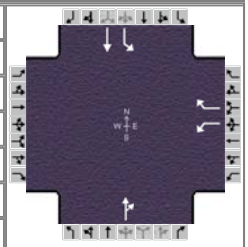
2010 HCS Signalized Intersection Results Summary

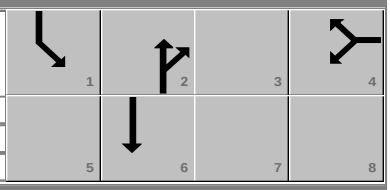
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM Existing				



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		860	100	100	900	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1067	111	0	1056
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1828	1774	0	1845
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	56.6
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	56.6
Capacity *(c)*, veh/h				520	0	462			927	140		1157
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.150	0.791	0.000	0.912
Available Capacity (c_a), veh/h				520	0	462			927	374		1157
Back of Queue *(Q)*, veh/ln				2.9		3.0			93.4	3.9		9.5
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				37.3	0.0	37.7			23.9	63.3		9.5
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	271.4	2.0	0.0	1.4
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				37.6	0.0	38.0			295.3	65.3		11.0
Level of Service (LOS)				D		D			F	E		B
Approach Delay, s/veh / LOS	0.0			37.8		D	295.3		F	16.1		B
Intersection Delay s/veh / LOS	139.4						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.4	B	2.4	B

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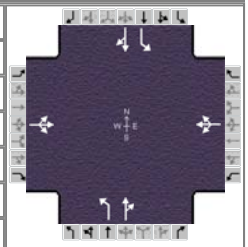
2010 HCS Signalized Intersection Results Summary

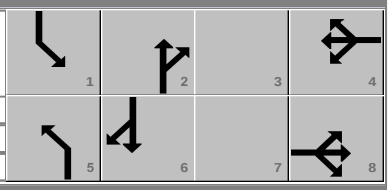
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	5	50	70	5	70	70	810	50	70	880	40

Signal Information			
Cycle, s	140.0	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	7.9	92.7	22.1	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	26.8	26.8	26.8	26.8	14.2	99.0	14.2	99.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	10.0	10.0	21.2	21.2	8.1		8.1	
Green Extension Time (g_e), s	1.0	1.0	1.0	1.0	0.2	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.95		0.95	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	94	0	0	161	0	0	78	0	956	78	0	1022
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1361	0	0	1134	0	0	1774	0	1843	1774	0	1848
Queue Service time (g_s), s	0.0	0.0	0.0	11.2	0.0	0.0	6.1	0.0	29.7	6.1	0.0	36.4
Cycle Queue Clearance Time (g_c), s	8.0	0.0	0.0	19.2	0.0	0.0	6.1	0.0	29.7	6.1	0.0	36.4
Capacity *(c)*, veh/h	250			218			100		1220	100		1223
Volume-to-Capacity Ratio *(X)*	0.378	0.000	0.000	0.741	0.000	0.000	0.777	0.000	0.783	0.777	0.000	0.836
Available Capacity (c_a), veh/h	447			399			712		1220	712		1223
Back of Queue *(Q)*, veh/ln	3.1			6.1			2.7		4.6	2.7		4.9
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	52.7			56.9			65.2		5.0	65.2		5.3
Incremental Delay (d_2), s/veh	0.9	0.0	0.0	5.1	0.0	0.0	1.2	0.0	0.5	1.2	0.0	0.7
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	53.7			62.0			66.4		5.5	66.4		6.0
Level of Service (LOS)	D			E			E		A	E		A
Approach Delay, s/veh / LOS	53.7	D		62.0	E		10.1	B		10.3	B	
Intersection Delay s/veh / LOS	15.4						B					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.6	A	0.8	A	2.2	B	2.3	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Existing
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		980	40	50	1030	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1088	44	55	1144	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		50			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		55			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		55		99				
C(m) (vph)		617		69				
v/c		0.09		1.43				
95% queue length		0.29		8.25				
Control Delay		11.4		363.0				
LOS		B		F				
Approach Delay				363.0				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Existing
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	20	850	80	80	640	80
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	22	944	88	88	711	88
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	20	5	70	30	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	22	5	77	33	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	22	88	27		77	44		11
C(m) (vph)	824	673	36		300	31		409
v/c	0.03	0.13	0.75		0.26	1.42		0.03
95% queue length	0.08	0.45	2.67		1.00	4.95		0.08
Control Delay	9.5	11.2	240.9		21.1	503.7		14.0
LOS	A	B	F		C	F		B
Approach Delay				78.2			405.8	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM Existing
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	540	70	240	450	5
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	600	77	266	500	5
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

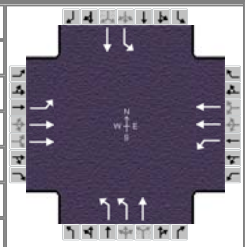
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	20	0	150	5	5	30
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	22	0	166	5	5	33
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	266		188			43	
C(m) (vph)	1060	915		233			146	
v/c	0.01	0.29		0.81			0.29	
95% queue length	0.03	1.21		6.04			1.15	
Control Delay	8.4	10.5		63.6			39.6	
LOS	A	B		F			E	
Approach Delay				63.6			39.6	
Approach LOS				F			E	

2010 HCS Signalized Intersection Results Summary

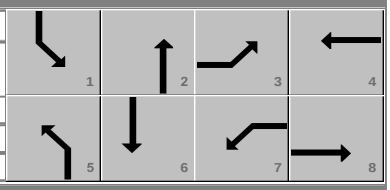
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM Existing				



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	120		150	240		680	300		50	220	

Signal Information			
Cycle, s	140.0	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	7.1	25.0	52.0	3.5	5.3	9.1
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	15.6	22.0	27.5	44.3	89.2	13.2	58.1
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	7.1	14.9	11.7	29.6		6.3	
Green Extension Time *(g_e)*, s	0.0	2.0	0.5	2.0	8.6	0.0	0.2	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.88	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	133	0	167	267	0	756	333	0	56	244	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	5.1	0.0	12.9	9.7	0.0	27.6	6.9	0.0	4.3	13.3	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	5.1	0.0	12.9	9.7	0.0	27.6	6.9	0.0	4.3	13.3	0.0
Capacity *(c)*, veh/h	44	230		195	532		940	1103		90	689	
Volume-to-Capacity Ratio *(X)*	0.250	0.580	0.000	0.853	0.501	0.000	0.804	0.302	0.000	0.619	0.355	0.000
Available Capacity *(c_a)*, veh/h	380	962		380	1264		1905	1103		981	689	
Back of Queue *(Q)*, veh/ln	0.5	2.4		6.4	4.3		10.7	2.3		2.1	6.2	
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	67.0	63.6		61.2	54.7		41.2	6.7		65.1	32.0	
Incremental Delay *(d_2)*, s/veh	6.2	2.8	0.0	13.2	0.9	0.0	0.3	0.1	0.0	8.4	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	66.4		74.4	55.6		41.5	6.8		73.5	33.4	
Level of Service (LOS)	E	E		E	E		D	A		E	C	
Approach Delay, s/veh / LOS	66.9	E		62.8	E		30.9	C		40.8	D	
Intersection Delay s/veh / LOS	42.1						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.6	A	0.8	A	2.3	B	1.0	A

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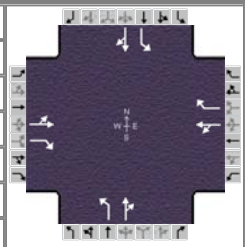
2010 HCS Signalized Intersection Results Summary

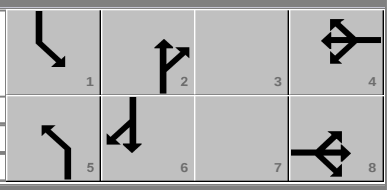
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	20	90	180	30	100	110	700	160	50	570	20

Signal Information			
Cycle, s	140.0	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	5.7	6.1	62.4	47.0	0.0	0.0
Yellow	4.3	0.0	4.3	3.0	0.0	0.0
Red	2.7	0.0	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	18.9	74.6	12.7	68.4
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.7	4.7	4.7	4.7	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	11.5		6.3	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.99		0.88	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	156	0	100	233	0	111	122	0	956	56	0	656
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	13	0	1579	3	0	1579	1774	0	1802	1774	0	1851
Queue Service time *(g_s)*, s	0.0	0.0	6.3	0.0	0.0	7.0	9.5	0.0	68.6	4.3	0.0	38.3
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	6.3	47.0	0.0	7.0	9.5	0.0	68.6	4.3	0.0	38.3
Capacity *(c)*, veh/h	52		530	49		530	150		883	72		826
Volume-to-Capacity Ratio *(X)*	2.980	0.000	0.189	4.798	0.000	0.210	0.813	0.000	1.082	0.767	0.000	0.794
Available Capacity *(c_a)*, veh/h	52		530	49		530	384		883	384		826
Back of Queue *(Q)*, veh/ln	54.3		2.5	94.7		2.7	4.3		60.6	2.0		14.0
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	66.0		33.0	69.2		33.2	63.0		26.4	66.5		23.8
Incremental Delay *(d_2)*, s/veh	3615.5	0.0	0.2	6882.8	0.0	0.2	1.4	0.0	150.4	1.6	0.0	0.8
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	3681.5		33.2	6952.0		33.4	64.4		176.8	68.1		24.5
Level of Service (LOS)	F		C	F		C	E		F	E		C
Approach Delay, s/veh / LOS	2253.9		F	4720.2		F	164.1		F	27.9		C
Intersection Delay s/veh / LOS	1004.0						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	1.1	A	2.3	B	1.7	A

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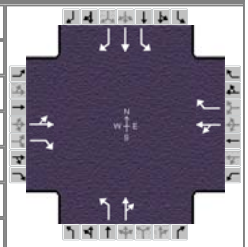
2010 HCS Signalized Intersection Results Summary

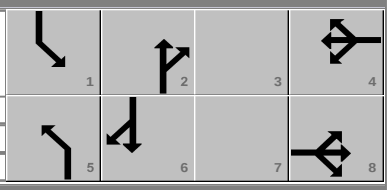
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Walmart/Lowes	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM Existing				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	260	30	240	40	40	150	280	680	30	120	630	180

Signal Information			
Cycle, s	140.0	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	12.6	7.9	49.0	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	32.7	69.1	18.7	55.1
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	26.1		12.4	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.99	
Max Out Probability	1.00	1.00	1.00	1.00	0.69		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	322	0	267	89	0	167	311	0	789	133	700	200
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1849	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	19.2	0.0	0.0	11.1	24.1	0.0	55.8	10.4	48.8	13.2
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	19.2	45.7	0.0	11.1	24.1	0.0	55.8	10.4	48.8	13.2
Capacity *(c)*, veh/h	49		515	65		515	337		829	160	650	550
Volume-to-Capacity Ratio *(X)*	6.605	0.000	0.517	1.364	0.000	0.323	0.924	0.000	0.952	0.834	1.078	0.363
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		829	390	650	550
Back of Queue *(Q)*, veh/ln	139.1		7.6	15.8		4.4	10.9		21.0	4.8	47.6	5.1
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	70.0		38.2	51.8		35.5	55.7		27.2	62.7	37.5	34.0
Incremental Delay *(d_2)*, s/veh	10132.6	0.0	1.1	745.4	0.0	0.4	3.9	0.0	3.7	5.6	156.0	0.9
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	10202.6		39.3	797.1		35.9	59.6		30.9	68.3	193.5	34.9
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	5600.3	F		300.7	F		39.0	D		146.6	F	
Intersection Delay s/veh / LOS	1198.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.5	A	0.9	A	2.3	B	2.2	B

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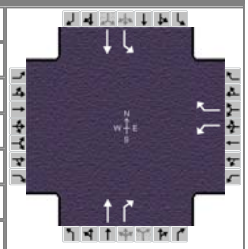
ALTERNATIVE NO-BUILD AM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

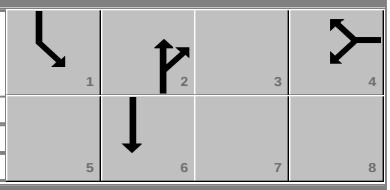
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	AM No Build				



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		310		675	130	230	755	

Signal Information			
Cycle, s	160.0	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	24.8	66.7	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	129.4	30.6	160.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			24.8	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.1	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			44	0	344	0	750	144	256	839	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.8	51.0	30.4	0.0	62.9	9.4	22.8	34.1	0.0
Capacity *(c)*, veh/h				565	0	503		776	658	275	1133	
Volume-to-Capacity Ratio *(X)*	0.000			0.079	0.000	0.685	0.000	0.966	0.220	0.929	0.741	0.000
Available Capacity (c_a), veh/h				565	0	503		776	658	282	1133	
Back of Queue *(Q)*, veh/ln				1.2		12.5		36.7	3.7	10.6	7.8	
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				38.1	0.0	47.5		45.6	30.0	66.7	9.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	4.1	0.0	39.9	0.8	6.3	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				38.2	0.0	51.6		85.5	30.7	73.0	9.6	
Level of Service (LOS)				D		D		F	C	E	A	
Approach Delay, s/veh / LOS	0.0			50.1		D	76.6		E	24.4		C
Intersection Delay s/veh / LOS	48.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	2.0	A	2.3	B

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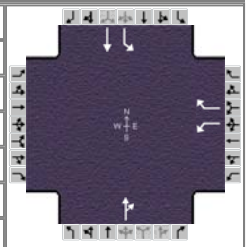
2010 HCS Signalized Intersection Results Summary

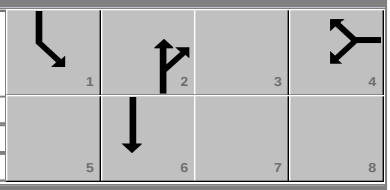
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	AM No Build				



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		785	100	100	845	

Signal Information			
Cycle, s	160.0	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	12.4	89.7	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	141.9	18.1	160.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			11.9	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	983	111	0	994
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1826	1774	0	1844
Queue Service time (g_s), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Cycle Queue Clearance Time (g_c), s	0.0			8.0	41.0	9.0	0.0	0.0	78.0	9.9	0.0	33.9
Capacity *(c)*, veh/h				455	0	405			1024	137		1243
Volume-to-Capacity Ratio *(X)*	0.000			0.244	0.000	0.275	0.000	0.000	0.960	0.810	0.000	0.800
Available Capacity (c_a), veh/h				455	0	405			1024	327		1243
Back of Queue *(Q)*, veh/ln				3.6		3.6			25.6	4.5		4.9
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				47.2	0.0	47.6			20.3	72.7		4.9
Incremental Delay (d_2), s/veh	0.0			0.3	0.0	0.4	0.0	0.0	3.7	2.3	0.0	0.5
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				47.5	0.0	48.0			23.9	75.0		5.4
Level of Service (LOS)				D		D			C	E		A
Approach Delay, s/veh / LOS	0.0			47.8		D	23.9		C	12.4		B
Intersection Delay s/veh / LOS	20.7						C					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.3	B	2.3	B

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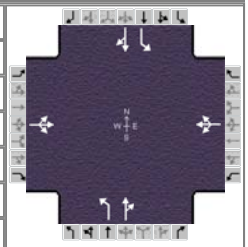
2010 HCS Signalized Intersection Results Summary

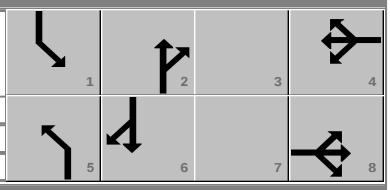
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	AM No Build				



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	0	20	90	0	130	20	865	120	190	835	20

Signal Information			
Cycle, s	160.0	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	3.8	11.2	85.2	36.2	0.0	0.0
Yellow	4.3	4.3	4.3	3.1	0.0	0.0
Red	2.0	2.0	2.0	1.6	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	40.9	40.9	40.9	40.9	10.1	91.5	27.5	109.0
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.3	4.3	4.3	4.3	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	4.5	4.5	35.4	35.4	4.0		20.7	
Green Extension Time (g_e), s	1.1	1.1	0.8	0.8	0.0	0.0	0.5	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.63		1.00	
Max Out Probability	0.00	0.00	0.02	0.02	0.00		0.01	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	0	244	0	0	22	0	1094	211	0	950
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1266	0	0	1145	0	0	1774	0	1823	1774	0	1855
Queue Service time (g_s), s	0.0	0.0	0.0	30.9	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Cycle Queue Clearance Time (g_c), s	2.5	0.0	0.0	33.4	0.0	0.0	2.0	0.0	85.2	18.7	0.0	38.1
Capacity *(c)*, veh/h	317			291			42		971	235		1190
Volume-to-Capacity Ratio *(X)*	0.105	0.000	0.000	0.839	0.000	0.000	0.532	0.000	1.127	0.897	0.000	0.798
Available Capacity (c_a), veh/h	390			365			355		971	355		1190
Back of Queue *(Q)*, veh/ln	1.1			10.9			0.9		91.0	8.5		6.4
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	48.8			60.2			77.2		24.9	68.3		7.1
Incremental Delay (d_2), s/veh	0.1	0.0	0.0	14.8	0.0	0.0	1.0	0.0	230.7	2.2	0.0	0.5
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	49.0			75.0			78.2		255.6	70.5		7.7
Level of Service (LOS)	D			E			E		F	E		A
Approach Delay, s/veh / LOS	49.0	D		75.0	E		252.1	F		19.1	B	
Intersection Delay s/veh / LOS	126.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.9	A	2.3	B	2.4	B

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM No Build
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		675	130	230	755	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		750	144	255	838	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		310			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	44		344			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		255		388				
C(m) (vph)		759		175				
v/c		0.34		2.22				
95% queue length		1.48		31.28				
Control Delay		12.1		608.5				
LOS		B		F				
Approach Delay				608.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM No Build
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	715	40	80	1235	60
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	794	44	88	1372	66
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	40	10	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	44	11	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT		R	LT		R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	11	88	33		44	11		11
C(m) (vph)	472	796	19		377	17		171
v/c	0.02	0.11	1.74		0.12	0.65		0.06
95% queue length	0.07	0.37	4.50		0.39	1.69		0.20
Control Delay	12.8	10.1	779.3		15.8	398.1		27.5
LOS	B	B	F		C	F		D
Approach Delay				343.0			212.8	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: AM No Build
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	665	120	280	485	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	738	133	311	538	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

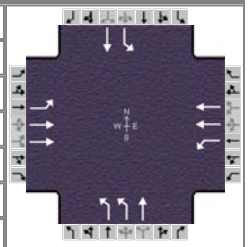
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10	0	90	0	0	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	0	100	0	0	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	311		111			11	
C(m) (vph)	1021	774		177			539	
v/c	0.01	0.40		0.63			0.02	
95% queue length	0.03	1.95		3.53			0.06	
Control Delay	8.6	12.7		54.5			11.8	
LOS	A	B		F			B	
Approach Delay				54.5			11.8	
Approach LOS				F			B	

2010 HCS Signalized Intersection Results Summary

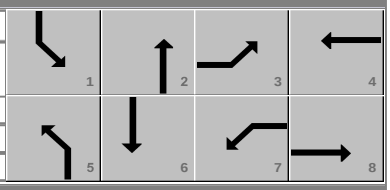
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	AM No Build				



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	480		95	200		410	160		200	430	

Signal Information			
Cycle, s	160.0	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	22.7	4.0	67.7	3.9	1.1	28.7
Yellow	4.3	0.0	4.3	5.0	5.0	5.0
Red	1.8	0.0	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.5	35.2	18.2	42.9	32.7	77.8	28.8	73.8
Change Period, ($Y+R_c$), s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time (g_s), s	3.0	25.2	11.4	10.3	22.0		21.7	
Green Extension Time (g_e), s	0.0	3.5	0.3	4.1	4.7	0.0	1.0	0.0
Phase Call Probability	0.39	1.00	0.99	1.00	1.00		1.00	
Max Out Probability	0.00	0.05	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	533	0	106	222	0	456	178	0	222	478	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time (g_s), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Cycle Queue Clearance Time (g_c), s	1.0	23.2	0.0	9.4	8.3	0.0	20.0	7.1	0.0	19.7	31.9	0.0
Capacity (*c*), veh/h	43	636		129	807		574	832		251	786	
Volume-to-Capacity Ratio (*X*)	0.257	0.838	0.000	0.820	0.275	0.000	0.794	0.214	0.000	0.884	0.608	0.000
Available Capacity (c_a), veh/h	333	926		333	1097		1649	832		849	786	
Back of Queue (*Q*), veh/ln	0.5	10.8		4.8	3.7		8.3	2.9		9.7	15.0	
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	76.6	63.4		73.2	50.9		59.7	19.3		67.4	35.9	
Incremental Delay (d_2), s/veh	6.6	5.4	0.0	15.9	0.2	0.0	0.5	0.1	0.0	13.4	3.5	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	83.3	68.7		89.0	51.1		60.2	19.4		80.7	39.5	
Level of Service (LOS)	F	E		F	D		E	B		F	D	
Approach Delay, s/veh / LOS	69.0	E		63.3	E		48.7	D		52.6	D	
Intersection Delay s/veh / LOS	57.1						E					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	0.8	A	1.5	A	1.6	A

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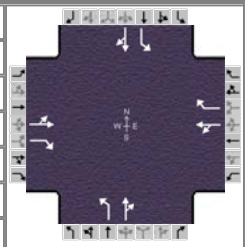
2010 HCS Signalized Intersection Results Summary

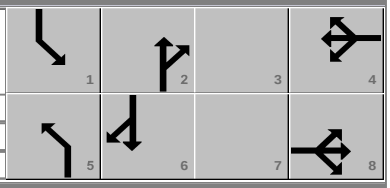
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	AM No Build				



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	10	40	240	10	110	50	555	190	150	1005	10

Signal Information			
Cycle, s	160.0	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	6.5	3.5	67.3	57.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	62.7	62.7	62.7	62.7	13.5	73.3	24.0	83.8
Change Period, $(Y+R_c)$, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	5.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	59.0	59.0	59.0	59.0	7.0		16.8	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.92		1.00	
Max Out Probability	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	33	0	44	278	0	122	56	0	828	167	0	1128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	33	0	1579	0	0	1579	1774	0	1781	1774	0	1859
Queue Service time (g_s), s	0.0	0.0	3.0	0.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Cycle Queue Clearance Time (g_c), s	57.0	0.0	3.0	57.0	0.0	8.6	5.0	0.0	67.3	14.8	0.0	77.8
Capacity *(c)*, veh/h	49		562	44		562	72		749	188		904
Volume-to-Capacity Ratio *(X)*	0.678	0.000	0.079	6.295	0.000	0.217	0.772	0.000	1.104	0.886	0.000	1.247
Available Capacity (c_a), veh/h	49		562	44		562	225		749	225		904
Back of Queue *(Q)*, veh/ln	1.9		1.2	119.2		3.4	2.3		65.9	6.9		140.0
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	60.3		34.1	80.0		35.9	76.0		38.0	70.6		28.3
Incremental Delay (d_2), s/veh	36.8	0.0	0.1	9579.6	0.0	0.2	2.3	0.0	190.3	3.9	0.0	445.9
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	97.1		34.2	9659.6		36.1	78.3		228.3	74.4		474.1
Level of Service (LOS)	F		C	F		D	E		F	E		F
Approach Delay, s/veh / LOS	61.1	E		6719.1	F		218.9	F		422.7	F	
Intersection Delay s/veh / LOS	1292.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.1	A	1.9	A	2.6	B

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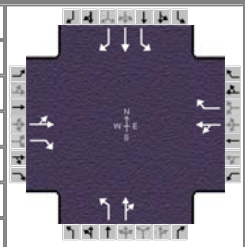
2010 HCS Signalized Intersection Results Summary

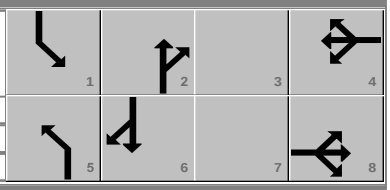
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	AM No Build				



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	30	90	40	10	80	150	575	30	130	1125	140

Signal Information			
Cycle, s	160.0	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	15.1	2.0	72.7	51.4	0.0	0.0
Yellow	4.3	0.0	4.3	5.0	0.0	0.0
Red	1.8	0.0	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	57.9	57.9	57.9	57.9	23.2	80.8	21.2	78.8
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	52.1	52.1	52.1	52.1	16.8		14.8	
Green Extension Time *(g_e)*, s	0.6	0.6	0.6	0.6	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	0.01		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	100	56	0	89	167	0	672	144	1250	156
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	54	0	1579	43	0	1579	1774	0	1846	1774	1863	1579
Queue Service time *(g_s)*, s	1.5	0.0	7.4	1.5	0.0	6.6	14.8	0.0	42.1	12.8	73.8	9.4
Cycle Queue Clearance Time *(g_c)*, s	50.1	0.0	7.4	50.1	0.0	6.6	14.8	0.0	42.1	12.8	73.8	9.4
Capacity *(c)*, veh/h	56		495	54		495	190		875	168	859	728
Volume-to-Capacity Ratio *(X)*	2.188	0.000	0.202	1.031	0.000	0.180	0.875	0.000	0.768	0.860	1.455	0.214
Available Capacity *(c_a)*, veh/h	87		550	83		550	308		875	308	859	728
Back of Queue *(Q)*, veh/ln	36.4		3.0	5.4		2.6	6.7		15.7	6.1	223.7	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	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	72.1		40.3	74.5		40.0	70.4		23.7	71.4	30.8	25.8
Incremental Delay *(d_2)*, s/veh	2196.2	0.0	0.2	209.3	0.0	0.2	1.7	0.0	0.6	6.5	821.7	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	0.0	0.0	0.0
Control Delay *(d)*, s/veh	2268.3		40.5	283.8		40.2	72.0		24.3	77.9	852.5	26.1
Level of Service (LOS)	F		D	F		D	E		C	E	F	C
Approach Delay, s/veh / LOS	1265.8	F		133.9	F		33.8	C		697.4	F	
Intersection Delay s/veh / LOS	511.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	0.7	A	1.9	A	3.0	C

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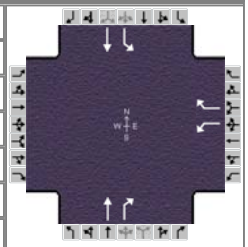
ALTERNATIVE NO-BUILD PM HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

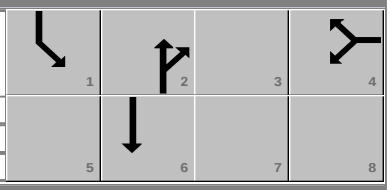
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & 2nd St	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & 2nd St.xus				
Project Description	PM No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				44		243		665	66	140	654	

Signal Information			
Cycle, s	140.0	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	14.4	57.1	51.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.5	1.8	2.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	3.0	2.0	4.0
Phase Duration, s	0.0		56.6	56.6	0.0	119.8	20.2	140.0
Change Period, $(Y+R_c)$, s	0.0		5.6	5.6	6.3	6.1	5.8	6.1
Max Allow Headway *(MAH)*, s	0.0		4.8	4.8	0.0	0.0	4.2	0.0
Queue Clearance Time (g_s), s			53.0	53.0			14.1	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability			1.00	1.00			1.00	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			49	0	270	0	739	73	156	727	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	1863	1579	1774	1863	0
Queue Service time (g_s), s	0.0			2.5	51.0	18.4	0.0	54.5	4.0	12.1	30.0	0.0
Cycle Queue Clearance Time (g_c), s	0.0			2.5	51.0	18.4	0.0	54.5	4.0	12.1	30.0	0.0
Capacity *(c)*, veh/h				646	0	575		760	644	182	1029	
Volume-to-Capacity Ratio *(X)*	0.000			0.076	0.000	0.470	0.000	0.973	0.114	0.853	0.707	0.000
Available Capacity (c_a), veh/h				646	0	575		760	644	322	1029	
Back of Queue *(Q)*, veh/ln				1.1		7.2		33.2	1.6	5.4	8.4	
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				29.1	0.0	34.1		40.7	25.7	61.8	12.2	
Incremental Delay (d_2), s/veh	0.0			0.1	0.0	0.7	0.0	44.3	0.4	1.2	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				29.2	0.0	34.8		84.9	26.1	63.0	12.6	
Level of Service (LOS)				C		C		F	C	E	B	
Approach Delay, s/veh / LOS	0.0			34.0		C	79.6		E	21.5		C
Intersection Delay s/veh / LOS	46.9						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS				F	1.8	A	1.9	A

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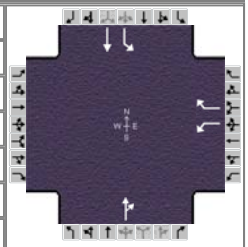
2010 HCS Signalized Intersection Results Summary

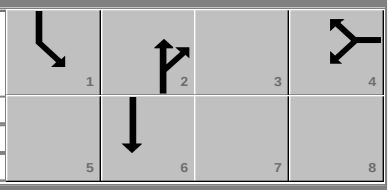
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Apple Tree Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Apple Tree Plaza.xus				
Project Description	PM No Build				



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		1135	100	100	1180	

Signal Information			
Cycle, s	140.0	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	11.1	71.0	41.0	0.0	0.0	0.0
Yellow	4.3	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.4	2.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	0		4	4	5	2	1	6
Case Number	0.0		9.0	9.0	0.0	4.0	2.0	4.0
Phase Duration, s	0.0		46.5	46.5	0.0	123.2	16.8	140.0
Change Period, $(Y+R_c)$, s	0.0		5.5	5.5	6.3	5.7	5.7	5.7
Max Allow Headway *(MAH)*, s	0.0		4.7	4.7	0.0	0.0	6.0	0.0
Queue Clearance Time (g_s), s			43.0	43.0			10.6	
Green Extension Time (g_e), s	0.0		0.0	0.0	0.0	0.0	0.6	0.0
Phase Call Probability			1.00	1.00			0.99	
Max Out Probability			1.00	1.00			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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	0			111	0	111	0	0	1372	111	0	1367
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0			1774	0	1579	0	0	1836	1774	0	1849
Queue Service time (g_s), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Cycle Queue Clearance Time (g_c), s	0.0			6.6	41.0	7.5	0.0	0.0	71.0	8.6	0.0	87.8
Capacity *(c)*, veh/h				520	0	462			931	140		1160
Volume-to-Capacity Ratio *(X)*	0.000			0.214	0.000	0.240	0.000	0.000	1.473	0.791	0.000	1.178
Available Capacity (c_a), veh/h				520	0	462			931	374		1160
Back of Queue *(Q)*, veh/ln				2.9		3.0			244.0	3.9		117.2
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				37.3	0.0	37.7			23.6	63.3		12.1
Incremental Delay (d_2), s/veh	0.0			0.2	0.0	0.3	0.0	0.0	852.7	2.0	0.0	322.1
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				37.6	0.0	38.0			876.3	65.3		334.2
Level of Service (LOS)				D		D			F	E		F
Approach Delay, s/veh / LOS	0.0			37.8		D	876.3		F	314.0		F
Intersection Delay s/veh / LOS	545.2						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	1.7	A	0.7	A
Bicycle LOS Score / LOS		F		F	2.9	C	2.9	C

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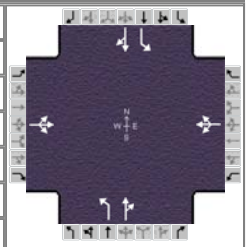
2010 HCS Signalized Intersection Results Summary

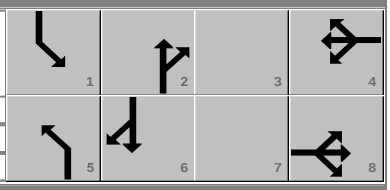
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Federal Dr	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Federal Dr.xus				
Project Description	PM No Build				



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	10	60	90	10	90	90	1045	60	90	1130	50

Signal Information			
Cycle, s	140.0	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	9.9	83.4	29.4	0.0	0.0	0.0
Yellow	4.3	4.3	3.1	0.0	0.0	0.0
Red	2.0	2.0	1.6	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	8.0	8.0	8.0	8.0	2.0	4.0	2.0	4.0
Phase Duration, s	34.1	34.1	34.1	34.1	16.2	89.7	16.2	89.7
Change Period, $(Y+R_c)$, s	4.7	4.7	4.7	4.7	6.3	6.3	6.3	6.3
Max Allow Headway *(MAH)*, s	4.4	4.4	4.4	4.4	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	12.3	12.3	28.2	28.2	9.8		9.8	
Green Extension Time (g_e), s	1.4	1.4	1.2	1.2	0.3	0.0	0.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	0.98		0.98	
Max Out Probability	0.00	0.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	122	0	0	211	0	0	100	0	1228	100	0	1311
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1327	0	0	1093	0	0	1774	0	1845	1774	0	1849
Queue Service time (g_s), s	0.0	0.0	0.0	15.9	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Cycle Queue Clearance Time (g_c), s	10.3	0.0	0.0	26.2	0.0	0.0	7.8	0.0	83.4	7.8	0.0	83.4
Capacity *(c)*, veh/h	314			268			125		1099	125		1101
Volume-to-Capacity Ratio *(X)*	0.389	0.000	0.000	0.789	0.000	0.000	0.799	0.000	1.117	0.799	0.000	1.191
Available Capacity (c_a), veh/h	450			396			619		1099	619		1101
Back of Queue *(Q)*, veh/ln	3.9			8.2			3.5		83.9	3.5		123.9
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	47.4			53.3			64.1		15.2	64.1		15.0
Incremental Delay (d_2), s/veh	0.8	0.0	0.0	6.6	0.0	0.0	1.1	0.0	212.7	1.1	0.0	344.2
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	48.2			59.9			65.2		227.9	65.2		359.2
Level of Service (LOS)	D			E			E		F	E		F
Approach Delay, s/veh / LOS	48.2	D		59.9	E		215.6	F		338.4	F	
Intersection Delay s/veh / LOS	254.6						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.8	A	2.7	B	2.8	C

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HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM No Build
Intersection: KY 321 & JCCHS Entrance
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: JCCHS Entrance
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1265	50	60	1320	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		1405	55	66	1466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	1	1	
Configuration			TR	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		60			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	55		66			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0	0				
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L		LR				
v (vph)		66		121				
C(m) (vph)		463		24				
v/c		0.14		5.04				
95% queue length		0.49		15.13				
Control Delay		14.1		2145				
LOS		B		F				
Approach Delay				2145				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM No Build
Intersection: KY 321 & Kmart
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: Kmart
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	1085	100	100	820	100
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	1205	111	111	911	111
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	10	90	40	10	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	11	100	44	11	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	0	1	1	0	1	1
Configuration	LT	R		LT	R	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	LT		R	LT		R
v (vph)	33	111	44		100	55		11
C(m) (vph)	679	525	10		208	5		309
v/c	0.05	0.21	4.40		0.48	11.00		0.04
95% queue length	0.15	0.79	6.71		2.36	8.64		0.11
Control Delay	10.6	13.7	2269		37.4	5912		17.1
LOS	B	B	F		E	F		C
Approach Delay				719.3			4930	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: JJL
Agency/Co.: Qk4
Date Performed: 11/14/2011
Analysis Time Period: PM No Build
Intersection: KY 321 & KY 321X
Jurisdiction: KYTC
Units: U. S. Customary
Analysis Year: 2035
Project ID: KY 321 Paintsville
East/West Street: KY 321X
North/South Street: KY 321
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	705	90	300	580	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	11	783	100	333	644	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

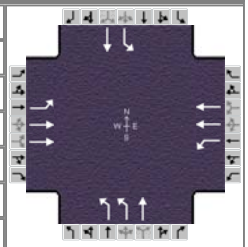
Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30	0	190	10	10	40
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	33	0	211	11	11	44
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	11	333		244			66	
C(m) (vph)	932	766		78			34	
v/c	0.01	0.43		3.13			1.94	
95% queue length	0.04	2.22		24.49			7.36	
Control Delay	8.9	13.3		1072			693.2	
LOS	A	B		F			F	
Approach Delay				1072			693.2	
Approach LOS				F			F	

2010 HCS Signalized Intersection Results Summary

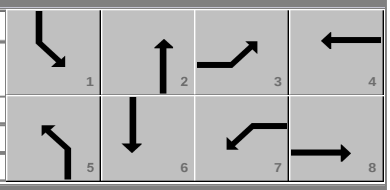
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & KY 40	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & KY 40.xus				
Project Description	PM No Build				



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	200		200	340		860	380		60	280	

Signal Information			
Cycle, s	140.0	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	7.4	33.4	34.6	3.5	9.7	13.4
Yellow	4.3	4.3	4.3	5.0	5.0	5.0
Red	1.8	1.8	1.8	1.6	1.6	1.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0
Phase Duration, s	10.1	19.9	26.4	36.2	53.0	80.2	13.5	40.7
Change Period, *(Y+Rc)*, s	6.6	6.5	6.6	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	6.0	4.4	4.5	4.4	6.0	0.0	4.5	0.0
Queue Clearance Time *(g_s)*, s	2.9	10.5	19.2	15.1	36.1		7.2	
Green Extension Time *(g_e)*, s	0.0	2.9	0.6	3.1	10.7	0.0	0.3	0.0
Phase Call Probability	0.35	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	0.00	0.00	0.03	0.00	0.09		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	11	222	0	222	378	0	956	422	0	67	311	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1774	1773	0	1774	1773	0	1723	1863	0	1774	1863	0
Queue Service time *(g_s)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Cycle Queue Clearance Time *(g_c)*, s	0.9	8.5	0.0	17.2	13.1	0.0	34.1	13.5	0.0	5.2	21.2	0.0
Capacity *(c)*, veh/h	44	339		251	753		1153	983		94	458	
Volume-to-Capacity Ratio *(X)*	0.250	0.655	0.000	0.884	0.502	0.000	0.829	0.430	0.000	0.711	0.680	0.000
Available Capacity *(c_a)*, veh/h	380	850		380	1264		1690	983		870	458	
Back of Queue *(Q)*, veh/ln	0.5	3.9		8.9	5.8		12.8	4.6		2.6	10.7	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	67.0	61.1		58.9	48.6		35.2	11.8		65.2	47.8	
Incremental Delay *(d_2)*, s/veh	6.2	2.6	0.0	19.2	0.6	0.0	0.4	0.1	0.0	12.0	8.2	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	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	73.2	63.7		78.1	49.2		35.6	11.9		77.3	56.0	
Level of Service (LOS)	E	E		E	D		D	B		E	E	
Approach Delay, s/veh / LOS	64.1	E		59.9	E		28.3	C		59.8	E	
Intersection Delay s/veh / LOS	43.5						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.8	C	2.9	C
Bicycle LOS Score / LOS	0.7	A	1.0	A	2.8	C	1.1	A

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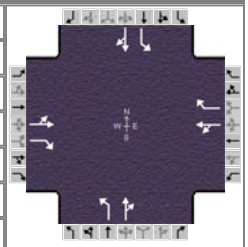
2010 HCS Signalized Intersection Results Summary

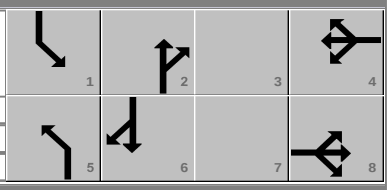
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & Mayo Plaza	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & Mayo Plaza.xus				
Project Description	PM No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150	20	110	230	40	120	140	905	200	60	740	20

Signal Information			
Cycle, s	140.0	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	6.8	0.8	59.7	47.0	0.0	0.0
Yellow	4.3	4.3	4.3	3.0	0.0	0.0
Red	2.7	2.7	1.7	2.7	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	4.0
Phase Duration, s	52.7	52.7	52.7	52.7	21.6	73.5	13.8	65.7
Change Period, *(Y+Rc)*, s	5.7	5.7	5.7	5.7	7.0	6.0	7.0	6.0
Max Allow Headway *(MAH)*, s	4.8	4.8	4.8	4.8	5.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	49.0	49.0	49.0	49.0	14.0		7.2	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.6	0.0	0.2	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		0.93	
Max Out Probability	1.00	1.00	1.00	1.00	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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	189	0	122	300	0	133	156	0	1228	67	0	844
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	11	0	1579	0	0	1579	1774	0	1804	1774	0	1854
Queue Service time *(g_s)*, s	0.0	0.0	7.8	0.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Cycle Queue Clearance Time *(g_c)*, s	47.0	0.0	7.8	47.0	0.0	8.6	12.0	0.0	67.5	5.2	0.0	59.7
Capacity *(c)*, veh/h	52		530	48		530	185		870	86		790
Volume-to-Capacity Ratio *(X)*	3.636	0.000	0.231	6.299	0.000	0.252	0.839	0.000	1.412	0.773	0.000	1.069
Available Capacity *(c_a)*, veh/h	52		530	48		530	384		870	384		790
Back of Queue *(Q)*, veh/ln	71.0		3.0	128.5		3.3	5.4		202.8	2.3		50.0
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	66.8		33.5	70.0		33.7	61.5		27.0	65.8		30.5
Incremental Delay *(d_2)*, s/veh	4791.3	0.0	0.2	9582.8	0.0	0.3	1.4	0.0	741.7	1.4	0.0	126.9
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	4858.1		33.7	9652.8		34.0	62.9		768.7	67.2		157.4
Level of Service (LOS)	F		C	F		C	E		F	E		F
Approach Delay, s/veh / LOS	2962.8	F		6693.1	F		689.4	F		150.8	F	
Intersection Delay s/veh / LOS	1616.7						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.0	A	1.2	A	2.8	C	2.0	A

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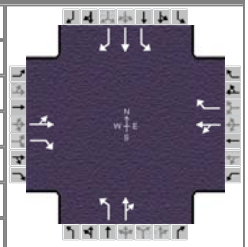
2010 HCS Signalized Intersection Results Summary

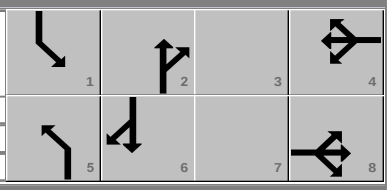
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	KY 321 & New Walmart.xus				
Project Description	PM No Build				



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	40	300	50	50	190	350	885	40	150	810	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, ($Y+R_c$), s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway (*MAH*), s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time (g_s), s	47.7	47.7	47.7	47.7	32.7		14.9	
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	411	0	333	111	0	211	389	0	1028	167	900	256
Adjusted Saturation Flow Rate (*s*), veh/h/ln	0	0	1579	82	0	1579	1774	0	1848	1774	1863	1579
Queue Service time (g_s), s	0.0	0.0	25.2	0.0	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time (g_c), s	45.7	0.0	25.2	45.7	0.0	14.6	30.7	0.0	60.1	12.9	44.6	18.4
Capacity (*c*), veh/h	49		515	65		515	390		793	194	593	503
Volume-to-Capacity Ratio (*X*)	8.448	0.000	0.647	1.705	0.000	0.410	0.996	0.000	1.296	0.858	1.517	0.508
Available Capacity (c_a), veh/h	49		515	65		515	390		793	390	593	503
Back of Queue (*Q*), veh/ln	183.5		10.2	26.4		5.7	16.0		139.8	6.0	172.2	7.2
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	70.0		40.3	51.8		36.7	54.5		30.4	61.3	40.3	38.8
Incremental Delay (d_2), s/veh	13449.0	0.0	3.0	1331.7	0.0	0.6	24.2	0.0	533.6	5.6	934.1	1.7
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	13519.0		43.3	1383.5		37.3	78.7		564.0	66.8	974.4	40.5
Level of Service (LOS)	F		D	F		D	E		F	E	F	D
Approach Delay, s/veh / LOS	7485.1	F		501.5	F		430.8	F		679.5	F	
Intersection Delay s/veh / LOS	1903.1						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	1.0	A	2.8	C	2.7	B

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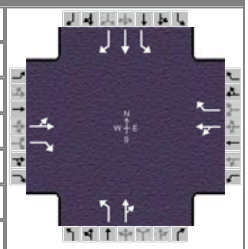
ALTERNATIVE WALMART MCLOUD PM

HCS ANALYSIS

2010 HCS Signalized Intersection Results Summary

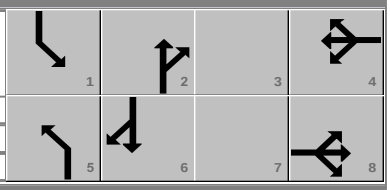
General Information				Intersection Information	
Agency				Duration, h	1.00
Analyst		Analysis Date	Nov 14, 2011	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Intersection	KY 321 & New Walmart	Analysis Year	2011	Analysis Period	1> 7:00
File Name	PM KY 321 & New Walmart (McCloud).xus				
Project Description	PM No Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	464	40	300	50	50	190	506	824	40	150	810	230

Signal Information			
Cycle, s	140.0	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	15.3	9.4	44.8	45.7	0.0	0.0
Yellow	4.3	4.3	4.3	5.0	0.0	0.0
Red	1.8	1.8	1.8	1.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	8	8	4	4	5	2	1	6
Case Number	7.0	7.0	7.0	7.0	2.0	4.0	2.0	3.0
Phase Duration, s	52.2	52.2	52.2	52.2	36.9	66.4	21.4	50.9
Change Period, *(Y+Rc)*, s	6.5	6.5	6.5	6.5	6.1	6.3	6.1	6.3
Max Allow Headway *(MAH)*, s	4.9	4.9	4.9	4.9	4.0	0.0	4.0	0.0
Queue Clearance Time *(g_s)*, s	47.7	47.7	47.7	47.7	32.8		14.9	
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	1.00	1.00	1.00	1.00		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	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	560	0	333	111	0	211	562	0	960	167	900	256
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	0	0	1579	82	0	1579	1774	0	1847	1774	1863	1579
Queue Service time *(g_s)*, s	0.0	0.0	25.2	0.0	0.0	14.6	30.8	0.0	60.1	12.9	44.6	18.4
Cycle Queue Clearance Time *(g_c)*, s	45.7	0.0	25.2	45.7	0.0	14.6	30.8	0.0	60.1	12.9	44.6	18.4
Capacity *(c)*, veh/h	49		515	65		515	390		793	194	593	503
Volume-to-Capacity Ratio *(X)*	11.336	0.000	0.647	1.705	0.000	0.410	1.441	0.000	1.211	0.858	1.517	0.508
Available Capacity *(c_a)*, veh/h	49		515	65		515	390		793	390	593	503
Back of Queue *(Q)*, veh/ln	257.6		10.2	26.4		5.7	99.5		106.2	6.0	172.2	7.2
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	70.0		40.3	51.8		36.7	54.6		30.4	61.3	40.3	38.8
Incremental Delay *(d_2)*, s/veh	18644.8	0.0	3.0	1331.9	0.0	0.6	794.3	0.0	381.2	5.6	934.1	1.7
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	18714.8		43.3	1383.6		37.3	848.9		411.6	66.8	974.4	40.5
Level of Service (LOS)	F		D	F		D	F		F	E	F	D
Approach Delay, s/veh / LOS	11747.8	F		501.5	F		573.1	F		679.5	F	
Intersection Delay s/veh / LOS	3060.9						F					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	2.0	A	1.0	A	3.0	C	2.7	B

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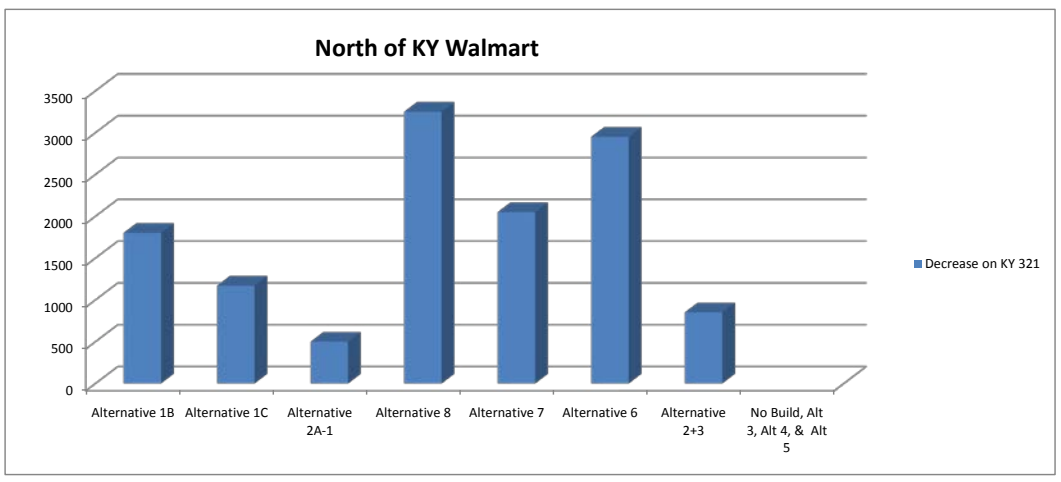
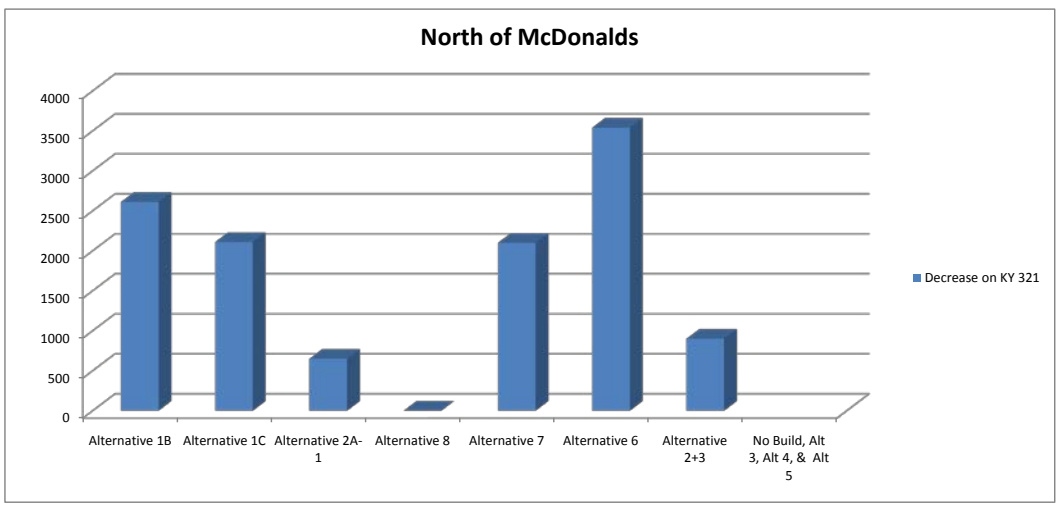
KY 321 SPOT ADTS FOR CONNECTOR ALTERNATIVES

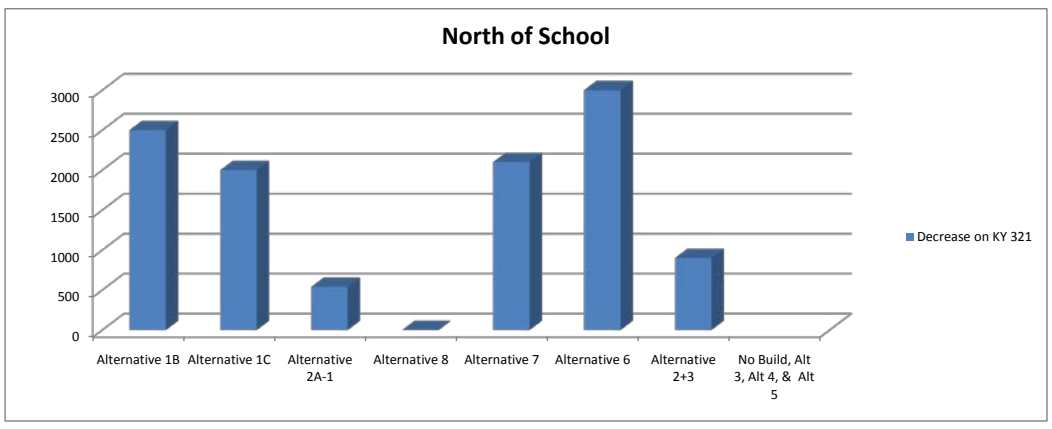
North of Walmart	Decrease on KY 321	ADT	DHV
Alternative 1B	1800	19830	2380
Alternative 1C	1170	20460	2455
Alternative 2A-1	500	21130	2535
Alternative 8	3250	18380	2215
Alternative 7	2050	19580	2345
Alternative 6	2950	18680	2235
Alternative 2+3	850	20780	2575
No Build, Alt 3, Alt 4, & Alt 5		21630	2595



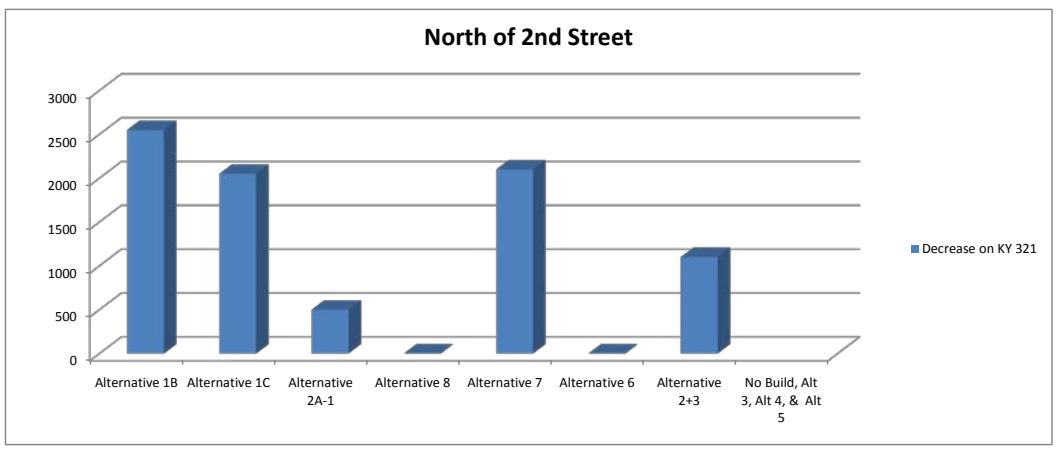
North of McDonalds	Decrease on KY 321	ADT	DHV
Alternative 1B	2610	14170	1700
Alternative 1C	2110	14670	1760
Alternative 2A-1	650	16130	1935
Alternative 8	0	16780	1995
Alternative 7	2100	14680	1745
Alternative 6	3540	13240	1635
Alternative 2+3	900	15880	1985
No Build, Alt 3, Alt 4, & Alt 5		16780	1995



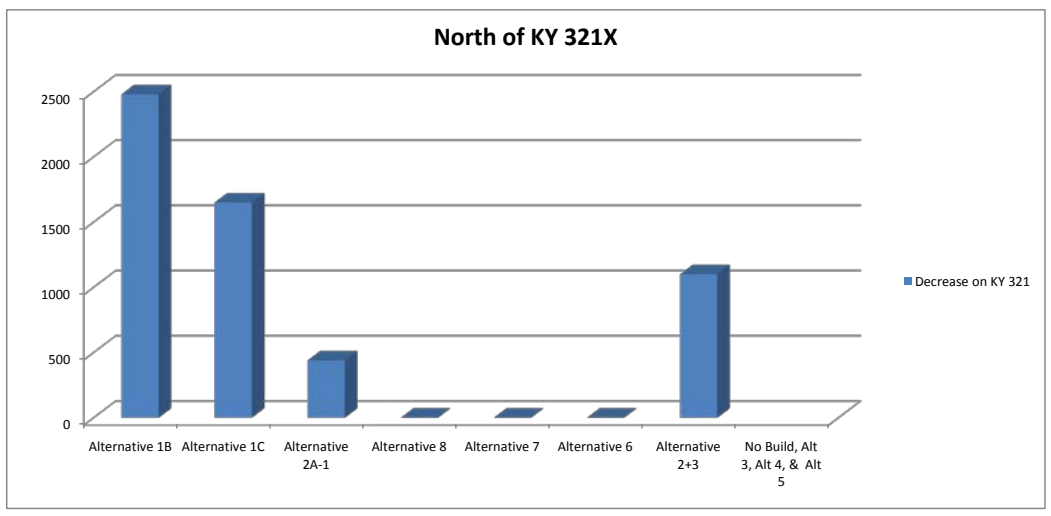
North of School	Decrease on KY 321	ADT	DHV
Alternative 1B	2500	20080	2410
Alternative 1C	2000	20580	2470
Alternative 2A-1	540	22040	2645
Alternative 8	0	22580	2705
Alternative 7	2100	20480	2455
Alternative 6	3000	19580	2345
Alternative 2+3	900	21680	2695
No Build, Alt 3, Alt 4, & Alt 5		22580	2705



North of 2nd St	Decrease on KY 321	ADT	DHV
Alternative 1B	2550	16830	2020
Alternative 1C	2050	17330	2080
Alternative 2A-1	500	18880	2265
Alternative 8	0	19380	2315
Alternative 7	2100	17280	2065
Alternative 6	0	19380	2315
Alternative 2+3	1100	18280	2170
No Build, Alt 3, Alt 4, & Alt 5		19380	2315



North of KY 321X	Decrease on KY 321	ADT	DHV
Alternative 1B	2480	12500	1500
Alternative 1C	1650	13330	1600
Alternative 2A-1	440	14540	1745
Alternative 8	0	14980	1795
Alternative 7	0	14980	1795
Alternative 6	0	14980	1795
Alternative 2+3	1100	13880	1650
No Build, Alt 3, Alt 4, & Alt 5		14980	1795



INTERSECTIONS	Alternative 1B	Alternative 1C	Alternative 2A-1	Alternative 8	Alternative 7	Alternative 6	Alternative 2+3	No Build, Alt 3, Alt 4, & Alt 5		
North of Walmart	1800	1170	500	3250	2050	2950	850		0	
North of McDonalds	2610	2110	650	0	2100	3540	900		0	
North of School	2500	2000	540	0	2100	3000	900		0	
North of 2nd St/ James Trimble Blvd	2550	2050	500	0	2100	0	1100		0	
North of KY 321X	2480	1650	440	0	0	0	1100			

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