
Appendix I: Synchro and Simtraffic Analysis Reports

Appendix I may be obtained in its entirety from the CD included with this report. The entire appendix contains approximately 340 pages of analysis data. The summary tables are provided for reference.

Traffic Analysis Process		Existing Baseline				Future Baseline				Near-Term Improvements			
Intersection	Approach	2009 Base Conditions				2035 No Improvements				Crabtree Valley Avenue Improvements (2009)			
		AM		PM		AM		PM		AM		PM	
Glenwood Ave/ Creedmoor Rd	Intersection	66.3	E	89.5	F	259.5	F	422.8	F	54.8	D	91.0	F
	EB	70.5	E	74.3	E	270.6	F	426.6	F	61.3	E	79.2	E
	WB	50.9	D	62.8	E	189.5	F	451.3	F	35.1	D	80.5	F
	NB	78.0	E	106.1	F	202.5	F	297.0	F	69.6	E	108.3	F
	SB	76.0	E	152.7	F	346.9	F	508.0	F	66.6	E	112.3	F
Glenwood Ave/ Marriott Dr	Intersection	18.0	B	30.5	C	39.2	D	220.6	F	5.9	A	25.1	C
	EB	11.5	B	11.8	B	49.7	D	259.3	F	3.3	A	16.0	B
	WB	21.2	C	39.9	D	22.2	C	201.7	F	3.5	A	19.4	B
	NB	74.6	E	61.7	E	78.2	E	54.0	D	71.7	E	95.6	F
	SB	85.9	F	99.1	F	141.5	F	202.8	F	78.3	E	65.2	E
Glenwood Ave/ Lead Mine Rd/ Blue Ridge Rd	Intersection	85.8	F	135.2	F	384.9	F	632.9	F	68.6	E	107.7	F
	EB	82.7	F	147.1	F	421.8	F	674.2	F	49.3	D	67.9	E
	WB	69.7	E	106.9	F	365.4	F	722.4	F	60.0	E	120.4	F
	NB	98.6	F	199.5	F	229.0	F	417.9	F	73.3	E	167.1	F
	SB	114.9	F	165.4	F	409.0	F	409.9	F	110.1	F	117.4	F
Glenwood Ave/ I-440 WB Ramp	Intersection	14.7	B	144.3	F	193.6	F	360.2	F	9.8	A	113.4	F
	EB	0.2	A	0.0	A	233.7	F	200.8	F	0.2	A	0.0	A
	WB	21.8	C	20.8	C	150.3	F	385.7	F	17.8	B	25.7	C
	NB	--	--	--	--	--	--	--	--	--	--	--	--
	SB	33.7	C	450.6	F	166.5	F	517.1	F	19.2	B	343.0	F
Glenwood Ave/ I-440 EB Ramp	Intersection	23.4	C	48.4	D	148.4	F	185.0	F	21.2	C	47.0	D
	EB	7.7	A	41.0	D	202.2	F	194.8	F	20.5	C	44.0	D
	WB	9.5	A	26.8	C	16.4	B	174.8	F	7.4	A	30.5	C
	NB	84.8	F	86.5	F	216.6	F	189.5	F	44.3	D	73.7	E
	SB	--	--	--	--	--	--	--	--	--	--	--	--
Lead Mine Rd/ North Hills Dr	Intersection	19.2	B	24.2	C	77.2	E	173.5	F	22.0	C	19.9	B
	EB	31.3	C	81.4	F	104.5	F	63.6	E	78.4	E	81.3	F
	WB	51.2	D	101.9	F	112.2	F	126.6	F	86.1	F	105.7	F
	NB	15.7	B	19.6	B	56.9	E	269.4	F	8.0	A	11.2	B
	SB	13.1	B	10.0	B	79.7	E	24.9	C	13.1	B	10.2	B
Creedmoor Rd/ Mall Entr	Intersection	8.9	A	15.8	B	121.7	F	70.8	E	9.1	A	24.4	C
	EB	83.0	F	44.5	D	170.0	F	98.8	F	63.0	E	83.5	F
	WB	80.4	F	35.9	D	69.5	E	76.0	E	46.8	D	71.3	E
	NB	5.2	A	12.3	B	30.7	C	81.7	F	16.1	B	18.3	B
	SB	8.5	A	13.9	B	158.4	F	54.2	D	4.6	A	17.5	B
Blue Ridge Rd/ Mall Entr	Intersection	8.2	A	16.1	B	139.7	F	133.4	F	--	--	--	--
	EB	38.7	D	33.3	C	120.7	F	274.0	F	15.4	C	14.7	B
	NB	2.3	A	9.8	A	2.0	A	15.7	B	--	--	--	--
	WB	6.1	A	8.8	A	203.8	F	129.5	F	--	--	--	--
	SB	--	--	--	--	48.7	D	97.1	F	11.7	B	12.5	B
Creedmoor Rd/ Crabtree Valley Ave	Intersection	--	--	--	--	48.7	D	97.1	F	11.7	B	12.5	B
	EB	--	--	--	--	--	--	79.3	E	--	--	--	--
	WB	67.1	F	--	F	46.8	D	75.3	E	71.1	E	31.1	C
	NB	--	--	--	--	38.3	D	122.5	F	6.8	A	13.2	B
	SB	0.9	A	3.1	C	53.8	D	71.8	E	6.2	A	6.4	A
Crabtree Valley Ave/ Blue Ridge Rd	Intersection	--	--	--	--	238.6	F	239.4	F	23.4	C	26.4	C
	EB	123.1	F	423.2	F	197.2	F	125.0	F	61.0	E	44.5	D
	WB	14.5	B	27.7	D	245.1	F	241.2	F	82.7	F	100.7	F
	NB	1.7	A	3.0	A	105.2	F	260.0	F	9.1	A	18.5	B
	SB	0.5	A	1.2	A	312.8	F	267.7	F	8.4	A	7.8	A
Crabtree Valley Ave/ Edwards Mill Rd	WB	2.8	A	4.0	A	6.3	A	6.0	A	--	--	--	--
	NB	10.6	B	29.6	D	56.1	F	--	F	--	--	--	--
Crabtree Valley Ave/ Mall Parking Deck	Intersection	--	--	--	--	--	--	--	--	--	--	--	--
	EB	--	--	--	--	--	--	--	--	0.3	A	0.9	A
	WB	--	--	--	--	--	--	--	--	0.2	A	0.3	A
	NB	--	--	--	--	--	--	--	--	11.3	B	15.2	C
	SB	--	--	--	--	--	--	--	--	11.6	B	14.2	B
Crabtree Valley Ave/ Homewood Banks Dr _ Mall Entr	Intersection	--	--	--	--	11.6	B	21.2	C	24.8	C	54.3	D
	EB	1.4	A	2.0	A	4.9	A	9.4	A	2.4	A	13.4	B
	WB	0.5	A	0.8	A	5.5	A	8.7	A	5.6	A	19.7	B
	NB	12.0	B	30.1	D	37.2	D	57.1	E	82.8	F	90.5	F
	SB	11.3	B	22.6	C	30.9	C	30.8	C	81.8	F	88.2	F
Crabtree Valley Ave/ Summit Park Ln Blue Ridge Rd/ Crabtree View Pl	NB	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--
Arrow Dr Extension/ Blue Ridge Rd	Intersection	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--
	NB	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--
	SB	--	--	--	--	--	--	--	--	--	--	--	--
Performance Index		550.4		2,218.9		6,549.3		12,596.3		463.7		1,859.0	
Glenwood Ave Arterial	EB	Speed (mph)	17 (16-18)	E	13 (9-17)	F	4 (4-4)	F	3 (3-3)	E	15 (13-18)	E	
		Travel Time (sec)	426.6 (406.6-453.2)		561.0 (476.3-755.1)		2,805.3 (2,467.6-3,171.4)		4,893.8 (4,530.0-5,493.5)		500.1 (416.2-554.1)		
		Delays (sec/veh)	262.7 (242.7-289.3)		396.9 (273.0-640.0)		2,638.2 (2,300.5-3,004.3)		4,726.2 (4,362.4-5,325.9)		335.7 (251.8-389.7)		
	WB	Speed (mph)	11 (10-15)	F	12 (9-14)	F	7 (6-7)	F	5 (3-5)	F	9 (8-10)	F	
		Travel Time (sec)	511 (422.2-533.4)		510.9 (424.8-895.4)		1,141.4 (930.3-1,589.6)		5,875.6 (4,932.8-10,417.3)		539.4 (442.6-772.5)		
		Delays (sec/veh)	380.2 (250.7-448.5)		379.5 (293.4-764.0)		1,007.7 (796.6-1,455.9)		5,742.1 (4,799.3-10,283.8)		408.5 (311.7-641.6)		
Total Delay (hr)		2,189.4 (1,848.5-2,408.9)		3,737.2 (3,341.6-4,020.4)		14,237.3 (13,714.1-14,695.0)		15,350.3 (15,085.0-15,601.8)		1,944.5 (1,663.8-2,136.5)		3,630.0 (3,523.6-3,961.9)	
Network Performance		41,572.0		50,886.0		72,973.0		76,420.0		38,978.0		61,137.0	
		1,313.1		1,663.1		3,945.6		4,207.9		1,297.0		1,695.2	
		13,615.0		14,460.0		18,208.0		19,383.0		14,095.0		14,647.0	
		592,226.0		605,867.0		671,004.0		727,244.0		616,524.0		619,746.0	
		45,002.0		45,673.0		42,317.0		44,038.0		47,233.0		47,487.0	

-- Not applicable or estimated delays over 1,000 seconds if LOS "F" is listed.

Traffic Analysis Process		Long-Term Improvement Alternative Screening															
Intersection	Approach	2035 Creedmoor Rd Interchange (without U-Turns on Glenwood Ave)				2035 Lead Mine Flyover				2035 Crabtree Valley Ave (CVA) Extensions				2035 CVA Extension to I-440 (with an at-grade intersection at CVA and Blue Ridge Rd)			
		AM		PM		AM		PM		AM		PM		AM		PM	
Glenwood Ave/ Creedmoor Rd	Intersection	151.2	F	192.9	F	262.5	F	384.3	F	161.1	F	248.7	F	234.0	F	362.5	F
	EB	105.3	F	213.8	F	292.7	F	352.9	F	94.9	F	131.8	F	224.0	F	296.8	F
	WB	79.2	E	94.5	F	190.3	F	362.1	F	152.3	F	250.7	F	197.6	F	336.6	F
	NB	138.6	F	261.4	F	177.7	F	461.0	F	132.8	F	357.6	F	185.5	F	476.6	F
	SB	196.5	F	196.6	F	344.7	F	389.2	F	214.4	F	266.8	F	295.4	F	388.0	F
Glenwood Ave/ Marriott Dr	Intersection	33.5	C	220.5	F	41.6	D	298.3	F	20.4	C	160.0	F	58.3	E	248.5	F
	EB	46.3	D	258.0	F	54.7	D	381.1	F	26.3	C	245.5	F	57.9	E	279.0	F
	WB	16.7	B	202.2	F	21.3	C	228.8	F	9.1	A	91.5	F	56.5	E	248.4	F
	NB	50.0	D	49.3	D	71.3	E	311.9	F	45.7	D	107.2	F	65.2	E	101.9	F
	SB	91.4	F	217.7	F	135.2	F	243.7	F	77.8	E	224.5	F	95.6	F	214.9	F
Glenwood Ave/ Lead Mine Rd/ Blue Ridge Rd	Intersection	384.0	F	528.0	F	258.4	F	466.5	F	260.0	F	362.5	F	305.8	F	466.6	F
	EB	419.4	F	531.6	F	298.7	F	467.4	F	220.3	F	249.5	F	302.4	F	357.0	F
	WB	378.1	F	546.9	F	263.8	F	533.9	F	263.5	F	433.2	F	324.6	F	648.4	F
	NB	236.2	F	566.7	F	37.9	D	186.1	F	215.3	F	304.7	F	52.3	D	138.9	F
	SB	386.1	F	398.1	F	281.8	F	283.8	F	314.1	F	432.6	F	337.2	F	290.6	F
Glenwood Ave/ I-440 WB Ramp	Intersection	158.5	F	310.8	F	90.6	F	289.8	F	166.4	F	227.2	F	57.7	E	186.1	F
	EB	156.3	F	26.5	C	9.8	A	9.7	A	225.8	F	139.4	F	66.7	E	34.7	C
	WB	153.6	F	421.8	F	162.4	F	357.0	F	40.0	D	254.8	F	58.5	E	312.1	F
	NB	--	--	--	--	--	--	--	--	271.5	F	294.0	F	5.7	A	2.1	A
	SB	167.5	F	513.3	F	161.9	F	538.7	F	60.0	E	320.7	F	60.3	E	346.1	F
Glenwood Ave/ I-440 EB Ramp	Intersection	156.4	F	185.5	F	148.3	F	186.2	F	113.9	F	51.3	D	68.5	E	53.7	D
	EB	216.3	F	201.7	F	205.5	F	203.9	F	160.1	F	73.8	E	82.3	F	40.5	D
	WB	13.8	B	155.3	F	16.4	B	155.3	F	7.2	A	17.8	B	20.3	C	51.9	D
	NB	226.0	F	212.1	F	207.7	F	212.1	F	160.7	F	85.8	F	99.5	F	73.2	E
	SB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead Mine Rd/ North Hills Dr	Intersection	52.0	D	208.1	F	51.1	D	58.3	E	54.7	D	155.7	F	69.0	E	143.6	F
	EB	64.2	E	62.4	E	77.1	E	71.0	E	52.6	D	77.9	E	75.3	E	75.1	E
	WB	125.3	F	131.3	F	97.0	F	135.2	F	157.6	F	127.6	F	143.1	F	121.0	F
	NB	21.3	C	330.2	F	34.3	C	66.5	E	28.8	C	237.2	F	36.4	D	216.6	F
	SB	51.5	D	23.6	C	49.0	D	23.7	C	44.4	D	25.6	C	69.6	E	26.4	C
Creedmoor Rd/ Mall Entr	Intersection	112.0	F	39.1	D	121.7	F	66.1	E	--	--	--	--	126.4	F	80.2	F
	EB	268.5	F	93.0	F	187.1	F	140.3	F	11.0	B	9.5	A	92.5	F	92.1	F
	WB	57.3	E	70.1	E	66.6	E	78.3	E	8.9	A	25.6	D	48.2	D	53.6	D
	NB	16.8	B	55.3	E	33.1	C	83.8	F	--	--	--	--	37.2	D	124.2	F
	SB	142.6	F	11.0	B	156.3	F	35.4	D	--	--	--	--	171.5	F	35.5	D
Blue Ridge Rd/ Mall Entr	Intersection	133.7	F	151.2	F	--	--	--	--	--	--	--	--	--	--	--	--
	EB	97.6	F	301.0	F	270.8	F	332.6	F	--	F	--	F	--	F	956.6	F
	NB	1.5	A	17.2	B	--	A	--	A	--	--	--	--	--	--	--	--
	SB	197.0	F	152.9	F	--	--	--	--	--	--	--	--	--	--	--	--
	SB	197.0	F	152.9	F	--	--	--	--	--	--	--	--	--	--	--	--
Creedmoor Rd/ Crabtree Valley Ave	Intersection	30.6	C	77.5	E	47.3	D	71.8	E	95.4	F	121.6	F	32.7	C	50.1	D
	EB	--	--	73.0	E	--	--	72.6	E	104.3	F	147.5	F	--	--	--	--
	WB	45.2	D	88.2	F	44.9	D	138.4	F	89.5	F	92.3	F	50.1	D	81.3	F
	NB	36.6	D	80.3	F	37.4	D	68.0	E	82.2	F	139.2	F	33.6	C	53.1	D
	SB	26.0	C	70.6	E	52.3	D	55.1	E	102.6	F	107.1	F	26.4	C	30.8	C
Crabtree Valley Ave/ Blue Ridge Rd	Intersection	242.4	F	267.1	F	220.9	F	246.6	F	104.2	F	149.3	F	111.0	F	108.0	F
	EB	209.4	F	135.2	F	239.1	F	151.6	F	86.2	F	140.3	F	77.8	E	52.2	D
	WB	245.2	F	288.9	F	238.3	F	241.9	F	110.3	F	106.9	F	68.1	E	106.7	F
	NB	92.3	F	286.3	F	132.4	F	268.0	F	78.4	E	168.8	F	102.6	F	118.5	F
	SB	322.8	F	305.1	F	253.2	F	267.2	F	132.3	F	221.7	F	149.3	F	136.8	F
Crabtree Valley Ave/ Edwards Mill Rd	WB	6.3	A	6.0	A	6.3	A	6.0	A	--	--	--	--	--	--	--	--
	NB	56.1	F	--	F	56.1	F	--	F	22.8	C	91.5	F	12.8	B	14.6	B
Crabtree Valley Ave/ Mall Parking Deck	Intersection	--	--	--	--	--	--	--	--	--	--	--	--	9.3	A	18.1	B
	EB	--	--	--	--	--	--	--	--	--	--	--	--	7.8	A	10.0	B
	WB	--	--	--	--	--	--	--	--	--	--	--	--	5.1	A	7.3	A
	NB	--	--	--	--	--	--	--	--	--	--	--	--	81.6	F	73.2	E
	SB	--	--	--	--	--	--	--	--	--	--	--	--	88.1	F	97.4	F
Crabtree Valley Ave/ Homewood Banks Dr _Mall Entr	Intersection	9.1	A	19.9	B	12.8	B	18.8	B	19.5	B	76.2	E	24.0	C	53.4	D
	EB	5.0	A	10.3	B	10.2	B	11.4	B	18.2	B	47.7	D	11.9	B	52.1	D
	WB	3.4	A	14.1	B	3.3	A	9.5	A	9.6	A	75.2	E	12.5	B	33.1	C
	NB	28.0	C	35.8	D	35.8	D	36.1	D	58.5	E	106.5	F	79.9	E	94.7	F
	SB	23.2	C	33.4	C	29.6	C	33.6	C	50.9	D	148.9	F	94.5	F	65.3	E
Crabtree Valley Ave/ Summit Park Ln Blue Ridge Rd/ Crabtree View Pl	NB	--	--	--	--	--	--	--	--	10.1	B	22.1	C	--	--	--	--
	WB	--	--	--	--	--	--	--	--	17.2	C	12.5	B	--	--	--	--
Arrow Dr Extension/ Blue Ridge Rd	Intersection	--	--	--	--	--	--	--	--	--	--	--	--	26.5	C	34.0	C
	WB	--	--	--	--	--	--	--	--	--	--	--	--	63.5	E	87.9	F
	NB	--	--	--	--	--	--	--	--	--	--	--	--	21.4	C	30.2	C
	SB	--	--	--	--	--	--	--	--	--	--	--	--	19.5	B	21.6	C
	SB	--	--	--	--	--	--	--	--	--	--	--	--	19.5	B	21.6	C
Performance Index		5,749.2		10,465.7		5,349.6		11,014.5		3,260.3		7,118.0		3,582.1		6,875.7	
Glenwood Ave Arterial	EB	Speed (mph)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Travel Time (sec)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Delays(sec/veh)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	Speed (mph)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Travel Time (sec)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		Delays (sec/veh)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Network Performance	Total Delay (hr)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Stops (#)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fuel Consumed (gal)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	HC Emissions (g)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	CO Emissions (g)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	NOx Emissions (g)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

-- Not applicable or estimated delays over 1,000 seconds if LOS "F" is listed.

Traffic Analysis Process		Long-Term Improvement Phase I				Long-Term Improvement Phase II								Long-Term Improvement Phase III			
Intersection	Approach	2035 CVA Extension to I-440 (with a grade separation at CVA and Blue Ridge Rd)				Not Recommended				Recommended				2035 CVA Extension to I-440, WB Glenwood Ave Overpass, and Creedmoor Rd SPUI			
		AM		PM		AM		PM		AM		PM		AM		PM	
Glenwood Ave/ Creedmoor Rd	Intersection	236.9	F	355.4	F	100.8	F	184.0	F	251.2	F	397.7	F	99.3	F	180.4	F
	EB	216.9	F	291.8	F	107.0	F	137.6	F	233.4	F	327.4	F	119.2	F	134.4	F
	WB	208.6	F	330.6	F	42.5	D	86.3	F	220.9	F	335.0	F	55.7	E	75.3	E
	NB	209.3	F	371.4	F	119.1	F	261.2	F	216.0	F	534.9	F	123.1	F	255.9	F
	SB	292.2	F	490.7	F	115.0	F	188.6	F	306.5	F	457.4	F	103.9	F	192.7	F
Glenwood Ave/ Marriott Dr	Intersection	53.1	D	240.0	F	--	--	--	--	9.5	A	85.3	F	--	--	--	--
	EB	50.0	D	281.8	F	--	--	--	--	10.7	B	108.6	F	--	--	--	--
	WB	53.6	D	228.7	F	--	--	--	--	5.7	A	59.5	E	--	--	--	--
	NB	69.5	E	101.6	F	57.0	F	676.6	F	101.1	F	145.3	F	58.8	F	676.6 *	F
	SB	100.7	F	213.8	F	16.8	C	46.9	E	--	--	--	--	15.7	C	46.9	E
Glenwood Ave/ Lead Mine Rd/ Blue Ridge Rd	Intersection	330.5	F	479.4	F	316.5	F	470.7	F	212.7	F	184.5	F	223.2	F	208.7	F
	EB	291.6	F	376.7	F	329.9	F	364.4	F	134.8	F	225.6	F	159.6	F	245.6	F
	WB	330.1	F	668.5	F	353.4	F	654.4	F	43.1	D	96.3	F	15.1	B	87.4	F
	NB	77.4	E	113.0	F	72.8	E	72.8	E	209.3	F	94.2	F	148.7	F	184.2	F
	SB	428.6	F	229.7	F	292.1	F	245.3	F	358.4	F	198.2	F	373.5	F	229.7	F
Glenwood Ave/ I-440 WB Ramp	Intersection	61.0	E	205.9	F	54.0	D	205.3	F	15.6	B	64.8	E	15.2	B	57.3	E
	EB	70.4	E	40.5	D	57.6	E	39.4	D	--	--	--	--	--	--	--	--
	WB	60.1	E	354.5	F	61.2	E	353.6	F	38.9	D	92.1	F	36.6	D	74.7	E
	NB	5.7	A	2.3	A	5.3	A	2.3	A	--	--	--	--	--	--	--	--
	SB	66.2	E	359.3	F	62.0	E	359.6	F	10.7	B	56.8	E	10.7	B	52.1	D
Glenwood Ave/ I-440 EB Ramp	Intersection	73.5	E	62.8	E	66.7	E	62.2	E	58.5	E	60.8	E	57.5	E	54.4	D
	EB	83.8	F	45.1	D	73.5	E	44.4	D	55.4	E	45.3	D	65.1	E	25.1	C
	WB	22.2	C	66.8	E	20.5	C	68.0	E	22.3	C	64.9	E	28.7	C	66.7	E
	NB	114.1	F	76.2	E	108.3	F	76.3	E	108.9	F	74.3	E	76.5	E	73.9	E
	SB	69.2	E	26.4	C	66.5	E	26.3	C	41.5	D	41.7	D	40.6	D	19.8	B
Lead Mine Rd/ North Hills Dr	Intersection	60.9	E	152.9	F	75.2	E	152.6	F	57.2	E	108.1	F	53.8	D	102.4	F
	EB	112.8	F	78.8	E	219.3	F	77.5	E	128.9	F	52.2	D	134.6	F	88.1	F
	WB	100.1	F	123.2	F	89.2	F	122.5	F	197.8	F	109.7	F	153.5	F	110.2	F
	NB	27.9	C	232.6	F	77.4	E	232.2	F	21.6	C	147.2	F	30.8	C	149.2	F
	SB	69.2	E	26.4	C	66.5	E	26.3	C	41.5	D	41.7	D	40.6	D	19.8	B
Creedmoor Rd/ Mall Entr	Intersection	71.6	E	55.9	E	87.0	F	73.4	E	86.2	F	55.7	E	67.8	E	56.3	E
	EB	97.5	F	95.9	F	83.1	F	99.3	F	168.6	F	152.5	F	175.0	F	160.1	F
	WB	65.3	E	78.9	E	62.8	E	199.7	F	75.0	E	148.2	F	28.5	C	123.1	F
	NB	39.5	D	51.8	D	40.4	D	43.6	D	18.2	B	31.0	C	57.4	E	41.5	D
	SB	83.8	F	49.5	D	109.2	F	52.8	D	109.9	F	36.0	D	65.7	E	35.0	C
Blue Ridge Rd/ Mall Entr	Intersection	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EB	--	F	957.7	F	--	F	956.4	F	10.8	B	16.5	C	10.6	B	15.9	C
	NB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creedmoor Rd/ Crabtree Valley Ave	Intersection	28.2	D	51.9	D	25.2	C	50.1	D	27.2	C	44.0	D	29.7	C	45.2	D
	EB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	42.7	D	71.5	E	35.9	D	80.2	F	39.1	D	40.9	D	41.4	D	43.7	D
	NB	33.0	C	64.5	E	31.5	C	55.1	E	32.7	C	55.6	E	54.2	D	60.4	E
	SB	20.8	C	24.0	C	18.3	B	28.4	C	20.3	C	28.8	C	13.0	B	23.6	C
Crabtree Valley Ave/ Blue Ridge Rd	Intersection	20.8	C	31.3	C	19.6	B	30.3	C	23.7	C	32.3	C	18.2	B	33.0	C
	EB	72.7	E	52.9	D	74.8	E	50.9	D	80.0	E	64.0	E	67.1	E	44.0	D
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	NB	26.7	C	30.3	C	27.1	C	29.8	C	34.6	C	30.2	C	26.6	C	25.4	C
	SB	8.9	A	23.5	C	6.4	A	22.5	C	6.7	A	19.5	B	4.0	A	36.2	D
Crabtree Valley Ave/ Edwards Mill Rd	Intersection	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	NB	12.8	B	14.6	B	12.8	B	14.6	B	12.8	B	14.6	B	12.8	B	14.6	B
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SB	9.9	A	23.5	C	6.4	A	22.5	C	6.7	A	19.5	B	4.0	A	36.2	D
Crabtree Valley Ave/ Mall Parking Deck	Intersection	7.6	A	20.4	C	7.5	A	21.3	C	8.2	A	18.9	B	6.9	A	18.8	B
	EB	7.1	A	11.4	B	5.9	A	13.9	B	6.2	A	11.0	B	5.0	A	11.3	B
	WB	2.0	A	10.3	B	3.8	B	10.1	B	4.1	A	10.6	B	2.5	A	10.2	B
	NB	84.7	F	75.8	E	73.3	E	74.9	E	83.7	F	67.1	E	85.7	F	68.9	E
	SB	91.9	F	100.9	F	79.0	E	99.6	F	90.5	F	89.6	F	92.9	F	91.8	F
Crabtree Valley Ave/ Homewood Banks Dr _Mall Entr	Intersection	40.6	D	62.8	E	36.6	D	60.7	E	43.1	D	66.5	E	46.2	D	70.7	E
	EB	19.8	B	57.8	E	17.9	B	48.8	D	21.2	C	52.2	D	30.0	C	63.3	E
	WB	48.6	D	52.1	D	43.6	D	48.3	D	52.3	D	74.5	E	53.3	D	73.7	E
	NB	41.9	D	69.1	E	38.6	D	75.4	E	39.7	D	59.6	F	40.6	D	71.8	E
	SB	97.0	F	84.2	F	85.1	F	85.3	F	96.4	F	73.2	E	98.6	F	71.2	E
Blue Ridge Rd/ Crabtree View Pl	Intersection	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	WB	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arrow Dr Extension/ Blue Ridge Rd	Intersection	33.1	C	36.4	D	28.5	C	36.4	D	32.7	C	35.8	D	33.5	C	34.4	C
	WB	70.0	E	70.3	E	60.2	E	69.5	E	70.7	E	65.0	E	72.5	E	66.8	E
	NB	19.5	B	28.2	C	19.2	B	28.1	C	17.1	B	24.3	C	17.2	B	24.4	C
	WB	27.8	C	30.8	C	22.4	C	31.1	C	28.0	C	36.4	D	29.1	C	31.4	C
	SB	27.8	C	30.8	C	22.4	C	31.1	C	28.0	C	36.4	D	29.1	C	31.4	C
Performance Index		3,525.6		8,969.8		2,704.0		7,047.0		2,186.2		5,941.9		1,426.3		4,394.8	
Glenwood Ave Arterial	Speed (mph)	4 (4-4)		5 (5-5)		4 (2-4)		5 (5-5)		5 (5-6)		5 (5-6)		7 (5-8)		6 (4-6)	
	Travel Time (sec)	2,334.0 (2,136.6-2,783.0)		2,188.0 (2,041.2-2,458.9)		3,478.1 (2,882.3-5,221.1)		2,337.9 (2,042.0-2,608.2)		1,700.7 (1,383.7-2,255.3)		2,161.7 (1,966.4-2,257.2)		1,148.1 (833.2-1,807.8)		1,960.3 (1,727.8-2,372.3)	
	Delays (sec/veh)	2,174.0 (1,976.6-2,623.0)		2,026.6 (1,879.8-2,297.5)		3,316.8 (2,721.0-5,095.8)		2,176.3 (1,880.4-2,446.6)		1,539.1 (1,222.1-2,093.7)		1,999.9 (1,798.6-2,089.4)		988.6 (673.7-1,648.3)		1,800.7 (1,568.2-2,212.7)	
	Speed (mph)	12 (12-13)		11 (10-11)		13 (9-14)		8 (7-8)		16 (12-22)		11 (9-13)		34 (30-37)		28 (19-33)	
Network Performance	Travel Time (sec)	1,190.3 (1,019.7-1,252.7)		3,273.6 (3,048.4-3,459.5)		1,366.4 (1,180.8-1,682.4)		7,515.8 (6,660.0-8,938.3)		790.8 (633.1-918.0)		1,524.5 (1,404.8-1,655.7)		522.5 (407.7-615.7)		984.1 (821.6-1,054.9)	
	Delays (sec/veh)	1,038.7 (868.1-1,101.1)		3,121.6 (2,896.4-3,307.5)		1,214.1 (1,028.5-1,530.1)		7,363.2 (6,507.4-8,785.7)		638.3 (510.6-765.5)		1,372.0 (1,252.3-1,503.2)		384.7 (269.9-477.9)		847.2 (684.7-918.0)	
	Total Delay (hr)	13,898.2 (13,618.7-14,163.9)		15,459.7 (15,315.6-15,785.4)		14,051.											

2009 Base Conditions

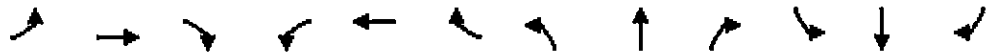
Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Baseline AM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	1614	89	324	1498	458	191	360	118	954	952	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			-2%	
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.992				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6357	0	3433	5085	1583	3433	3539	1583	3467	3521	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6357	0	3433	5085	1583	3433	3539	1583	3465	3521	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35				45
Link Distance (ft)		1166			1075			606				1602
Travel Time (s)		17.7			16.3			11.8				24.3
Confl. Peds. (#/hr)										1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	1754	97	352	1628	498	208	391	128	1037	1035	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	1851	0	352	1628	498	208	391	128	1037	1146	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4	14.3	14.4	17.4	
Total Split (s)	15.0	60.0	0.0	29.0	74.0	0.0	29.0	31.0	29.0	60.0	62.0	0.0
Total Split (%)	8.3%	33.3%	0.0%	16.1%	41.1%	0.0%	16.1%	17.2%	16.1%	33.3%	34.4%	0.0%
Maximum Green (s)	7.7	52.7		21.7	66.7		21.6	23.6	21.7	52.6	54.6	
Yellow Time (s)	5.5	5.5		5.5	5.5		5.5	5.5	5.5	5.5	5.5	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9	1.8	1.9	1.9	
Lost Time Adjust (s)	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.4	-2.4	-2.3	-2.4	-2.4	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effect Green (s)	9.9	56.1		22.9	72.0	180.0	17.7	26.0	53.9	55.0	63.3	
Actuated g/C Ratio	0.06	0.31		0.13	0.40	1.00	0.10	0.14	0.30	0.31	0.35	
v/c Ratio	0.53	0.93		0.81	0.80	0.31	0.62	0.77	0.27	0.98	0.92	
Control Delay	102.6	69.6		68.9	62.5	0.5	83.3	85.4	46.6	84.1	68.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	102.6	69.6		68.9	62.5	0.5	83.3	85.4	46.6	84.1	68.7	
LOS	F	E		E	E	A	F	F	D	F	E	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Baseline AM (2009)
 4/21/2010

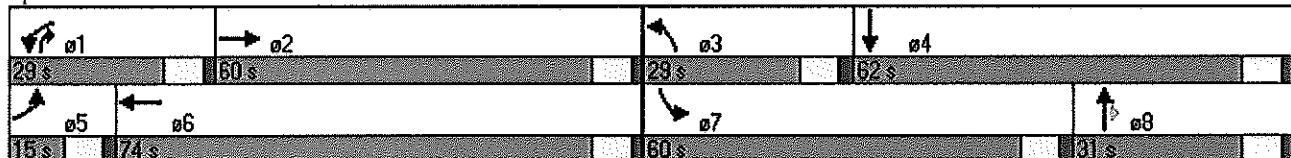


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		70.5			50.9			78.0			76.0	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)	60	627		212	743	0	124	239	108	630	687	
Queue Length 95th (ft)	113	#681		249	791	0	168	303	182	#777	#873	
Internal Link Dist (ft)		1086			995			526			1522	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	98	1982		458	2034	1583	458	511	484	1059	1239	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.52	0.93		0.77	0.80	0.31	0.45	0.77	0.26	0.98	0.92	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 55 (31%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 66.3
 Intersection LOS: E
 Intersection Capacity Utilization 88.6%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



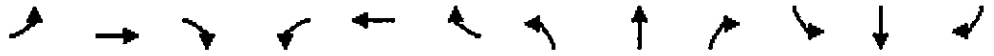
Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Baseline AM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	2654	24	35	2242	68	17	2	26	82	6	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%			-1%	
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.996				0.850		0.885	
Flt Protected	0.950			0.950				0.957		0.950		
Satd. Flow (prot)	1752	6337	0	1770	6382	0	0	1792	1591	1778	1657	0
Flt Permitted	0.950			0.950				0.764		0.744		
Satd. Flow (perm)	1752	6337	0	1770	6382	0	0	1430	1591	1393	1657	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1075			1624			201			281	
Travel Time (s)		16.3			24.6			5.5			5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2885	26	38	2437	74	18	2	28	89	7	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	2911	0	38	2511	0	0	20	28	89	30	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			4			4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	13.4	21.4		13.3	21.3		22.6	22.6	22.6	22.6	22.6	
Total Split (s)	16.0	130.0	0.0	17.0	131.0	0.0	33.0	33.0	33.0	33.0	33.0	0.0
Total Split (%)	8.9%	72.2%	0.0%	9.4%	72.8%	0.0%	18.3%	18.3%	18.3%	18.3%	18.3%	0.0%
Maximum Green (s)	9.6	123.6		10.7	124.7		25.4	25.4	25.4	25.4	25.4	
Yellow Time (s)	3.0	4.3		3.0	4.5		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	3.4	2.1		3.3	1.8		3.7	3.7	3.7	3.7	3.7	
Lost Time Adjust (s)	-1.4	-1.4	0.0	-1.3	1.3	0.0	0.0	-2.6	0.0	-2.6	-2.6	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	7.6	4.0	7.6	5.0	7.6	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	8.6	136.7		10.8	141.7			20.1	17.5	20.1	20.1	
Actuated g/C Ratio	0.05	0.76		0.06	0.79			0.11	0.10	0.11	0.11	
v/c Ratio	0.11	0.60		0.36	0.50			0.12	0.18	0.57	0.16	
Control Delay	66.8	11.3		61.3	20.6			72.4	76.1	90.1	73.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	66.8	11.3		61.3	20.6			72.4	76.1	90.1	73.1	
LOS	E	B		E	C			E	E	F	E	
Approach Delay		11.5			21.2			74.6			85.9	
Approach LOS		B			C			E			F	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Baseline AM (2009)
4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	10	444		40	748			22	31	103	33	
Queue Length 95th (ft)	m12	m323		m43	530			51	66	163	68	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	107	4814		122	5025			222	225	217	258	
Starvation Cap Reductn	0	228		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.08	0.63		0.31	0.50			0.09	0.12	0.41	0.12	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 50 (28%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 18.0
 Intersection LOS: B
 Intersection Capacity Utilization 78.5%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1 17 s	ø2 130 s	ø4 33 s
ø5 16 s	ø6 131 s	

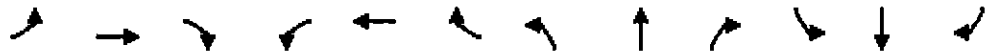
Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Baseline AM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	287	2422	52	448	2230	458	30	134	91	1386	448	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.997				0.850			0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6325	0	3433	5085	1583	1752	3504	1567	5040	3489	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6325	0	3433	5085	1583	1752	3504	1567	5036	3489	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1624			371			433			524	
Travel Time (s)		24.6			5.6			8.4			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	312	2633	57	487	2424	498	33	146	99	1507	487	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	312	2690	0	487	2424	498	33	146	99	1507	579	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	17.0		13.5	17.0	13.0	14.0	13.0	13.5	13.0	13.0	
Total Split (s)	15.0	85.0	0.0	25.0	95.0	56.0	14.0	14.0	25.0	56.0	56.0	0.0
Total Split (%)	8.3%	47.2%	0.0%	13.9%	52.8%	31.1%	7.8%	7.8%	13.9%	31.1%	31.1%	0.0%
Maximum Green (s)	7.5	78.0		17.5	88.0	49.0	6.0	7.0	17.5	49.0	49.0	
Yellow Time (s)	5.0	4.5		5.0	4.5	4.5	5.0	4.5	5.0	4.5	4.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	3.0	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.5	-2.0	0.0	-2.0	-2.0	-2.0	-3.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.5	5.0	5.0	5.0	5.0	5.5	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effect Green (s)	10.0	80.0		19.5	90.0	146.0	9.0	9.0	33.5	51.0	53.8	
Actuated g/C Ratio	0.06	0.44		0.11	0.50	0.81	0.05	0.05	0.19	0.28	0.30	
v/c Ratio	1.65	0.96		1.31	0.95	0.39	0.38	0.83	0.34	1.06	0.56	
Control Delay	359.3	49.5		209.6	47.0	4.5	92.3	125.0	61.7	98.0	52.8	
Queue Delay	0.0	1.2		40.0	0.0	0.0	0.0	0.0	0.0	40.3	0.8	
Total Delay	359.3	50.6		249.6	47.0	4.5	92.3	125.0	61.7	138.4	53.6	
LOS	F	D		F	D	A	F	F	E	F	D	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Baseline AM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		82.7			69.7			98.6				114.9
Approach LOS		F			E			F				F
Queue Length 50th (ft)	~280	975		~385	822	104	39	93	92	~691	335	
Queue Length 95th (ft)	#385	922		m#473	893	m130	82	#161	158	#763	285	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	189	2811		372	2543	1284	88	175	292	1428	1043	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	119	209	
Spillback Cap Reductn	0	41		24	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.65	0.97		1.40	0.95	0.39	0.38	0.83	0.34	1.15	0.69	

Intersection Summary

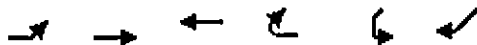
Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 89 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.65
 Intersection Signal Delay: 85.8
 Intersection LOS: F
 Intersection Capacity Utilization 99.3%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø1 25 s	ø2 85 s	ø3 14 s	ø4 56 s
ø5 15 s	ø6 95 s	ø7 56 s	ø8 14 s

Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

Baseline AM (2009)
4/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	2798	1610	0	0	1526
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Flt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3041	1750	0	0	1659
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	3041	1750	0	0	1659
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			13.1			13.1
Total Split (s)	0.0	0.0	47.0	0.0	0.0	43.0
Total Split (%)	0.0%	0.0%	52.2%	0.0%	0.0%	47.8%
Maximum Green (s)			40.9			36.9
Yellow Time (s)			5.0			5.0
All-Red Time (s)			1.1			1.1
Lost Time Adjust (s)	0.0	0.0	-1.1	0.0	0.0	-1.1
Total Lost Time (s)	4.0	4.0	5.0	4.0	4.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		90.0	35.7			44.3
Actuated g/C Ratio		1.00	0.40			0.49
v/c Ratio		0.61	0.58			0.93
Control Delay		0.2	21.8			33.7
Queue Delay		0.0	0.0			0.0
Total Delay		0.2	21.8			33.7
LOS		A	C			C
Approach Delay		0.2	21.8			
Approach LOS		A	C			
Queue Length 50th (ft)		0	334			369
Queue Length 95th (ft)		m0	319			#581
Internal Link Dist (ft)		364	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Baseline AM (2009)
 4/21/2010

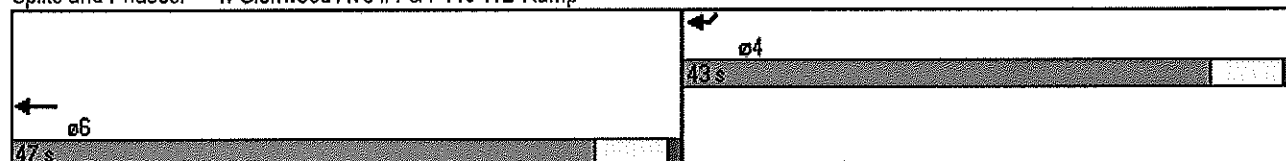


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	3556			1786
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.61	0.49			0.93

Intersection Summary

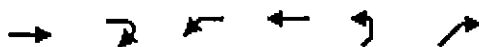
Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 41 (46%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 14.7
 Intersection LOS: B
 Intersection Capacity Utilization 79.6%
 ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

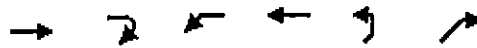


Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Baseline AM (2009)
4/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↘↘	
Volume (vph)	1705	0	0	1040	674	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Frt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Frt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1853	0	0	1130	733	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1853	0	0	1130	733	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	12.9			12.9	13.0	
Total Split (s)	140.0	0.0	0.0	140.0	40.0	0.0
Total Split (%)	77.8%	0.0%	0.0%	77.8%	22.2%	0.0%
Maximum Green (s)	134.1			134.1	34.0	
Yellow Time (s)	5.0			5.0	4.0	
All-Red Time (s)	0.9			0.9	2.0	
Lost Time Adjust (s)	-0.9	0.0	0.0	-0.9	-1.0	0.0
Total Lost Time (s)	5.0	4.0	4.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	128.5			128.5	41.5	
Actuated g/C Ratio	0.71			0.71	0.23	
w/c Ratio	0.75			0.30	0.93	
Control Delay	7.5			9.5	84.8	
Queue Delay	0.2			0.0	0.0	
Total Delay	7.7			9.5	84.8	
LOS	A			A	F	
Approach Delay	7.7			9.5	84.8	
Approach LOS	A			A	F	
Queue Length 50th (ft)	76			142	~505	
Queue Length 95th (ft)	92			160	#638	
Internal Link Dist (ft)	301			418	376	



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	2601			3947	787	
Starvation Cap Reductn	154			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.76			0.29	0.93	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 124 (69%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 23.4
 Intersection LOS: C
 Intersection Capacity Utilization 89.8%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
40s	40s

Lanes, Volumes, Timings
6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

Baseline AM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔		↔	↔↔	↔	↔	↔↔↔	
Volume (vph)	3	1	15	377	2	15	4	728	148	36	1530	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.989				0.850			
Flt Protected		0.964		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1814	1599	1631	1623	0	1717	3433	1536	1823	5238	0
Flt Permitted		0.964		0.950	0.956		0.090			0.280		
Satd. Flow (perm)	0	1814	1577	1626	1619	0	163	3433	1503	537	5238	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1	16	410	2	16	4	791	161	39	1663	2
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	4	16	213	215	0	4	791	161	39	1665	0
Turn Type	Split		pm+ov	Split			pm+pt		pm+ov	pm+pt		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3				2		2	6		
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	13.0	13.0	13.2	13.0	13.0		13.2	18.2	13.0	13.2	18.2	
Total Split (s)	13.0	13.0	13.2	23.0	23.0	0.0	13.2	40.8	23.0	13.2	40.8	0.0
Total Split (%)	14.4%	14.4%	14.7%	25.6%	25.6%	0.0%	14.7%	45.3%	25.6%	14.7%	45.3%	0.0%
Maximum Green (s)	7.0	7.0	7.0	17.0	17.0		7.0	34.6	17.0	7.0	34.6	
Yellow Time (s)	4.0	4.0	4.7	4.0	4.0		4.7	4.7	4.0	4.7	4.7	
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0		1.5	1.5	2.0	1.5	1.5	
Lost Time Adjust (s)	0.0	-1.0	0.0	-1.0	-1.0	0.0	-1.2	-1.2	-1.2	-1.2	-1.2	0.0
Total Lost Time (s)	6.0	5.0	6.2	5.0	5.0	4.0	5.0	5.0	4.8	5.0	5.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		8.0	8.4	16.3	16.3		58.1	53.2	69.9	59.1	55.9	
Actuated g/C Ratio		0.09	0.09	0.18	0.18		0.65	0.59	0.78	0.66	0.62	
v/c Ratio		0.02	0.11	0.72	0.73		0.02	0.39	0.14	0.08	0.51	
Control Delay		38.0	29.7	48.9	49.7		10.8	18.2	3.4	7.4	13.0	
Queue Delay		0.0	0.0	1.8	1.9		0.0	0.0	0.0	0.0	0.2	
Total Delay		38.0	29.7	50.7	51.7		10.8	18.2	3.4	7.4	13.2	
LOS		D	C	D	D		B	B	A	A	B	

Lanes, Volumes, Timings
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

Baseline AM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		31.3			51.2			15.7			13.1	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)		2	9	120	121		1	315	66	6	132	
Queue Length 95th (ft)		12	15	#201	#205		m4	m317	m35	24	360	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		161	148	335	334		247	2030	1204	470	3251	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	40	40		0	0	0	0	637	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02	0.11	0.72	0.73		0.02	0.39	0.13	0.08	0.64	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 18 (20%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 19.2
 Intersection LOS: B
 Intersection Capacity Utilization 60.1%
 ICU Level of Service B
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
13.2 s	40.8 s	13 s	23 s
ø5	ø6		
13.2 s	40.8 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Baseline AM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	1	5	2	36	21	633	25	39	1357	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Frt		0.850				0.850		0.994			0.999	
Flt Protected					0.966		0.950			0.950		
Satd. Flow (prot)	1853	1575	0	0	1799	2787	1805	5156	0	3416	3518	0
Flt Permitted					0.966		0.950			0.950		
Satd. Flow (perm)	1853	1575	0	0	1799	2787	1805	5156	0	3416	3518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1	5	2	39	23	688	27	42	1475	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	7	39	23	715	0	42	1484	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	13.0	13.0		14.5	14.5	14.0	14.0	17.0		14.0	17.0	
Total Split (s)	15.0	15.0	0.0	16.0	16.0	16.0	18.0	133.0	0.0	16.0	131.0	0.0
Total Split (%)	8.3%	8.3%	0.0%	8.9%	8.9%	8.9%	10.0%	73.9%	0.0%	8.9%	72.8%	0.0%
Maximum Green (s)	9.0	9.0		8.5	8.5	9.0	11.0	126.0		9.0	124.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		3.5	3.5	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	0.0	-2.5	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	7.5	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		8.0			9.5	12.0	9.3	159.2		9.1	162.8	
Actuated g/C Ratio		0.04			0.05	0.07	0.05	0.88		0.05	0.90	
v/c Ratio		0.01			0.07	0.21	0.25	0.16		0.24	0.47	
Control Delay		83.0			83.0	80.0	88.6	2.6		72.2	6.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.4	
Total Delay		83.0			83.0	80.0	88.6	2.6		72.2	6.7	
LOS		F			F	E	F	A		E	A	
Approach Delay		83.0			80.4			5.2			8.5	
Approach LOS		F			F			A			A	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

Baseline AM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		1			8	25	27	27		22	410	
Queue Length 95th (ft)		8			27	46	61	102		m30	292	
Internal Link Dist (ft)		104			168			329			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)		88			110	215	130	4560		209	3182	
Starvation Cap Reductn		0			0	0	0	0		0	988	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.01			0.06	0.18	0.18	0.16		0.20	0.68	

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 155 (86%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 8.9

Intersection LOS: A

Intersection Capacity Utilization 51.9%

ICU Level of Service A

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1 16 s	ø2 133 s	ø3 15 s	ø4 16 s
ø5 18 s	ø6 131 s		

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

Baseline AM (2009)
4/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙↙	↘		↑↑↑	↑	↘↘
Volume (vph)	72	33	20	184	670	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950			0.995		
Satd. Flow (prot)	3399	1567	0	5110	1844	2759
Fl _t Permitted	0.950			0.870		
Satd. Flow (perm)	3399	1567	0	4468	1844	2759
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	433	
Travel Time (s)	4.2			7.3	8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	36	22	200	728	302
Shared Lane Traffic (%)						
Lane Group Flow (vph)	78	36	0	222	728	302
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	13.3	13.3	12.5	12.5	12.5	13.3
Total Split (s)	18.0	18.0	72.0	72.0	72.0	18.0
Total Split (%)	20.0%	20.0%	80.0%	80.0%	80.0%	20.0%
Maximum Green (s)	11.7	11.7	66.5	66.5	66.5	11.7
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	1.8	1.8	1.0	1.0	1.0	1.8
Lost Time Adjust (s)	-1.3	-1.3	0.0	-0.5	-0.5	-0.5
Total Lost Time (s)	5.0	5.0	5.5	5.0	5.0	5.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	9.4	9.4		70.6	70.6	90.0
Actuated g/C Ratio	0.10	0.10		0.78	0.78	1.00
v/c Ratio	0.22	0.22		0.06	0.50	0.11
Control Delay	38.1	39.8		2.3	7.2	0.0
Queue Delay	0.0	0.0		0.0	1.4	0.0
Total Delay	38.1	39.8		2.3	8.6	0.0
LOS	D	D		A	A	A
Approach Delay	38.7			2.3	6.1	
Approach LOS	D			A	A	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

Baseline AM (2009)
 4/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	21	19		7	182	0
Queue Length 95th (ft)	41	47		14	m445	m0
Internal Link Dist (ft)	134			296	353	
Turn Bay Length (ft)						175
Base Capacity (vph)	491	226		3507	1447	2693
Starvation Cap Reductn	0	0		0	487	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.16	0.16		0.06	0.76	0.11

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 28 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 8.2
 Intersection LOS: A
 Intersection Capacity Utilization 49.4%
 ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd

↑ ø2 72 s	↘ ø4 18 s
↓ ø6 72 s	

HCM Unsignalized Intersection Capacity Analysis
 9: Crabtree Valley Ave & Creedmoor Rd.

Baseline AM (2009)
 4/21/2010




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↕	↗	↖	↑↑↑		↖	↑↑	
Volume (veh/h)	0	0	0	55	0	89	0	590	84	128	1235	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	60	0	97	0	641	91	139	1342	0
Pedestrians					2							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											409	
pX, platoon unblocked	0.87	0.87	0.87	0.87	0.87		0.87					
vC, conflicting volume	1931	2355	671	1638	2310	261	1342			735		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1767	2256	313	1429	2204	261	1088			735		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	17	100	87	100			84		
cM capacity (veh/h)	35	30	592	72	32	736	552			865		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	0	60	97	0	257	257	220	139	895	447
Volume Left	0	60	0	0	0	0	0	139	0	0
Volume Right	0	0	97	0	0	0	91	0	0	0
cSH	1700	72	736	1700	1700	1700	1700	865	1700	1700
Volume to Capacity	0.00	0.83	0.13	0.00	0.15	0.15	0.13	0.16	0.53	0.26
Queue Length 95th (ft)	0	101	11	0	0	0	0	14	0	0
Control Delay (s)	0.0	158.4	10.6	0.0	0.0	0.0	0.0	10.0	0.0	0.0
Lane LOS	A	F	B					A		
Approach Delay (s)	0.0	67.1		0.0				0.9		
Approach LOS	A	F								

Intersection Summary		
Average Delay		5.0
Intersection Capacity Utilization	50.8%	ICU Level of Service A
Analysis Period (min)		15

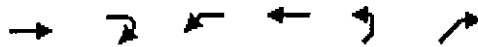
HCM Unsignalized Intersection Capacity Analysis
 10: Crabtree Valley Ave & Blue Ridge Rd.

Baseline AM (2009)
 4/21/2010

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	182	7	17	5	14	46	27	150	8	22	540	141
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	198	8	18	5	15	50	29	163	9	24	587	153
Pedestrians					9			2				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					4.0			4.0				
Percent Blockage					1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											662	
pX, platoon unblocked	0.83	0.83	0.83	0.83	0.83		0.83					
vC, conflicting volume	995	951	666	971	1023	176	740			181		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	893	840	497	864	927	176	587			181		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	97	96	97	93	94	96			98		
cM capacity (veh/h)	185	236	476	203	210	860	822			1384		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	198	26	71	201	764							
Volume Left	198	0	5	29	24							
Volume Right	0	18	50	9	153							
cSH	185	367	449	822	1384							
Volume to Capacity	1.07	0.07	0.16	0.04	0.02							
Queue Length 95th (ft)	236	6	14	3	1							
Control Delay (s)	137.3	15.6	14.5	1.7	0.5							
Lane LOS	F	C	B	A	A							
Approach Delay (s)	123.1		14.5	1.7	0.5							
Approach LOS	F		B									
Intersection Summary												
Average Delay			23.2									
Intersection Capacity Utilization			63.9%		ICU Level of Service					B		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

Baseline AM (2009)
 4/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↩		↩	↩	↩	
Volume (veh/h)	179	33	74	129	15	59
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	195	36	80	140	16	64
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			195		514	212
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			195		514	212
IC, single (s)			4.1		6.4	6.2
IC, 2 stage (s)						
IF (s)			2.2		3.5	3.3
p0 queue free %			94		97	92
cM capacity (veh/h)			1379		490	828

Direction, Lane #	EB 1	WB 1	WB 2	NE 1
Volume Total	230	80	140	80
Volume Left	0	80	0	16
Volume Right	36	0	0	64
cSH	1700	1379	1700	726
Volume to Capacity	0.14	0.06	0.08	0.11
Queue Length 95th (ft)	0	5	0	9
Control Delay (s)	0.0	7.8	0.0	10.6
Lane LOS		A		B
Approach Delay (s)	0.0	2.8		10.6
Approach LOS				B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 12: Crabtree Valley Ave & Mall Entrance

Baseline AM (2009)
 4/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↷		↶	↷	
Volume (veh/h)	44	168	26	11	151	21	18	14	24	14	12	34
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	183	28	12	164	23	20	15	26	15	13	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	187			211			524	503	197	511	506	176
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	187			211			524	503	197	511	506	176
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			95	97	97	96	97	96
cM capacity (veh/h)	1387			1360			420	450	844	432	449	868
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total	48	211	12	187	20	41	15	50				
Volume Left	48	0	12	0	20	0	15	0				
Volume Right	0	28	0	23	0	26	0	37				
cSH	1387	1700	1360	1700	420	639	432	698				
Volume to Capacity	0.03	0.12	0.01	0.11	0.05	0.06	0.04	0.07				
Queue Length 95th (ft)	3	0	1	0	4	5	3	6				
Control Delay (s)	7.7	0.0	7.7	0.0	14.0	11.0	13.6	10.6				
Lane LOS	A		A		B	B	B	B				
Approach Delay (s)	1.4		0.5		12.0		11.3					
Approach LOS					B		B					
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			31.4%		ICU Level of Service		A					
Analysis Period (min)			15									

Network Totals

Number of Intersections	31
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	12
Total Delay (hr)	484
Stops / Veh	0.16
Stops (#)	23749
Average Speed (mph)	22
Total Travel Time (hr)	889
Distance Traveled (mi)	20002
Fuel Consumed (gal)	1319
Fuel Economy (mpg)	15.2
CO Emissions (kg)	92.19
NOx Emissions (kg)	17.94
VOC Emissions (kg)	21.37
Unserved Vehicles (#)	292
Vehicles in dilemma zone (#)	819
Performance Index	550.4

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	2408.9	1848.5	2128.3	2630.1	2281.4	2039.6	2021.9
Delay / Veh (s)	508.5	365.7	432.0	587.7	481.8	406.6	416.3
Stop Delay (hr)	2156.6	1586.5	1859.6	2389.9	2026.1	1761.2	1767.1
St Del/Veh (s)	455.2	313.9	377.5	534.0	427.9	351.1	363.9
Total Stops	40347	39015	42772	40467	41801	43214	41158
Stop/Veh	2.37	2.14	2.41	2.51	2.45	2.39	2.35
Travel Dist (mi)	22468.8	23975.4	23187.3	21285.1	22433.9	23635.7	22681.9
Travel Time (hr)	2898.7	2369.4	2632.1	3097.4	2771.6	2553.4	2515.5
Avg Speed (mph)	15	16	15	13	14	15	15
Fuel Used (gal)	1351.7	1280.6	1313.3	1361.2	1323.0	1308.5	1274.7
Fuel Eff. (mpg)	16.6	18.7	17.7	15.6	17.0	18.1	17.8
HC Emissions (g)	13238	13958	13630	13370	13776	14041	14296
CO Emissions (g)	585790	620558	598370	565369	589884	612355	604554
NOx Emissions (g)	43645	46968	45336	42980	45113	46789	46414
Vehicles Entered	17537	18533	18240	16560	17465	18523	17989
Vehicles Exited	16571	17859	17233	15665	16625	17595	16978
Hourly Exit Rate	16571	17859	17233	15665	16625	17595	16978
Input Volume	198246	198246	198246	198246	198246	198246	198246
% of Volume	8	9	9	8	8	9	9
Denied Entry Before	65	5	16	50	37	88	13
Denied Entry After	3450	2560	2962	4364	3472	2533	2968

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	2167.8	2201.3	2165.9	2189.4
Delay / Veh (s)	450.3	464.4	455.6	454.9
Stop Delay (hr)	1907.1	1946.6	1902.9	1930.4
St Del/Veh (s)	396.1	410.7	400.3	401.1
Total Stops	42641	42646	41663	41572
Stop/Veh	2.46	2.50	2.43	2.40
Travel Dist (mi)	22782.1	22385.7	22502.0	22733.8
Travel Time (hr)	2664.8	2687.6	2657.4	2684.8
Avg Speed (mph)	14	14	14	14
Fuel Used (gal)	1312.1	1306.5	1299.8	1313.1
Fuel Eff. (mpg)	17.4	17.1	17.3	17.3
HC Emissions (g)	12962	13563	13313	13615
CO Emissions (g)	580853	588666	575859	592226
NOx Emissions (g)	43849	44690	44232	45002
Vehicles Entered	17657	17452	17620	17758
Vehicles Exited	17005	16676	16610	16883
Hourly Exit Rate	17005	16676	16610	16883
Input Volume	198246	198246	198246	198246
% of Volume	9	8	8	9
Denied Entry Before	70	10	10	36
Denied Entry After	3302	3383	3431	3241

Arterial Level of Service: EB #1

City Street	Nodes	Delay (s)	Travel Time (s)	Cost (veh)	Arterial Speed (mph)	Plan 1 Speed (mph)	Plan 1 Delay (s)
	44	7.5	53.1	0.4	43	43	2.5
	25	0.7	55.5	0.2	42	43	0.7
Creedmoor Rd	1	84.5	101.5	0.2	8	8	80.1
Crabtree Mall Entr	2	48.6	65.6	0.2	11	12	45.3
Blue Ridge Rd	3	84.2	108.8	0.3	10	10	83.7
Crabtree View Pl	32	6.5	12.3	0.1	21	21	6.2
WB I-440 On-Ramp fro	18	3.1	8.6	0.1	29	29	2.9
I-440 WB Off-Ramp to	4	3.9	10.9	0.1	28	31	2.8
WB I-440 Off-Ramp to	38	1.7	4.3	0.0	41	49	1.0
WB I-440 On-Ramp fro	44	3.2	7.3	0.1	25	30	2.1
EB I-440 On-Ramp fro	23	4.3	7.8	0.0	14	20	2.0
I-440 EB Off-Ramp	5	17.0	22.8	0.1	11	14	12.6
EB I-440 Off-Ramp to	41	2.5	8.0	0.1	42	44	2.1
Total		262.7	426.6	2.1	17	18	243.9

Arterial Level of Service: EB #1

City Street	Plan 11 Speed (mph)	Plan 11 Delay (s)	Plan 12 Speed (mph)	Plan 12 Delay (s)	Plan 13 Speed (mph)	Plan 13 Delay (s)	Plan 14 Speed (mph)
	42	0.7	43	0.4	43	0.5	43
	42	0.7	43	0.7	42	0.8	42
Creedmoor Rd	8	86.5	8	80.2	8	88.4	7
Crabtree Mall Entr	12	42.8	13	39.8	9	60.6	10
Blue Ridge Rd	9	94.5	10	90.0	10	83.2	11
Crabtree View Pl	21	6.5	21	6.5	20	6.8	21
WB I-440 On-Ramp fro	29	2.9	30	2.6	27	3.5	29
I-440 WB Off-Ramp to	31	2.8	31	2.8	30	3.1	25
WB I-440 Off-Ramp to	50	0.9	46	1.2	49	1.0	35
WB I-440 On-Ramp fro	31	1.9	26	3.1	30	2.1	22
EB I-440 On-Ramp fro	22	1.4	12	5.4	18	2.6	12
I-440 EB Off-Ramp	14	12.5	10	20.1	14	12.2	10
EB I-440 Off-Ramp to	43	2.4	41	2.9	43	2.4	41
Total	18	258.6	18	257.7	17	269.2	17

Arterial Level of Service: EB #1

Cross Street	Flow 5 Delay	Flow 6 Delay	Flow 6 Delay	Flow 6 Delay	Flow 7 Delay	Flow 7 Delay	Flow 7 Delay
	2.4	42	2.6	43	2.4	43	2.4
	0.7	42	0.8	42	0.7	43	0.7
Creedmoor Rd	92.0	6	107.2	8	76.6	8	85.0
Crabtree Mall Entr	54.2	9	63.5	11	48.4	12	41.6
Blue Ridge Rd	77.0	10	83.2	10	82.7	10	88.2
Crabtree View Pl	6.4	20	6.8	19	7.2	21	6.4
WB I-440 On-Ramp fro	3.1	29	2.9	26	4.1	26	3.8
I-440 WB Off-Ramp to	5.2	31	2.6	23	6.3	23	6.2
WB I-440 Off-Ramp to	2.5	50	0.9	32	3.0	31	3.2
WB I-440 On-Ramp fro	4.4	31	1.9	20	5.1	19	5.5
EB I-440 On-Ramp fro	5.8	19	2.0	11	6.6	10	7.4
I-440 EB Off-Ramp	19.5	14	12.6	9	21.5	10	20.7
EB I-440 Off-Ramp to	2.8	44	2.3	42	2.5	41	2.7
Total	275.9	16	289.3	17	267.2	17	273.9

Arterial Level of Service: EB #1

Flow 5 Delay	Flow 6 Delay	Flow 6 Delay	Flow 6 Delay	
43	2.4	43	2.4	
43	0.6	43	0.7	
9	71.5	9	76.1	
11	49.8	13	40.0	
11	72.8	10	86.1	
21	6.3	21	6.3	
31	2.3	29	2.8	
31	2.6	27	4.3	
46	1.2	38	2.1	
27	2.9	25	3.5	
12	5.5	13	4.6	
9	22.0	12	16.7	
42	2.7	43	2.4	
Total	18	242.7	18	247.8

Arterial Level of Service: WB #1

Cross Street	Queue Length	Delay (s)	Travel Time (s)	LOS	Arterial Speed (mph)	Queue Length	Delay (s)	Travel Time (s)
EB I-440 On-Ramp fro	5	1.3	15.9	0.2	43	44	0.7	43
I-440 EB Off-Ramp	5	25.4	33.1	0.1	10	13	18.1	18.1
EB I-440 On-Ramp fro	23	20.3	24.5	0.1	11	13	16.1	16.1
WB I-440 On-Ramp fro	44	24.0	28.0	0.0	4	5	18.5	18.5
WB I-440 Off-Ramp to	38	33.6	38.0	0.1	5	6	24.8	24.8
I-440 WB Off-Ramp to	4	42.0	45.1	0.0	4	4	37.8	37.8
WB I-440 On-Ramp fro	18	35.2	41.1	0.1	7	7	38.5	38.5
Crabtree View Pl	32	66.3	73.7	0.1	3	3	69.7	69.7
Lead Mine Rd	3	40.9	45.9	0.1	6	6	39.5	39.5
Marriott Dr	2	13.4	38.6	0.3	29	29	12.9	12.9
Creedmoor Rd	1	68.9	85.0	0.2	9	9	68.0	68.0
	25	7.4	25.7	0.2	31	31	7.4	7.4
	64	1.7	16.6	0.2	40	40	1.6	1.6
Total		380.2	511.0	1.6	11	12	353.6	353.6

Arterial Level of Service: WB #1

Cross Street	Queue Length	Delay (s)	Travel Time (s)	LOS	Arterial Speed (mph)	Queue Length	Delay (s)	Travel Time (s)
EB I-440 On-Ramp fro	44	0.6	44	0.7	36	16	43	43
I-440 EB Off-Ramp	18	11.2	12	21.4	7	42.2	12	12
EB I-440 On-Ramp fro	44	1.7	12	17.7	7	34.7	12	12
WB I-440 On-Ramp fro	20	1.3	4	26.4	3	33.6	4	4
WB I-440 Off-Ramp to	18	5.7	4	37.7	4	45.0	5	5
I-440 WB Off-Ramp to	8	18.8	4	46.3	3	50.3	4	4
WB I-440 On-Ramp fro	11	22.8	7	38.0	7	37.8	8	8
Crabtree View Pl	4	56.8	3	74.5	3	70.1	3	3
Lead Mine Rd	6	39.9	5	42.9	6	39.7	5	5
Marriott Dr	29	12.9	29	12.4	30	11.1	29	29
Creedmoor Rd	9	69.8	9	68.9	8	71.6	9	9
	31	7.3	32	7.0	31	7.1	31	31
	40	1.8	40	1.7	40	1.6	40	40
Total	15	250.7	11	395.6	10	448.5	12	12

Arterial Level of Service: WB #1

Gross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On-Ramp fro	0.8	40	1.8	44	0.6	43	0.9
I-440 EB Off-Ramp	21.4	10	27.1	12	19.6	11	23.6
EB I-440 On-Ramp fro	17.3	11	19.5	14	14.1	11	20.5
WB I-440 On-Ramp fro	22.6	4	24.8	5	18.8	3	31.5
WB I-440 Off-Ramp to	33.1	4	38.4	6	28.3	4	45.2
I-440 WB Off-Ramp to	43.0	4	44.5	4	41.3	3	48.6
WB I-440 On-Ramp fro	33.7	8	31.1	7	35.4	6	41.7
Crabtree View Pl	65.2	3	66.6	4	59.0	3	69.5
Lead Mine Rd	44.2	5	45.1	6	38.9	6	36.8
Marriott Dr	13.2	26	17.0	29	13.3	29	13.5
Creedmoor Rd	69.4	9	64.6	9	69.7	9	67.2
	7.5	31	7.6	31	7.1	30	7.7
	1.8	40	1.8	41	1.5	40	1.5
Total	373.0	11	389.9	12	347.7	11	408.0

Arterial Level of Service: WB #1

Gross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On-Ramp fro	43	1.0	40	2.1
I-440 EB Off-Ramp	10	27.6	7	41.8
EB I-440 On-Ramp fro	9	23.6	6	37.8
WB I-440 On-Ramp fro	3	29.2	3	37.6
WB I-440 Off-Ramp to	4	39.3	4	44.1
I-440 WB Off-Ramp to	3	48.3	4	45.8
WB I-440 On-Ramp fro	6	42.6	8	32.4
Crabtree View Pl	3	68.0	3	64.4
Lead Mine Rd	5	41.5	6	39.9
Marriott Dr	29	12.4	28	14.5
Creedmoor Rd	9	69.6	8	70.5
	31	7.3	31	7.6
	40	1.7	40	1.8
Total	11	412.1	10	440.4

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Baseline PM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	170	1875	187	257	1930	911	523	966	199	652	666	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Fr't		0.986				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6318	0	3433	5085	1583	3433	3539	1583	3467	3514	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6318	0	3433	5085	1583	3433	3539	1583	3466	3514	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		1166			1075			606			1604	
Travel Time (s)		17.7			16.3			11.8			24.3	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	2038	203	279	2098	990	568	1050	216	709	724	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	2241	0	279	2098	990	568	1050	216	709	819	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4	14.3	14.4	17.4	
Total Split (s)	24.0	82.0	0.0	23.0	81.0	0.0	43.0	59.0	23.0	36.0	52.0	0.0
Total Split (%)	12.0%	41.0%	0.0%	11.5%	40.5%	0.0%	21.5%	29.5%	11.5%	18.0%	26.0%	0.0%
Maximum Green (s)	16.7	74.7		15.7	73.7		35.6	51.6	15.7	28.6	44.6	
Yellow Time (s)	5.5	5.5		5.5	5.5		5.5	5.5	5.5	5.5	5.5	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9	1.8	1.9	1.9	
Lost Time Adjust (s)	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.4	-2.4	-2.3	-2.4	-2.4	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	19.0	77.0		18.0	76.0	200.0	36.8	54.0	77.0	31.0	48.2	
Actuated g/C Ratio	0.10	0.38		0.09	0.38	1.00	0.18	0.27	0.38	0.16	0.24	
v/c Ratio	1.10	0.92		0.90	1.09	0.63	0.90	1.10	0.35	1.32	0.97	
Control Delay	176.2	65.9		143.3	77.9	8.1	101.3	121.7	42.6	216.3	97.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	176.2	65.9		143.3	77.9	8.1	101.3	121.7	42.6	216.3	97.7	
LOS	F	E		F	E	A	F	F	D	F	F	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		74.3			62.8			106.1				152.7
Approach LOS		E			E			F				F
Queue Length 50th (ft)	~275	820		199	~1111	171	402	~823	179	~618	573	
Queue Length 95th (ft)	#457	862		#288	#1194	200	#479	#943	238	#754	#722	
Internal Link Dist (ft)		1086			995			526				1524
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	168	2432		309	1932	1583	652	956	609	537	846	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	0.92		0.90	1.09	0.63	0.87	1.10	0.35	1.32	0.97	

Intersection Summary

Area Type: Other

Cycle Length: 200

Actuated Cycle Length: 200

Offset: 101 (51%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.32

Intersection Signal Delay: 89.5

Intersection LOS: F

Intersection Capacity Utilization 108.7%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

ø1 23 s	ø2 92 s	ø3 43 s	ø4 52 s
ø5 24 s	ø6 81 s	ø7 36 s	ø8 59 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Baseline PM (2009)
4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	2562	144	215	2987	59	80	5	153	152	7	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.997				0.850		0.879	
Flt Protected	0.950			0.950				0.955		0.950		
Satd. Flow (prot)	1752	6293	0	1770	6389	0	0	1788	1591	1778	1646	0
Flt Permitted	0.950			0.950				0.707		0.620		
Satd. Flow (perm)	1752	6293	0	1770	6389	0	0	1324	1591	1161	1646	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1075			1624			201				281
Travel Time (s)		16.3			24.6			5.5				5.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	2785	157	234	3247	64	87	5	166	165	8	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	2942	0	234	3311	0	0	92	166	165	42	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	13.4	21.4		13.3	21.3		22.6	22.6	13.3	22.6	22.6	
Total Split (s)	14.0	128.0	0.0	40.0	154.0	0.0	32.0	32.0	40.0	32.0	32.0	0.0
Total Split (%)	7.0%	64.0%	0.0%	20.0%	77.0%	0.0%	16.0%	16.0%	20.0%	16.0%	16.0%	0.0%
Maximum Green (s)	7.6	121.6		33.7	147.7		24.4	24.4	33.7	24.4	24.4	
Yellow Time (s)	3.0	4.3		3.0	4.5		3.9	3.9	3.0	3.9	3.9	
All-Red Time (s)	3.4	2.1		3.3	1.8		3.7	3.7	3.3	3.7	3.7	
Lost Time Adjust (s)	-1.4	-1.4	0.0	-1.3	1.3	0.0	0.0	-2.6	0.0	-2.6	-2.6	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	7.6	4.0	7.6	5.0	6.3	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effect Green (s)	8.8	118.7		31.2	144.0			35.0	70.0	35.0	35.0	
Actuated g/C Ratio	0.04	0.59		0.16	0.72			0.18	0.35	0.18	0.18	
v/c Ratio	0.27	0.79		0.84	0.72			0.40	0.30	0.81	0.15	
Control Delay	102.2	10.2		68.9	37.8			82.4	50.2	105.1	75.9	
Queue Delay	0.0	0.9		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	102.2	11.1		68.9	37.8			82.4	50.2	105.1	75.9	
LOS	F	B		E	D			F	D	F	E	
Approach Delay		11.8			39.9			61.7			99.1	
Approach LOS		B			D			E			F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	29	86		284	1129			115	168	~236	50	
Queue Length 95th (ft)	m32	m82		m250	m1010			186	240	#413	95	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	79	3883		310	4677			232	587	204	288	
Starvation Cap Reductn	0	596		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.27	0.90		0.75	0.71			0.40	0.28	0.81	0.15	

Intersection Summary
























Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 111 (56%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 30.5
 Intersection Capacity Utilization 79.9%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1 40 s	ø2 128 s	ø4 32 s
ø5 14 s	ø6 154 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Baseline PM (2009)
4/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	264	2526	77	864	3084	987	89	377	624	799	307	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.996				0.850			0.850		0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6318	0	3433	5085	1583	1752	3504	1568	5040	3457	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6318	0	3433	5085	1583	1752	3504	1568	5034	3457	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1624			371			433			524	
Travel Time (s)		24.6			5.6			8.4			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	287	2746	84	939	3352	1073	97	410	678	868	334	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	287	2830	0	939	3352	1073	97	410	678	868	430	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	17.0		13.5	17.0	13.0	14.0	13.0	13.5	13.0	13.0	
Total Split (s)	20.6	88.0	0.0	56.0	123.4	32.0	20.0	24.0	56.0	32.0	36.0	0.0
Total Split (%)	10.3%	44.0%	0.0%	28.0%	61.7%	16.0%	10.0%	12.0%	28.0%	16.0%	18.0%	0.0%
Maximum Green (s)	13.1	81.0		48.5	116.4	25.0	12.0	17.0	48.5	25.0	29.0	
Yellow Time (s)	5.0	4.5		5.0	4.5	4.5	5.0	4.5	5.0	4.5	4.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	3.0	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.5	-2.0	0.0	-2.0	-2.0	-2.0	-3.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.5	5.0	5.0	5.0	5.0	5.5	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	15.6	83.0		50.5	118.4	150.4	14.6	19.0	74.5	27.0	31.4	
Actuated g/C Ratio	0.08	0.42		0.25	0.59	0.75	0.07	0.10	0.37	0.14	0.16	
v/c Ratio	1.08	1.08		1.08	1.11	0.90	0.76	1.23	1.16	1.28	0.79	
Control Delay	144.7	110.8		113.0	91.2	24.4	113.9	196.0	137.7	199.4	96.8	
Queue Delay	107.5	25.7		67.5	7.4	43.6	0.0	0.0	76.1	0.0	0.0	
Total Delay	252.3	136.5		180.5	98.7	67.9	113.9	196.0	213.8	199.4	96.8	
LOS	F	F		F	F	E	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		147.1			106.9			199.5			165.4	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~213	~1225		~720	~1868	1241	124	~354	~1066	~518	261	
Queue Length 95th (ft)	m#322	#1266		m542	m1052	m661	#223	#478	#1291	#609	375	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	265	2622		867	3010	1190	131	333	584	680	543	
Starvation Cap Reductn	0	0		0	45	134	0	0	76	0	0	
Spillback Cap Reductn	51	136		110	0	208	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.34	1.14		1.24	1.13	1.09	0.74	1.23	1.33	1.28	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 200

Actuated Cycle Length: 200

Offset: 25 (13%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.28

Intersection Signal Delay: 135.2

Intersection LOS: F

Intersection Capacity Utilization 109.4%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

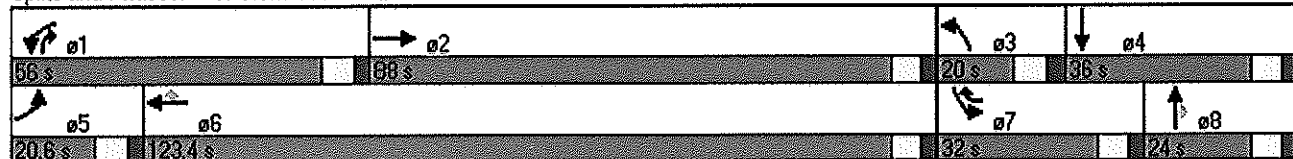
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd



Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

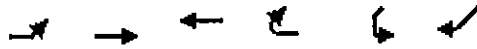
Baseline PM (2009)
4/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	2537	2665	0	0	2270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2758	2897	0	0	2467
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2758	2897	0	0	2467
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			13.1			13.1
Total Split (s)	0.0	0.0	60.0	0.0	0.0	40.0
Total Split (%)	0.0%	0.0%	60.0%	0.0%	0.0%	40.0%
Maximum Green (s)			53.9			33.9
Yellow Time (s)			5.0			5.0
All-Red Time (s)			1.1			1.1
Lost Time Adjust (s)	0.0	0.0	-1.1	0.0	0.0	-1.1
Total Lost Time (s)	4.0	4.0	5.0	4.0	4.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		100.0	55.0			35.0
Actuated g/C Ratio		1.00	0.55			0.35
v/c Ratio		0.55	0.69			1.94
Control Delay		0.0	20.7			450.6
Queue Delay		0.0	0.0			0.0
Total Delay		0.0	20.8			450.6
LOS		A	C			F
Approach Delay		0.0	20.8			
Approach LOS		A	C			
Queue Length 50th (ft)		0	389			~1071
Queue Length 95th (ft)		m0	m387			#1185
Internal Link Dist (ft)		364	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	4191			1270
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	104			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.55	0.71			1.94

Intersection Summary:

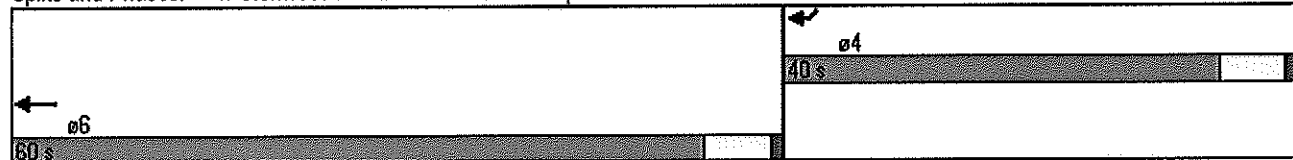
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 41 (41%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.94
 Intersection Signal Delay: 144.3
 Intersection Capacity Utilization 92.2%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service F

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp



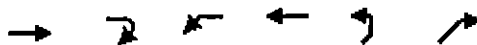
Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Baseline PM (2009)
4/21/2010

	→	↘	↙	←	↗	↖
Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↗↖	
Volume (vph)	1144	0	0	1654	1154	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Frt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Frt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1243	0	0	1798	1254	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1243	0	0	1798	1254	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	12.9			12.9	13.0	
Total Split (s)	130.0	0.0	0.0	130.0	70.0	0.0
Total Split (%)	65.0%	0.0%	0.0%	65.0%	35.0%	0.0%
Maximum Green (s)	124.1			124.1	64.0	
Yellow Time (s)	5.0			5.0	4.0	
All-Red Time (s)	0.9			0.9	2.0	
Lost Time Adjust (s)	-0.9	0.0	0.0	-0.9	-1.0	0.0
Total Lost Time (s)	5.0	4.0	4.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	116.9			116.9	73.1	
Actuated g/C Ratio	0.58			0.58	0.37	
v/c Ratio	0.61			0.58	1.00	
Control Delay	40.8			26.8	86.5	
Queue Delay	0.2			0.0	0.0	
Total Delay	41.0			26.8	86.5	
LOS	D			C	F	
Approach Delay	41.0			26.8	86.5	
Approach LOS	D			C	F	
Queue Length 50th (ft)	588			509	~929	
Queue Length 95th (ft)	605			515	#1117	
Internal Link Dist (ft)	301			418	376	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

Baseline PM (2009)
 4/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	2168			3289	1249	
Starvation Cap Reductn	258			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.65			0.55	1.00	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 172 (86%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 48.4
 Intersection Capacity Utilization 175.5%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
30 s	70 s

Lanes, Volumes, Timings
6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

Baseline PM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	21	216	0	36	28	1245	355	35	957	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.98	1.00	1.00				0.98	1.00		
Frt			0.850		0.957				0.850			
Flt Protected		0.958		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1802	1599	1631	1587	0	1717	3433	1536	1823	5238	0
Flt Permitted		0.958		0.950	0.966		0.244			0.156		
Satd. Flow (perm)	0	1802	1575	1625	1583	0	441	3433	1503	299	5238	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	2	23	235	0	39	30	1353	386	38	1040	0
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	15	23	139	135	0	30	1353	386	38	1040	0
Turn Type	Split		pm+ov	Split			pm+pt		pm+ov	pm+pt		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3				2		2	6		
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	13.0	13.0	13.2	13.0	13.0		13.2	18.2	13.0	13.2	18.2	
Total Split (s)	16.0	16.0	15.0	40.0	40.0	0.0	15.0	129.0	40.0	15.0	129.0	0.0
Total Split (%)	8.0%	8.0%	7.5%	20.0%	20.0%	0.0%	7.5%	64.5%	20.0%	7.5%	64.5%	0.0%
Maximum Green (s)	10.0	10.0	8.8	34.0	34.0		8.8	122.8	34.0	8.8	122.8	
Yellow Time (s)	4.0	4.0	4.7	4.0	4.0		4.7	4.7	4.0	4.7	4.7	
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0		1.5	1.5	2.0	1.5	1.5	
Lost Time Adjust (s)	0.0	-1.0	0.0	-1.0	-1.0	0.0	-1.2	-1.2	-1.2	-1.2	-1.2	0.0
Total Lost Time (s)	6.0	5.0	6.2	5.0	5.0	4.0	5.0	5.0	4.8	5.0	5.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		8.1	11.2	24.6	24.6		153.6	147.0	172.0	153.6	147.0	
Actuated g/C Ratio		0.04	0.06	0.12	0.12		0.77	0.74	0.86	0.77	0.74	
v/c Ratio		0.21	0.26	0.70	0.69		0.08	0.54	0.30	0.13	0.27	
Control Delay		99.6	69.5	101.8	102.1		7.3	16.5	2.1	7.1	10.2	
Queue Delay		0.0	0.0	0.0	0.0		0.0	8.2	0.5	0.0	0.0	
Total Delay		99.6	69.5	101.8	102.1		7.3	24.7	2.5	7.1	10.2	
LOS		F	E	F	F		A	C	A	A	B	

Lanes, Volumes, Timings
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		81.4			101.9			19.6				10.0
Approach LOS		F			F			B				B
Queue Length 50th (ft)		20	24	189	184		7	564	105	11		176
Queue Length 95th (ft)		50	49	268	262		m17	m634	m31	26		231
Internal Link Dist (ft)		140			1181			444				609
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		99	103	285	278		406	2523	1364	308		3850
Starvation Cap Reductn		0	0	0	0		0	1134	556	0		0
Spillback Cap Reductn		0	0	0	0		0	0	0	0		0
Storage Cap Reductn		0	0	0	0		0	0	0	0		0
Reduced v/c Ratio		0.15	0.22	0.49	0.49		0.07	0.97	0.48	0.12		0.27

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 70 (35%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 24.2
 Intersection Capacity Utilization 56.5%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
16 s	129 s	16 s	40 s
ø5	ø6		
16 s	129 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Baseline PM (2009)
4/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	0	0	67	1	295	1	1380	77	210	1065	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Frt						0.850		0.992			0.999	
Flt Protected	0.950				0.953		0.950			0.950		
Satd. Flow (prot)	1761	1853	0	0	1775	2787	1805	5146	0	3416	3518	0
Flt Permitted	0.950				0.953		0.950			0.950		
Satd. Flow (perm)	1761	1853	0	0	1775	2787	1805	5146	0	3416	3518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	0	0	73	1	321	1	1500	84	228	1158	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	0	0	0	74	321	1	1584	0	228	1167	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	13.0	13.0		14.5	14.5	14.0	14.0	17.0		14.0	17.0	
Total Split (s)	13.0	13.0	0.0	16.0	16.0	16.0	14.0	55.0	0.0	16.0	57.0	0.0
Total Split (%)	13.0%	13.0%	0.0%	16.0%	16.0%	16.0%	14.0%	55.0%	0.0%	16.0%	57.0%	0.0%
Maximum Green (s)	7.0	7.0		8.5	8.5	9.0	7.0	48.0		9.0	50.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		3.5	3.5	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	0.0	-2.5	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	7.5	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	8.0			10.9	24.7	9.0	62.7			11.7	77.6	
Actuated g/C Ratio	0.08			0.11	0.25	0.09	0.63			0.12	0.78	
v/c Ratio	0.10			0.38	0.47	0.01	0.49			0.57	0.43	
Control Delay	44.5			47.0	33.4	42.0	12.3			48.3	7.1	
Queue Delay	0.0			0.0	0.0	0.0	0.0			0.0	0.0	
Total Delay	44.5			47.0	33.4	42.0	12.3			48.3	7.1	
LOS	D			D	C	D	B			D	A	
Approach Delay				35.9			12.3				13.9	
Approach LOS				D			B				B	

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Baseline PM (2009)
4/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	8				44	94	1	185		98	342	
Queue Length 95th (ft)	28				88	138	6	312		m144	m285	
Internal Link Dist (ft)		104			168			329				187
Turn Bay Length (ft)										200		
Base Capacity (vph)	141				205	692	162	3238		402	2737	
Starvation Cap Reductn	0				0	0	0	0		0	0	
Spillback Cap Reductn	0				0	0	0	0		0	0	
Storage Cap Reductn	0				0	0	0	0		0	0	
Reduced v/c Ratio	0.10				0.36	0.46	0.01	0.49		0.57	0.43	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 15.8
 Intersection Capacity Utilization 58.5%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1		ø2		ø3		ø4	
16 s		55 s		13 s		15 s	
ø5		ø6					
14 s		57 s					

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

Baseline PM (2009)
4/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↑↑↑	↑	↗↗
Volume (vph)	598	127	45	493	490	758
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Frt		0.850				0.850
Flt Protected	0.950			0.996		
Satd. Flow (prot)	3399	1568	0	5116	1844	2759
Flt Permitted	0.950			0.859		
Satd. Flow (perm)	3399	1568	0	4412	1844	2759
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	433	
Travel Time (s)	4.2			7.3	8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	650	138	49	536	533	824
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	138	0	585	533	824
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	13.3	13.3	12.5	12.5	12.5	13.3
Total Split (s)	37.0	37.0	63.0	63.0	63.0	37.0
Total Split (%)	37.0%	37.0%	63.0%	63.0%	63.0%	37.0%
Maximum Green (s)	30.7	30.7	57.5	57.5	57.5	30.7
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	1.8	1.8	1.0	1.0	1.0	1.8
Lost Time Adjust (s)	-1.3	-1.3	0.0	-0.5	-0.5	-0.5
Total Lost Time (s)	5.0	5.0	5.5	5.0	5.0	5.8
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	29.0	29.0		61.0	61.0	100.0
Actuated g/C Ratio	0.29	0.29		0.61	0.61	1.00
v/c Ratio	0.66	0.30		0.22	0.47	0.30
Control Delay	34.0	28.1		9.7	20.7	0.0
Queue Delay	0.4	0.0		0.0	1.6	0.0
Total Delay	34.4	28.1		9.8	22.3	0.0
LOS	C	C		A	C	A
Approach Delay	33.3			9.8	8.8	
Approach LOS	C			A	A	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

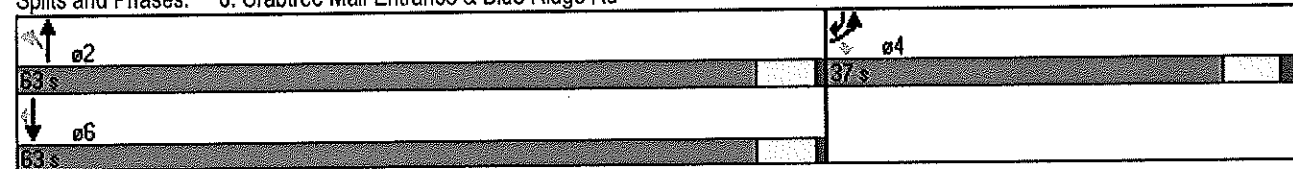
Baseline PM (2009)
 4/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	188	69		56	521	0
Queue Length 95th (ft)	220	107		91	m362	m0
Internal Link Dist (ft)	134			296	353	
Turn Bay Length (ft)						175
Base Capacity (vph)	1120	517		2734	1143	2745
Starvation Cap Reductn	0	0		0	416	0
Spillback Cap Reductn	138	0		409	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.66	0.27		0.25	0.73	0.30

Intersection Summary
 Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 53 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 16.1
 Intersection Capacity Utilization 65.8%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd



HCM Unsignalized Intersection Capacity Analysis
 9: Crabtree Valley Ave & Creedmoor Rd.

Baseline PM (2009)
 4/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑↑↑		↔	↔	
Volume (veh/h)	0	0	0	73	1	220	7	1239	193	174	957	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	79	1	239	8	1347	210	189	1040	1
Pedestrians					2							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)											409	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	2123	2993	521	2367	2888	556	1041			1559		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1952	2991	37	2244	2867	556	659			1559		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	85	50	99			55		
cM capacity (veh/h)	9	6	859	12	7	474	774			420		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	0	80	239	8	539	539	479	189	693	348
Volume Left	0	79	0	8	0	0	0	189	0	0
Volume Right	0	0	239	0	0	0	210	0	0	1
cSH	1700	12	474	774	1700	1700	1700	420	1700	1700
Volume to Capacity	0.00	6.59	0.50	0.01	0.32	0.32	0.28	0.45	0.41	0.20
Queue Length 95th (ft)	0	Err	70	1	0	0	0	57	0	0
Control Delay (s)	0.0	Err	20.1	9.7	0.0	0.0	0.0	20.4	0.0	0.0
Lane LOS	A	F	C	A				C		
Approach Delay (s)	0.0	2531.8		0.0				3.1		
Approach LOS	A	F								

Intersection Summary		
Average Delay		261.1
Intersection Capacity Utilization	52.0%	ICU Level of Service
Analysis Period (min)	15	A

HCM Unsignalized Intersection Capacity Analysis
 10: Crabtree Valley Ave & Blue Ridge Rd.

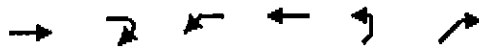
Baseline PM (2009)
 4/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷			↕			↕			↕	
Volume (veh/h)	165	41	114	3	9	43	100	448	7	46	445	126
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	179	45	124	3	10	47	109	487	8	50	484	137
Pedestrians					9			2				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					4.0			4.0				
Percent Blockage					1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												662
pX, platoon unblocked	0.83	0.83	0.83	0.83	0.83		0.83					
vC, conflicting volume	1412	1373	554	1518	1438	500	621			504		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1394	1348	363	1521	1425	500	443			504		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	57	78	91	90	92	88			95		
cM capacity (veh/h)	73	105	566	37	94	567	929			1053		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	179	168	60	603	671							
Volume Left	179	0	3	109	50							
Volume Right	0	124	47	8	137							
cSH	73	262	217	929	1053							
Volume to Capacity	2.45	0.64	0.27	0.12	0.05							
Queue Length 95th (ft)	430	101	27	10	4							
Control Delay (s)	782.5	40.7	27.7	3.0	1.2							
Lane LOS	F	E	D	A	A							
Approach Delay (s)	423.2		27.7	3.0	1.2							
Approach LOS	F		D									
Intersection Summary												
Average Delay			90.1									
Intersection Capacity Utilization			76.3%			ICU Level of Service				D		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

Baseline PM (2009)
 4/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	→	↘	↙	↑	↘	↙
Volume (veh/h)	301	66	165	186	108	101
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	327	72	179	202	117	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			327		924	363
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			327		924	363
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		54	84
cM capacity (veh/h)			1232		256	682

Direction, Lane #	EB 1	WB 1	WB 2	NE 1
Volume Total	399	179	202	227
Volume Left	0	179	0	117
Volume Right	72	0	0	110
cSH	1700	1232	1700	366
Volume to Capacity	0.23	0.15	0.12	0.62
Queue Length 95th (ft)	0	13	0	100
Control Delay (s)	0.0	8.4	0.0	29.6
Lane LOS		A		D
Approach Delay (s)	0.0	4.0		29.6
Approach LOS				D

Intersection Summary			
Average Delay		8.2	
Intersection Capacity Utilization		51.2%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 12: Crabtree Valley Ave & Mall Entrance

Baseline PM (2009)
 4/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (veh/h)	101	254	46	23	171	41	43	93	10	55	89	137
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	276	50	25	186	45	47	101	11	60	97	149
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	230			326			954	801	301	815	804	208
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			326			954	801	301	815	804	208
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			98			65	65	99	70	66	82
cM capacity (veh/h)	1337			1234			134	286	739	196	285	832

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	110	326	25	230	47	112	60	246
Volume Left	110	0	25	0	47	0	60	0
Volume Right	0	50	0	45	0	11	0	149
cSH	1337	1700	1234	1700	134	304	196	474
Volume to Capacity	0.08	0.19	0.02	0.14	0.35	0.37	0.30	0.52
Queue Length 95th (ft)	7	0	2	0	36	41	31	73
Control Delay (s)	7.9	0.0	8.0	0.0	45.7	23.6	31.2	20.5
Lane LOS	A		A		E	C	D	C
Approach Delay (s)	2.0		0.8		30.1		22.6	
Approach LOS					D		C	

Intersection Summary		
Average Delay	11.0	
Intersection Capacity Utilization	49.2%	ICU Level of Service A
Analysis Period (min)	15	

Network Totals

Number of Intersections	31
Control Delay / Veh (s/v)	46
Queue Delay / Veh (s/v)	2
Total Delay / Veh (s/v)	48
Total Delay (hr)	2125
Stops / Veh	0.21
Stops (#)	33678
Average Speed (mph)	8
Total Travel Time (hr)	2578
Distance Traveled (mi)	21639
Fuel Consumed (gal)	2678
Fuel Economy (mpg)	8.1
CO Emissions (kg)	187.21
NOx Emissions (kg)	36.42
VOC Emissions (kg)	43.39
Unserved Vehicles (#)	2442
Vehicles in dilemma zone (#)	796
Performance Index	2218.9

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	3899.7	3945.9	3341.6	3696.0	3707.5	3747.3	3911.2
Delay / Veh (s)	848.1	862.6	636.6	780.9	743.0	758.6	816.2
Stop Delay (hr)	3645.4	3672.6	3020.7	3423.0	3395.8	3450.4	3634.8
St Del/Veh (s)	792.8	802.8	575.5	723.2	680.5	698.5	758.5
Total Stops	43793	48856	57543	46211	54150	50406	48752
Stop/Veh	2.65	2.97	3.05	2.71	3.01	2.83	2.83
Travel Dist (mi)	20844.8	21637.8	24311.5	22419.4	23511.6	23101.2	22568.1
Travel Time (hr)	4359.0	4429.5	3885.7	4196.3	4231.4	4261.8	4413.2
Avg Speed (mph)	9	10	12	11	11	11	11
Fuel Used (gal)	1637.7	1671.6	1635.5	1640.5	1686.5	1677.4	1698.7
Fuel Eff. (mpg)	12.7	12.9	14.9	13.7	13.9	13.8	13.3
HC Emissions (g)	13659	13848	15339	14198	13638	15119	15101
CO Emissions (g)	582036	577320	637998	592071	600036	624603	615593
NOx Emissions (g)	42373	43336	49294	45104	44700	47231	46769
Vehicles Entered	17356	16999	19508	17708	18589	18483	17962
Vehicles Exited	15751	15938	18285	16370	17339	17086	16540
Hourly Exit Rate	15751	15938	18285	16370	17339	17086	16540
Input Volume	221688	221688	221688	221688	221688	221688	221688
% of Volume	7	7	8	7	8	8	7
Denied Entry Before	17	72	37	33	113	80	36
Denied Entry After	6199	6728	4373	6151	5315	5420	5964

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	3589.8	4020.4	3512.4	3737.2
Delay / Veh (s)	706.8	882.4	694.4	769.4
Stop Delay (hr)	3275.1	3756.1	3204.9	3447.9
St Del/Veh (s)	644.9	824.4	633.7	709.8
Total Stops	58498	45762	54910	50886
Stop/Veh	3.20	2.79	3.02	2.91
Travel Dist (mi)	23708.6	20779.8	23591.2	22647.4
Travel Time (hr)	4122.7	4478.5	4041.0	4241.9
Avg Speed (mph)	11	9	11	11
Fuel Used (gal)	1675.3	1662.9	1644.2	1663.1
Fuel Eff. (mpg)	14.2	12.5	14.3	13.6
HC Emissions (g)	15231	14232	14239	14460
CO Emissions (g)	631286	587225	610498	605867
NOx Emissions (g)	48437	43365	46121	45673
Vehicles Entered	18874	17342	18893	18166
Vehicles Exited	17693	15463	17524	16802
Hourly Exit Rate	17693	15463	17524	16802
Input Volume	221688	221688	221688	221688
% of Volume	8	7	8	8
Denied Entry Before	58	19	46	49
Denied Entry After	4760	6521	5034	5642

Arterial Level of Service: EB Glenwood Ave #1

Group Street	Mode	Delay (Sec)	Travel Time (Sec)	Dist (mi)	Arterial Class	Run 1 Speed (mi/h)	Run 1 Delay (Sec)
	25	56.9	71.8	0.2	9	5	131.2
Creedmoor Rd	1	145.6	162.5	0.2	5	5	146.7
Crabtree Mall Entr	2	11.3	28.4	0.2	26	26	11.6
Blue Ridge Rd	3	92.6	117.0	0.3	9	11	80.0
Crabtree View PI	32	8.2	13.9	0.1	18	18	8.5
WB I-440 On-Ramp fro	18	3.2	8.6	0.1	28	28	3.3
I-440 WB Off-Ramp to	4	3.4	10.4	0.1	29	29	3.4
WB I-440 Off-Ramp to	38	1.2	3.8	0.0	47	46	1.2
WB I-440 On-Ramp fro	44	2.5	6.6	0.1	28	28	2.6
EB I-440 On-Ramp fro	23	2.7	6.2	0.0	17	13	4.8
I-440 EB Off-Ramp	5	30.0	35.8	0.1	7	7	32.2
EB I-440 Off-Ramp to	41	2.9	8.4	0.1	41	40	3.1
Total		396.9	561.0	2.1	13	10	582.6

Arterial Level of Service: EB Glenwood Ave #1

Group Street	Run 10 Speed (mi/h)	Run 10 Delay (Sec)	Run 11 Speed (mi/h)	Run 11 Delay (Sec)	Run 12 Speed (mi/h)	Run 12 Delay (Sec)	Run 13 Speed (mi/h)	Run 13 Delay (Sec)
	11	42.9	24	12.9	30	7.2	41	9
Creedmoor Rd	5	143.6	6	107.4	6	112.2	4	4
Crabtree Mall Entr	26	10.9	26	11.2	23	14.7	26	26
Blue Ridge Rd	10	82.8	11	80.3	6	147.4	11	11
Crabtree View PI	19	7.4	18	8.7	19	7.5	17	17
WB I-440 On-Ramp fro	28	3.3	27	3.4	27	3.6	30	30
I-440 WB Off-Ramp to	29	3.4	28	3.8	29	3.6	31	31
WB I-440 Off-Ramp to	48	1.1	44	1.4	46	1.3	51	51
WB I-440 On-Ramp fro	28	2.5	27	2.9	28	2.5	31	31
EB I-440 On-Ramp fro	15	3.5	16	3.1	21	1.5	20	20
I-440 EB Off-Ramp	7	30.4	7	31.3	7	29.8	8	8
EB I-440 Off-Ramp to	41	2.8	40	3.0	41	2.7	42	42
Total	15	340.8	17	273.0	15	337.7	14	14

Arterial Level of Service: EB Glenwood Ave #1

Entry Street	Rate Delay	Rate Queue	Rate Delay	Rate Queue	Rate Delay	Rate Queue	Rate Delay
	4.7	33	45.9	43	4.1	42	4.7
	55.4	5	114.3	9	61.8	26	10.8
Creedmoor Rd	169.1	4	170.5	4	164.7	6	115.9
Crabtree Mall Entr	10.7	28	9.0	27	9.6	25	12.6
Blue Ridge Rd	72.2	12	69.9	11	79.2	8	116.4
Crabtree View Pl	8.9	20	7.1	19	7.6	17	9.1
WB I-440 On-Ramp fro	2.6	28	3.1	29	3.0	28	3.2
I-440 WB Off-Ramp to	2.7	29	3.3	29	3.3	29	3.5
WB I-440 Off-Ramp to	0.9	48	1.1	48	1.1	45	1.3
WB I-440 On-Ramp fro	2.0	29	2.3	29	2.4	27	2.7
EB I-440 On-Ramp fro	1.7	18	2.3	17	2.7	17	2.7
I-440 EB Off-Ramp	25.5	7	31.1	8	28.7	7	29.0
EB I-440 Off-Ramp to	2.7	41	2.7	42	2.6	41	2.8
Total	358.9	12	462.7	14	372.9	16	313.6

Arterial Level of Service: EB Glenwood Ave #1

Entry Street	Rate Delay	Rate Queue	Rate Delay	Rate Queue
	11	166.7	43	6.2
	5	109.4	8	65.3
Creedmoor Rd	4	175.1	4	167.9
Crabtree Mall Entr	25	12.1	27	10.1
Blue Ridge Rd	8	120.0	11	74.4
Crabtree View Pl	16	9.8	19	7.4
WB I-440 On-Ramp fro	28	3.3	30	2.7
I-440 WB Off-Ramp to	29	3.5	30	3.2
WB I-440 Off-Ramp to	46	1.3	46	1.3
WB I-440 On-Ramp fro	28	2.5	28	2.5
EB I-440 On-Ramp fro	21	1.5	15	3.6
I-440 EB Off-Ramp	7	29.0	7	32.6
EB I-440 Off-Ramp to	40	2.9	39	3.2
Total	9	640.0	14	380.3

Arterial Level of Service: WB Glenwood Ave #1

Class Street	Flow	Delay (Sec)	Travel Time (Min)	Rel (Min)	Arterial Speed (Mph)	Post-1 Speed (Mph)	Post-2 Speed (Mph)
EB I-440 On-Ramp to	41	55.3	71.5	0.2	14	13	40.3
I-440 EB Off-Ramp	5	53.2	60.8	0.1	6	5	56.1
EB I-440 On-Ramp fro	23	15.5	19.7	0.1	13	13	16.0
WB I-440 On-Ramp fro	44	14.3	18.3	0.0	6	6	13.9
WB I-440 Off-Ramp to	38	22.1	26.4	0.1	7	7	22.5
I-440 WB Off-Ramp to	4	26.7	29.7	0.0	6	6	27.7
WB I-440 On-Ramp fro	18	19.6	25.5	0.1	12	10	24.6
Crabtree View Pl	32	44.2	51.6	0.1	5	4	51.0
Lead Mine Rd	3	33.8	38.8	0.1	7	6	35.3
Marriott Dr	2	48.4	73.8	0.3	15	14	56.1
Creedmoor Rd	1	36.8	52.8	0.2	14	14	37.0
	25	6.6	24.9	0.2	32	32	6.1
	64	2.0	16.9	0.2	39	39	2.1
Total		379.5	510.9	1.6	12	11	396.6

Arterial Level of Service: WB Glenwood Ave #1

Class Street	Post-1 Speed	Post-2 Speed	Post-3 Speed	Post-4 Speed	Post-5 Speed	Post-6 Speed	Post-7 Speed
EB I-440 On-Ramp to	5	103.3	25	11.4	15	36.8	11
I-440 EB Off-Ramp	3	103.7	6	46.2	6	47.9	5
EB I-440 On-Ramp fro	6	38.1	15	13.6	12	17.4	16
WB I-440 On-Ramp fro	3	28.4	6	14.7	7	11.9	6
WB I-440 Off-Ramp to	5	36.3	7	23.0	7	20.4	8
I-440 WB Off-Ramp to	4	38.6	6	26.6	6	28.5	6
WB I-440 On-Ramp fro	9	27.9	12	19.9	15	14.8	12
Crabtree View Pl	4	53.2	5	42.3	5	45.6	5
Lead Mine Rd	8	28.7	7	33.2	6	34.5	7
Marriott Dr	18	37.7	18	36.5	18	37.5	18
Creedmoor Rd	18	25.4	15	34.0	15	32.2	14
	34	5.2	31	7.1	32	6.6	31
	40	1.6	39	2.1	40	1.9	39
Total	9	764.0	13	310.7	13	337.8	12

Arterial Level of Service: WB Glenwood Ave #1

Gross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On-Ramp fro	54.7	24	12.2	17	25.4	10	85.8
I-440 EB Off-Ramp	55.3	6	46.4	7	42.1	5	66.4
EB I-440 On-Ramp fro	12.0	16	12.0	17	10.9	11	20.2
WB I-440 On-Ramp fro	13.4	7	11.3	6	12.7	5	17.3
WB I-440 Off-Ramp to	20.3	8	17.6	7	22.2	6	24.7
I-440 WB Off-Ramp to	24.4	7	21.7	6	27.7	6	28.2
WB I-440 On-Ramp fro	18.4	15	14.4	12	20.0	11	21.0
Crabtree View Pl	42.9	6	36.8	5	45.2	5	43.7
Lead Mine Rd	33.1	7	31.7	7	32.0	7	30.8
Marriott Dr	37.4	13	63.2	11	79.5	19	33.7
Creedmoor Rd	35.2	12	47.4	11	48.3	15	32.8
	7.4	31	7.0	32	6.7	32	6.6
	2.3	39	2.1	40	1.9	39	2.1
Total	356.7	13	323.7	12	374.6	11	413.2

Arterial Level of Service: WB Glenwood Ave #1

Gross Street	Run 4 Speed	Run 5 Delay	Run 6 Speed	Run 7 Delay
EB I-440 On-Ramp fro	10	7.2	25	11.5
I-440 EB Off-Ramp	8	36.4	6	45.7
EB I-440 On-Ramp fro	19	9.8	16	12.5
WB I-440 On-Ramp fro	8	9.8	7	12.2
WB I-440 Off-Ramp to	8	17.9	8	19.3
I-440 WB Off-Ramp to	7	23.9	7	23.0
WB I-440 On-Ramp fro	12	19.8	13	16.9
Crabtree View Pl	5	40.5	5	43.8
Lead Mine Rd	5	44.9	7	33.7
Marriott Dr	12	68.8	19	34.5
Creedmoor Rd	13	40.9	15	32.5
	32	6.6	33	6.0
	39	2.2	40	1.8
Total	13	328.8	14	293.4

2035 No Improvements

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

No Improvements AM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	2786	423	611	2827	865	348	657	216	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.980				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6280	0	3433	5085	1583	3433	3539	1583	3467	3521	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6280	0	3433	5085	1583	3433	3539	1583	3466	3521	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		1166			1075			606			1605	
Travel Time (s)		17.7			16.3			11.8			24.3	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	2786	423	611	2827	865	348	657	216	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	3209	0	611	2827	865	348	657	216	1813	2004	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4	14.3	14.4	17.4	
Total Split (s)	16.0	65.0	0.0	26.0	75.0	0.0	19.0	28.0	26.0	59.0	68.0	0.0
Total Split (%)	9.0%	36.5%	0.0%	14.6%	42.1%	0.0%	10.7%	15.7%	14.6%	33.1%	38.2%	0.0%
Maximum Green (s)	9.0	58.0		19.0	68.0		12.0	21.0	19.0	52.0	61.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	11.0	60.0		21.0	70.0	178.0	14.0	23.0	44.0	54.0	63.0	
Actuated g/C Ratio	0.06	0.34		0.12	0.39	1.00	0.08	0.13	0.25	0.30	0.35	
v/c Ratio	1.10	1.52		1.51	1.41	0.55	1.29	1.44	0.55	1.72	1.61	
Control Delay	187.1	273.7		290.1	225.5	0.7	216.6	251.4	31.3	365.0	313.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.6	
Total Delay	187.1	273.7		290.1	225.5	0.7	216.6	251.4	31.3	365.0	330.5	
LOS	F	F		F	F	A	F	F	C	F	F	

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

No Improvements AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		270.6			189.5			202.5				346.9
Approach LOS		F			F			F				F
Queue Length 50th (ft)	~158	~1511		~520	~1613	0	~251	~518	94	~1603	~1756	
Queue Length 95th (ft)	#305	#1550		#639	#1679	0	#363	#660	m158	#1730	#1881	
Internal Link Dist (ft)		1086			995			526				1525
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	109	2117		405	2000	1583	270	457	391	1052	1246	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	28
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	1.52		1.51	1.41	0.55	1.29	1.44	0.55	1.72	1.65	

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 140 (79%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.72
 Intersection Signal Delay: 259.5
 Intersection LOS: F
 Intersection Capacity Utilization 151.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

φ1	φ2	φ3	φ4
26 s	65 s	19 s	68 s
φ5	φ6	φ8	φ7
16 s	75 s	28 s	59 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

No Improvements AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔	↑	↔	↔	
Volume (vph)	14	4757	43	66	4230	128	33	4	50	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Fr		0.999			0.996				0.850		0.882	
Fit Protected	0.950			0.950				0.957		0.950		
Satd. Flow (prot)	1752	6337	0	1770	6382	0	0	1792	1591	1778	1651	0
Fit Permitted	0.950			0.950				0.717		0.733		
Satd. Flow (perm)	1752	6337	0	1770	6382	0	0	1342	1591	1372	1651	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1075			1624			201				281
Travel Time (s)		16.3			24.6			5.5				5.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	4757	43	66	4230	128	33	4	50	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4800	0	66	4358	0	0	37	50	156	51	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			4			4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	23.7	23.7	23.7	
Total Split (s)	15.4	138.7	0.0	15.3	138.6	0.0	24.0	24.0	24.0	24.0	24.0	0.0
Total Split (%)	8.7%	77.9%	0.0%	8.6%	77.9%	0.0%	13.5%	13.5%	13.5%	13.5%	13.5%	0.0%
Maximum Green (s)	8.4	131.7		8.3	131.6		17.0	17.0	17.0	17.0	17.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	9.4	133.7		10.2	142.8			19.1	19.1	19.1	19.1	
Actuated g/C Ratio	0.05	0.75		0.06	0.80			0.11	0.11	0.11	0.11	
v/c Ratio	0.15	1.01		0.65	0.85			0.26	0.29	1.06	0.29	
Control Delay	83.1	29.5		63.8	21.6			78.1	78.3	162.2	78.0	
Queue Delay	0.0	20.1		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	83.1	49.6		63.8	21.6			78.1	78.3	162.2	78.0	
LOS	F	D		E	C			E	E	F	E	
Approach Delay		49.7			22.2			78.2			141.5	
Approach LOS		D			C			E			F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	16	~971		81	473			40	55	~200	56	
Queue Length 95th (ft)	m10	m175		m47	m32			83	104	#362	106	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	102	4760		102	5121			144	171	147	177	
Starvation Cap Reductn	0	236		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.14	1.06		0.65	0.85			0.26	0.29	1.06	0.29	

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 98 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 39.2
 Intersection LOS: D
 Intersection Capacity Utilization 107.2%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø2	ø1	ø4
138.7 s	15.3 s	24 s
ø5	ø6	
15.4 s	138.6 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

No Improvements AM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	516	4263	184	984	4107	870	105	385	507	2578	876	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frnt		0.994				0.850			0.850		0.971	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6306	0	3433	5085	1583	1752	3504	1567	5040	3471	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6306	0	3433	5085	1583	1752	3504	1567	5037	3471	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1624			371			433			524	
Travel Time (s)		24.6			5.6			8.4			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	516	4263	184	984	4107	870	105	385	507	2578	876	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	4447	0	984	4107	870	105	385	507	2578	1089	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	17.5		13.5	17.5	13.5	14.0	13.5	13.5	13.5	13.5	
Total Split (s)	22.0	72.0	0.0	34.0	84.0	53.0	14.0	19.0	34.0	53.0	58.0	0.0
Total Split (%)	12.4%	40.4%	0.0%	19.1%	47.2%	29.8%	7.9%	10.7%	19.1%	29.8%	32.6%	0.0%
Maximum Green (s)	15.0	65.0		27.0	77.0	46.0	7.0	12.0	27.0	46.0	51.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	17.0	67.0		29.0	79.0	127.0	9.0	14.0	48.0	48.0	53.0	
Actuated g/C Ratio	0.10	0.38		0.16	0.44	0.71	0.05	0.08	0.27	0.27	0.30	
v/c Ratio	1.59	1.87		1.76	1.82	0.77	1.18	1.39	1.20	1.90	1.05	
Control Delay	316.0	425.4		382.3	399.5	12.0	226.8	241.7	149.3	438.1	98.2	
Queue Delay	0.0	8.6		150.0	0.0	3.3	0.0	0.0	70.5	59.8	100.3	
Total Delay	316.0	434.0		532.3	399.5	15.3	226.8	241.7	219.8	497.9	198.6	
LOS	F	F		F	F	B	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		421.8			365.4			229.0			409.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~447	~2297		~886	~2664	426	~151	~315	~715	~1629	~722	
Queue Length 95th (ft)	m#442	m#2267		m#629	m#1900	m291	m#284	#434	#961	m#1686	m#787	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	325	2374		559	2257	1129	89	276	423	1359	1034	
Starvation Cap Reductn	0	0		0	0	0	0	0	50	89	188	
Spillback Cap Reductn	0	24		89	0	170	0	0	0	0	20	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.59	1.89		2.09	1.82	0.91	1.18	1.39	1.36	2.03	1.29	

Intersection Summary

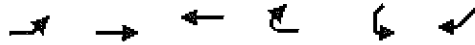
Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 104 (58%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.90
 Intersection Signal Delay: 384.9
 Intersection LOS: F
 Intersection Capacity Utilization 170.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ρ2	↖ ρ1	↓ ρ4	↗ ρ3
72 s	34 s	58 s	14 s
↖ ρ5	← ρ6	↑ ρ8	↘ ρ7
22 s	84 s	19 s	53 s

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & WB Glenwood Ave

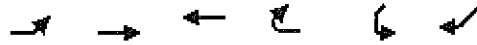
No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	5276	3060	0	0	2901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Fit						0.850
Fit Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Fit Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5276	3060	0	0	2901
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5276	3060	0	0	2901
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	63.0	0.0	0.0	115.0
Total Split (%)	0.0%	0.0%	35.4%	0.0%	0.0%	64.6%
Maximum Green (s)			56.0			108.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		178.0	58.0			110.0
Actuated g/C Ratio		1.00	0.33			0.62
v/c Ratio		1.06	1.23			1.29
Control Delay		47.1	150.3			166.5
Queue Delay		186.6	0.0			0.0
Total Delay		233.7	150.3			166.5
LOS		F	F			F
Approach Delay		233.7	150.3			
Approach LOS		F	F			
Queue Length 50th (ft)		~1909	~1076			~1887
Queue Length 95th (ft)		m0	m#910			#1959
Internal Link Dist (ft)		364	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & WB Glenwood Ave

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	2483			2242
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		1410	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		1.48	1.23			1.29

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 36 (20%), Referenced to phase 6:WBT; Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.29
 Intersection Signal Delay: 193.6
 Intersection Capacity Utilization 144.5%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service H

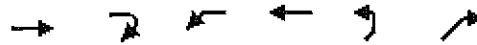
- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & WB Glenwood Ave

	← ρ4
	115 s
← ρ6	
63 s	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Off-Ramp

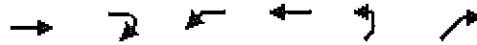
No Improvements AM (2035)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	3222	0	0	1976	1281	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	12	12	12	12	12
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	3700	0	0	5263	3416	0
Flt Permitted					0.950	
Satd. Flow (perm)	3700	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	459	
Travel Time (s)	5.8			7.5	12.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3222	0	0	1976	1281	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3222	0	0	1976	1281	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	124.0	0.0	0.0	124.0	54.0	0.0
Total Split (%)	69.7%	0.0%	0.0%	69.7%	30.3%	0.0%
Maximum Green (s)	117.0			117.0	47.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	119.0			119.0	49.0	
Actuated g/C Ratio	0.67			0.67	0.28	
v/c Ratio	1.30			0.56	1.36	
Control Delay	165.0			16.4	216.6	
Queue Delay	37.2			0.0	0.0	
Total Delay	202.2			16.4	216.6	
LOS	F			B	F	
Approach Delay	202.2			16.4	216.6	
Approach LOS	F			B	F	
Queue Length 50th (ft)	~2537			426	~1010	
Queue Length 95th (ft)	m#2328			462	#1147	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Off-Ramp

No Improvements AM (2035)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Internal Link Dist (ft)	301			418	379	
Turn Bay Length (ft)						
Base Capacity (vph)	2474			3519	940	
Starvation Cap Reductn	148			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.39			0.56	1.36	

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 62 (35%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.36
 Intersection Signal Delay: 148.4
 Intersection Capacity Utilization 249.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Off-Ramp

ø6	ø8
124 s	54 s

Lanes, Volumes, Timings
6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

No Improvements AM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.989				0.850		0.999	
Fit Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1625	0	1717	3433	1536	1823	5233	0
Fit Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1575	1627	1621	0	1717	3433	1503	1820	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	14.0	46.0	46.0	0.0	14.0	103.0	46.0	15.0	104.0	0.0
Total Split (%)	7.9%	7.9%	7.9%	25.8%	25.8%	0.0%	7.9%	57.9%	25.8%	8.4%	58.4%	0.0%
Maximum Green (s)	7.0	7.0	7.0	39.0	39.0		7.0	96.0	39.0	8.0	97.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	14.4	41.0	41.0		9.0	103.7	144.7	9.9	104.6	
Actuated g/C Ratio		0.05	0.08	0.23	0.23		0.05	0.58	0.81	0.06	0.59	
v/c Ratio		0.18	0.50	1.01	0.99		0.77	0.71	0.23	0.68	0.95	
Control Delay		85.9	63.9	114.0	110.4		80.0	20.3	5.8	112.9	42.4	
Queue Delay		0.0	45.5	0.0	0.0		0.0	45.6	0.2	0.0	36.5	
Total Delay		85.9	109.4	114.0	110.4		80.0	65.9	6.0	112.9	78.9	
LOS		F	F	F	F		F	E	A	F	E	

Lanes, Volumes, Timings

No Improvements AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		104.5			112.2			56.9			79.7	
Approach LOS		F			F			E			E	
Queue Length 50th (ft)		19	48	~475	458		79	476	101	81	~1220	
Queue Length 95th (ft)		50	85	#717	#696		m78	m422	m94	#159	#1349	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		92	128	376	374		87	2000	1229	103	3075	
Starvation Cap Reductn		0	0	0	0		0	699	390	0	0	
Spillback Cap Reductn		0	61	0	0		0	0	0	0	384	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.18	0.96	1.01	0.99		0.77	1.09	0.34	0.67	1.08	

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 48 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 77.2
 Intersection Capacity Utilization 95.7%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service F

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

φ1 15 s	φ2 103 s	φ4 46 s	φ3 14 s
φ6 104 s	φ5 14 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

No Improvements AM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Frt		0.878				0.850		0.994			0.994	
Fit Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Fit Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	69	145	1092	0	82	2838	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	16.0	16.0	0.0	15.5	15.5	15.0	18.0	131.5	0.0	15.0	128.5	0.0
Total Split (%)	9.0%	9.0%	0.0%	8.7%	8.7%	8.4%	10.1%	73.9%	0.0%	8.4%	72.2%	0.0%
Maximum Green (s)	9.0	9.0		8.5	8.5	8.0	11.0	124.5		8.0	121.5	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	13.6	13.6		9.7	17.5	13.9	127.9			9.5	123.5	
Actuated g/C Ratio	0.08	0.08		0.05	0.10	0.08	0.72			0.05	0.69	
v/c Ratio	0.79	0.89		0.34	0.25	1.03	0.29			0.45	1.17	
Control Delay	114.6	132.4		90.2	59.3	153.1	13.8			74.9	103.1	
Queue Delay	0.0	91.0		0.0	0.0	0.0	0.7			0.0	57.8	
Total Delay	114.6	223.3		90.2	59.3	153.1	14.5			74.9	160.9	
LOS	F	F		F	E	F	B			E	F	
Approach Delay		170.0			69.5		30.7				158.4	
Approach LOS		F			E		C				F	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	127	~138			39	36	~185	349		50	~2040	
Queue Length 95th (ft)	#270	#289			80	63	#344	76		m33	m324	
Internal Link Dist (ft)		104			168			329			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)	135	125			108	281	141	3704		192	2428	
Starvation Cap Reductn	0	0			0	0	0	2104		0	196	
Spillback Cap Reductn	0	32			0	0	0	0		0	242	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.79	1.19			0.31	0.25	1.03	0.68		0.43	1.30	

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 16 (9%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.17
 Intersection Signal Delay: 121.7
 Intersection Capacity Utilization 112.0%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1	ø2	ø4	ø3
15 s	131.5 s	15.5 s	16 s
ø5	ø6		
18 s	128.5 s		

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

No Improvements AM (2035)
6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	137	63	64	860	1701	343
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Frnt		0.850				0.850
Flt Protected	0.950			0.997		
Satd. Flow (prot)	3399	1567	0	5121	1844	2759
Flt Permitted	0.950			0.640		
Satd. Flow (perm)	3399	1567	0	3287	1844	2759
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	433	
Travel Time (s)	4.2			7.3	8.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	137	63	64	860	1701	343
Shared Lane Traffic (%)						
Lane Group Flow (vph)	137	63	0	924	1701	343
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	14.0	14.0	164.0	164.0	164.0	14.0
Total Split (%)	7.9%	7.9%	92.1%	92.1%	92.1%	7.9%
Maximum Green (s)	7.0	7.0	157.0	157.0	157.0	7.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	9.0	9.0		159.0	159.0	178.0
Actuated g/C Ratio	0.05	0.05		0.89	0.89	1.00
v/c Ratio	0.80	0.80		1.52dl	1.03	0.12
Control Delay	113.3	137.0		2.0	54.7	0.0
Queue Delay	0.0	0.0		0.0	190.1	0.0
Total Delay	113.3	137.0		2.0	244.9	0.0
LOS	F	F		A	F	A
Approach Delay	120.7			2.0	203.8	
Approach LOS	F			A	F	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	83	74		48	~1764	0
Queue Length 95th (ft)	#144	#170		m38	m1023	m0
Internal Link Dist (ft)	134			296	353	
Turn Bay Length (ft)						175
Base Capacity (vph)	172	79		2936	1647	2759
Starvation Cap Reductn	0	0		0	488	0
Spillback Cap Reductn	0	0		74	199	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.80	0.80		0.32	1.47	0.12

Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 118 (66%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 139.7
 Intersection Capacity Utilization 103.7%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.























dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd

02	04
164 s	14 s
06	
164 s	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

No Improvements AM (2035)
 6/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frts						0.850		0.967				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	1863	0	1770	1863	1583	1770	4903	0	1770	3539	0
Flt Permitted				0.757			0.950			0.950		
Satd. Flow (perm)	0	1863	0	1410	1863	1583	1770	4903	0	1770	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1553			404			409	
Travel Time (s)		2.9			23.5			6.1			6.2	
Conf. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	126	4	202	5	1323	0	544	2288	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	4.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	11.0	20.0		14.0	20.0	
Total Split (s)	26.0	26.0	0.0	26.0	26.0	82.0	11.0	70.0	0.0	82.0	141.0	0.0
Total Split (%)	14.6%	14.6%	0.0%	14.6%	14.6%	46.1%	6.2%	39.3%	0.0%	46.1%	79.2%	0.0%
Maximum Green (s)	19.0	19.0		19.0	19.0	75.0	4.0	63.0		75.0	134.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)				21.9	21.9	85.4	7.5	82.6		58.5	143.9	
Actuated g/C Ratio				0.12	0.12	0.48	0.04	0.46		0.33	0.81	
v/c Ratio				0.73	0.02	0.27	0.07	0.58		0.93	0.80	
Control Delay				89.6	59.5	19.9	84.4	38.1		47.5	7.2	
Queue Delay				0.0	0.0	0.0	0.0	0.0		11.7	45.4	
Total Delay				89.6	59.5	19.9	84.4	38.2		59.2	52.6	
LOS				F	E	B	F	D		E	D	
Approach Delay					46.8			38.3			53.8	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					D			D				D
Queue Length 50th (ft)				137	3	114	6	386		~701		417
Queue Length 95th (ft)				#255	18	160	23	551		m324		m58
Internal Link Dist (ft)		109			1473			324				329
Turn Bay Length (ft)							40					
Base Capacity (vph)				182	241	773	75	2274		766		2861
Starvation Cap Reductn				0	0	0	0	0		200		774
Spillback Cap Reductn				0	0	0	0	48		0		0
Storage Cap Reductn				0	0	0	0	0		0		0
Reduced v/c Ratio				0.69	0.02	0.26	0.07	0.59		0.96		1.10

Intersection Summary





















Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 8 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 48.7
 Intersection Capacity Utilization 86.1%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø2	ø1	ø4
70 s	82 s	26 s
ø5	ø6	ø8
11 s	141 s	26 s

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

No Improvements AM (2035)
6/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	139	45	32	90	297	170	611	55	397	1041	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98							0.99		
Frt			0.850		0.904			0.988			0.964	
Flt Protected	0.950				0.996		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1677	0	1770	1840	0	1770	1796	0
Flt Permitted	0.950				0.963		0.950			0.950		
Satd. Flow (perm)	1770	1863	1548	0	1622	0	1770	1840	0	1749	1796	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			133			907			285	
Travel Time (s)		18.1			3.6			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	348	139	45	32	90	297	170	611	55	397	1041	326
Shared Lane Traffic (%)												
Lane Group Flow (vph)	348	139	45	0	419	0	170	666	0	397	1367	0
Turn Type	Prot		pm+ov	Perm			Prot			Prot		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases			4	8								
Detector Phase	7	4	5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	20.0	20.0		14.0	20.0		14.0	20.0	
Total Split (s)	29.0	67.0	18.0	38.0	38.0	0.0	18.0	79.0	0.0	32.0	93.0	0.0
Total Split (%)	16.3%	37.6%	10.1%	21.3%	21.3%	0.0%	10.1%	44.4%	0.0%	18.0%	52.2%	0.0%
Maximum Green (s)	22.0	60.0	11.0	31.0	31.0		11.0	72.0		25.0	86.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag		Lag	Lead	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	24.0	62.0	75.0		33.0		13.0	70.1		30.9	88.0	
Actuated g/C Ratio	0.13	0.35	0.42		0.19		0.07	0.39		0.17	0.49	
v/c Ratio	1.46	0.21	0.07		1.39		1.32	0.92		1.29	1.54	
Control Delay	276.5	50.5	37.3		245.1		244.9	69.5		187.0	276.1	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	73.2	
Total Delay	276.5	50.5	37.3		245.1		244.9	69.5		187.0	349.4	
LOS	F	D	D		F		F	E		F	F	
Approach Delay		197.2			245.1			105.2			312.8	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F		F			F		
Queue Length 50th (ft)	~536	126	36		~649		~255	717		~627	~2243	
Queue Length 95th (ft)	#782	186	64		#877		#422	#916		m#616	m#2150	
Internal Link Dist (ft)		1112			53			827			205	
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	239	649	655		301		129	765		307	888	
Starvation Cap Reductn	0	0	0		0		0	0		0	85	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.46	0.21	0.07		1.39		1.32	0.87		1.29	1.70	

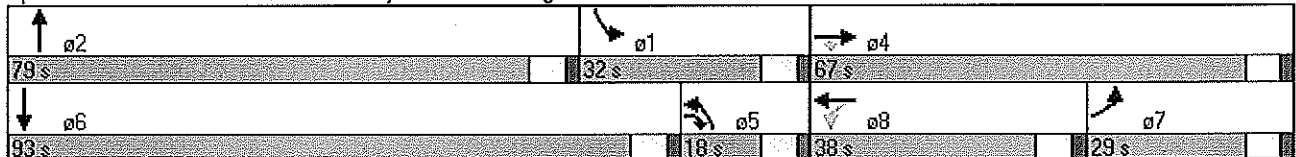
Intersection Summary

Area Type: Other
 Cycle Length: 178
 Actuated Cycle Length: 178
 Offset: 130 (73%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.54
 Intersection Signal Delay: 238.6
 Intersection Capacity Utilization 144.8%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service H





















- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

No Improvements AM (2035)
6/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	387	387	54	492	39	88	69	118	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.989			0.905			0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3274	0	1770	3500	0	1770	1686	0	1770	1656	0
Flt Permitted	0.455			0.341			0.700			0.516		
Satd. Flow (perm)	848	3274	0	635	3500	0	1304	1686	0	961	1656	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		571			1192			291			153	
Travel Time (s)		8.7			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	387	387	54	492	39	88	69	118	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	774	0	54	531	0	88	187	0	27	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	55.0	55.0	0.0	55.0	55.0	0.0	34.0	34.0	0.0	34.0	34.0	0.0
Total Split (%)	61.8%	61.8%	0.0%	61.8%	61.8%	0.0%	38.2%	38.2%	0.0%	38.2%	38.2%	0.0%
Maximum Green (s)	48.0	48.0		48.0	48.0		27.0	27.0		27.0	27.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	61.8	61.8		61.8	61.8		17.2	17.2		17.2	17.2	
Actuated g/C Ratio	0.69	0.69		0.69	0.69		0.19	0.19		0.19	0.19	
v/c Ratio	0.12	0.34		0.12	0.22		0.35	0.57		0.15	0.28	
Control Delay	3.4	5.0		5.6	5.5		33.6	38.9		29.5	31.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.4	5.0		5.6	5.5		33.6	38.9		29.5	31.3	
LOS	A	A		A	A		C	D		C	C	
Approach Delay		4.9			5.5			37.2			30.9	
Approach LOS		A			A			D			C	
Queue Length 50th (ft)	6	61		10	55		43	96		13	43	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

No Improvements AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m21	132		m9	m46		80	150		33	77	
Internal Link Dist (ft)		491			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	589	2273		441	2430		425	549		313	540	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.34		0.12	0.22		0.21	0.34		0.09	0.16	

Intersection Summary

Area Type: Other
 Cycle Length: 89
 Actuated Cycle Length: 89
 Offset: 56 (63%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 11.6
 Intersection Capacity Utilization 66.5%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

φ2	φ4
55 s	34 s
φ6	φ8
55 s	34 s

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

No Improvements AM (2035)
 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↵	↑↑	↵	
Volume (veh/h)	732	100	342	303	29	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	732	100	342	303	29	112
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				571		
pX, platoon unblocked						
vC, conflicting volume			732		1618	416
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			732		1618	416
iC, single (s)			4.1		6.8	6.9
iC, 2 stage (s)						
iF (s)			2.2		3.5	3.3
p0 queue free %			61		49	81
cM capacity (veh/h)			868		57	585

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	488	344	342	152	152	141
Volume Left	0	0	342	0	0	29
Volume Right	0	100	0	0	0	112
cSH	1700	1700	868	1700	1700	202
Volume to Capacity	0.29	0.20	0.39	0.09	0.09	0.70
Queue Length 95th (ft)	0	0	47	0	0	110
Control Delay (s)	0.0	0.0	11.8	0.0	0.0	56.1
Lane LOS			B			F
Approach Delay (s)	0.0		6.3			56.1
Approach LOS						F

Intersection Summary	
Average Delay	7.4
Intersection Capacity Utilization	60.9%
ICU Level of Service	B
Analysis Period (min)	15

Network Totals

Number of Intersections	31
Control Delay / Veh (s/v)	73
Queue Delay / Veh (s/v)	9
Total Delay / Veh (s/v)	82
Total Delay (hr)	6401
Stops / Veh	0.19
Stops (#)	53249
Average Speed (mph)	5
Total Travel Time (hr)	7184
Distance Traveled (mi)	38475
Fuel Consumed (gal)	6619
Fuel Economy (mpg)	5.8
CO Emissions (kg)	462.64
NOx Emissions (kg)	90.01
VOC Emissions (kg)	107.22
Unserviced Vehicles (#)	13927
Vehicles in dilemma zone (#)	1325
Performance Index	6549.3

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	14012.8	14476.1	14695.0	13917.7	13714.1	14653.9	14250.8
Delay / Veh (s)	3354.6	3302.1	3438.8	3228.6	3121.2	3572.4	3275.6
Stop Delay (hr)	13635.4	14067.7	14301.7	13536.0	13329.0	14278.7	13859.8
St Del/Veh (s)	3264.2	3209.0	3346.7	3140.0	3033.5	3481.0	3185.8
Total Stops	71422	75322	72765	71703	71237	71650	76330
Stop/Veh	4.75	4.77	4.73	4.62	4.50	4.85	4.87
Travel Dist (mi)	19291.7	20099.9	19609.9	19880.7	20084.5	18921.8	19806.2
Travel Time (hr)	14443.5	14929.3	15137.0	14366.0	14164.3	15081.1	14698.2
Avg Speed (mph)	6	7	7	7	7	6	6
Fuel Used (gal)	3879.2	4012.3	4046.0	3879.2	3840.9	4014.4	3950.8
Fuel Eff. (mpg)	5.0	5.0	4.8	5.1	5.2	4.7	5.0
HC Emissions (g)	17291	18561	18341	16888	18531	18218	18401
CO Emissions (g)	650936	681788	675045	653328	678420	663417	672497
NOx Emissions (g)	40576	43198	42586	40362	43522	41340	42380
Vehicles Entered	15522	16391	15916	16028	16312	15255	16154
Vehicles Exited	14554	15173	14852	15010	15325	14280	15170
Hourly Exit Rate	14554	15173	14852	15010	15325	14280	15170
Input Volume	352938	352938	352938	352938	352938	352938	352938
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	1600	1806	1854	1595	1728	1739	1879
Denied Entry After	23876	23650	24145	23639	23016	24455	23367

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	14376.2	14043.6	14232.4	14237.3
Delay / Veh (s)	3328.9	3209.6	3255.4	3307.4
Stop Delay (hr)	13994.9	13667.0	13831.8	13850.2
St Del/Veh (s)	3240.6	3123.5	3163.8	3217.4
Total Stops	73289	72126	73879	72973
Stop/Veh	4.71	4.58	4.69	4.71
Travel Dist (mi)	19634.3	19953.9	19917.7	19720.1
Travel Time (hr)	14819.8	14492.3	14678.3	14681.0
Avg Speed (mph)	6	7	6	6
Fuel Used (gal)	3975.2	3908.0	3949.6	3945.6
Fuel Eff. (mpg)	4.9	5.1	5.0	5.0
HC Emissions (g)	18364	18770	18719	18208
CO Emissions (g)	673396	683551	677659	671004
NOx Emissions (g)	42572	43362	43271	42317
Vehicles Entered	16115	16142	16405	16020
Vehicles Exited	14979	15363	15073	14977
Hourly Exit Rate	14979	15363	15073	14977
Input Volume	352938	352938	352938	352938
% of Volume	4	4	4	4
Denied Entry Before	1957	1820	1672	1762
Denied Entry After	23652	23441	23115	23635

Arterial Level of Service: EB Glenwood Ave #1

Link	Node	Delay (Sec)	Travel Time (Min)	LOS	Queue (Veh)	Queue (Sec)	Travel Time (Min)
	10	1457.0	1500.7	0.8	4	4	5501.3
	20	300.5	315.7	0.2	2	2	2044.5
Creedmoor Rd	1	375.5	392.7	0.2	2	2	359.0
Crabtree Mall Entr	2	154.0	171.3	0.2	4	4	160.6
Blue Ridge Rd	3	320.9	346.1	0.3	3	3	334.4
Crabtree View Pl	32	6.5	12.4	0.1	20	20	6.6
WB I-440 On-Ramp fro	18	1.6	7.2	0.1	34	34	1.6
WB Glenwood Ave	4	1.7	8.9	0.1	34	34	1.7
WB I-440 Off-Ramp to	38	0.5	3.1	0.0	57	57	0.5
WB I-440 On-Ramp fro	44	1.0	5.3	0.1	35	35	1.1
EB I-440 On-Ramp fro	23	1.5	4.9	0.0	22	19	2.0
I-440 EB Off-Ramp	5	14.0	20.0	0.1	13	12	16.1
EB I-440 Off-Ramp to	41	2.5	8.1	0.1	42	40	2.9
Total		2638.2	2805.3	2.1	4	4	2501.3

Arterial Level of Service: EB Glenwood Ave #1

Link	Rel 10 Speed	Rel 15 Delay	Rel 20 Speed	Rel 25 Delay	Rel 30 Speed	Rel 35 Delay	Rel 40 Speed
	4	1418.1	3	1700.5	4	1200.5	3
	2	279.6	2	330.3	2	271.1	2
Creedmoor Rd	2	327.2	2	403.6	2	339.8	2
Crabtree Mall Entr	5	140.1	4	150.9	5	143.1	5
Blue Ridge Rd	3	303.1	3	325.6	3	305.0	3
Crabtree View Pl	20	6.7	21	6.5	20	6.7	21
WB I-440 On-Ramp fro	34	1.7	35	1.4	33	1.9	34
WB Glenwood Ave	34	1.7	36	1.4	33	1.9	34
WB I-440 Off-Ramp to	56	0.5	58	0.4	56	0.5	57
WB I-440 On-Ramp fro	33	1.4	36	0.9	35	1.1	35
EB I-440 On-Ramp fro	18	2.5	23	1.1	21	1.6	21
I-440 EB Off-Ramp	11	17.0	14	13.3	12	15.4	13
EB I-440 Off-Ramp to	41	2.7	42	2.5	40	2.9	41
Total	4	2502.5	4	3004.3	4	2300.5	4

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
	1541.0	4	1387.4	4	1635.1	4	1333.0
	312.8	2	285.5	2	330.1	2	304.1
Creedmoor Rd	378.4	2	366.2	2	427.3	2	385.9
Crabtree Mall Entr	137.3	5	145.4	4	178.8	4	163.5
Blue Ridge Rd	302.8	3	311.6	3	338.0	3	326.8
Crabtree View PI	6.4	20	6.5	20	6.5	20	6.6
WB I-440 On-Ramp fro	1.7	34	1.7	35	1.4	33	1.9
WB Glenwood Ave	1.7	33	1.9	35	1.4	33	2.0
WB I-440 Off-Ramp to	0.5	57	0.5	57	0.5	57	0.5
WB I-440 On-Ramp fro	1.1	36	1.0	36	1.0	36	0.9
EB I-440 On-Ramp fro	1.5	22	1.3	23	1.2	24	1.0
I-440 EB Off-Ramp	14.1	13	14.1	14	12.8	14	12.4
EB I-440 Off-Ramp to	2.6	42	2.5	42	2.4	43	2.3
Total	2701.9	4	2525.6	4	2936.5	4	2541.1

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 4 Speed	Run 5 Delay	Run 6 Speed	Run 7 Delay
	4	1412.0	4	1001.7
	2	312.7	2	304.4
Creedmoor Rd	2	406.3	2	378.8
Crabtree Mall Entr	4	166.1	4	159.3
Blue Ridge Rd	3	337.5	3	327.1
Crabtree View PI	21	6.5	20	6.6
WB I-440 On-Ramp fro	34	1.5	34	1.7
WB Glenwood Ave	34	1.6	34	1.7
WB I-440 Off-Ramp to	57	0.5	58	0.4
WB I-440 On-Ramp fro	35	1.0	36	0.9
EB I-440 On-Ramp fro	22	1.3	25	0.9
I-440 EB Off-Ramp	14	13.1	15	11.6
EB I-440 Off-Ramp to	42	2.5	43	2.2
Total	4	2662.6	4	2797.2

Arterial Level of Service: WB Glenwood Ave #1

From Street	Nodes	Delay (Sec)	Travel Time (Sec)	Delay (Hr)	Arterial Grade	Plan 1 Grade	Plan 1 Delay
EB I-440 On-Ramp fro	41	414.3	430.0	0.2	5	5	391.6
I-440 EB Off-Ramp	5	86.1	93.8	0.1	4	4	87.6
EB I-440 On-Ramp fro	23	52.7	56.5	0.1	5	5	52.4
WB I-440 On-Ramp fro	44	66.3	70.8	0.0	2	1	69.3
WB I-440 Off-Ramp to	38	72.1	76.5	0.1	2	2	78.1
WB Glenwood Ave	4	70.7	73.7	0.0	2	2	72.6
WB I-440 On-Ramp fro	18	46.7	52.8	0.1	6	6	48.3
Crabtree View Pl	32	85.5	93.0	0.1	3	3	82.7
Lead Mine Rd	3	49.5	54.7	0.1	5	5	49.2
Marriott Dr	2	13.5	39.3	0.3	28	27	15.1
Creedmoor Rd	1	43.9	60.2	0.2	12	12	46.7
	25	4.9	23.7	0.2	34	34	4.9
	63	1.4	16.5	0.2	40	40	1.4
Total		1007.7	1141.4	1.6	7	7	1000.9

Arterial Level of Service: WB Glenwood Ave #1

From Street	Plan 10 Speed	Plan 10 Delay	Plan 15 Speed	Plan 15 Delay	Plan 20 Speed	Plan 20 Delay	Plan 25 Speed
EB I-440 On-Ramp fro	5	530.8	5	365.2	7	514.4	5
I-440 EB Off-Ramp	3	91.0	4	79.9	4	88.1	4
EB I-440 On-Ramp fro	4	55.1	5	50.1	5	52.2	5
WB I-440 On-Ramp fro	1	67.9	2	63.3	1	71.2	2
WB I-440 Off-Ramp to	2	74.2	3	68.4	2	81.6	2
WB Glenwood Ave	2	73.3	3	67.3	2	78.1	2
WB I-440 On-Ramp fro	6	44.9	6	44.1	5	49.9	6
Crabtree View Pl	3	81.6	3	89.2	3	80.1	3
Lead Mine Rd	5	45.3	4	53.9	5	41.4	5
Marriott Dr	28	13.6	28	14.3	29	13.1	27
Creedmoor Rd	12	45.6	12	45.0	13	41.5	12
	34	4.8	33	5.1	34	4.9	33
	40	1.3	40	1.5	40	1.6	40
Total	7	1132.5	7	950.3	7	1118.1	7

Arterial Level of Service: WB Glenwood Ave #1
























Link Name	Flow 4 Delay	Flow 5 Speed	Flow 6 Delay	Flow 7 Speed	Flow 8 Delay	Flow 9 Speed
EB I-440 On-Ramp fro	341.5	4	355.7	7	277.7	7
I-440 EB Off-Ramp	55.5	3	113.5	4	75.5	4
EB I-440 On-Ramp fro	54.4	4	67.2	5	47.8	5
WB I-440 On-Ramp fro	66.3	1	73.5	2	60.6	2
WB I-440 Off-Ramp to	76.2	3	64.2	3	66.5	3
WB Glenwood Ave	71.6	2	68.3	3	64.9	2
WB I-440 On-Ramp fro	47.6	5	52.2	6	47.5	6
Crabtree View Pl	82.7	2	97.0	2	91.7	3
Lead Mine Rd	49.2	5	51.0	4	57.7	4
Marriott Dr	14.8	28	13.6	29	12.5	29
Creedmoor Rd	47.1	13	40.6	12	44.7	12
	5.5	34	4.9	34	4.9	34
	1.3	40	1.3	40	1.3	40
Total	943.8	6	1455.9	7	796.6	7

Arterial Level of Service: WB Glenwood Ave #1

Link Name	Flow 4 Delay	Flow 5 Speed	Flow 6 Delay	Flow 7 Speed
EB I-440 On-Ramp fro	5	341.5	5	452.1
I-440 EB Off-Ramp	4	83.7	4	84.6
EB I-440 On-Ramp fro	5	51.5	5	52.6
WB I-440 On-Ramp fro	2	65.7	2	66.1
WB I-440 Off-Ramp to	2	71.0	2	70.1
WB Glenwood Ave	2	69.7	2	70.4
WB I-440 On-Ramp fro	6	47.5	6	40.8
Crabtree View Pl	3	85.5	3	80.3
Lead Mine Rd	5	47.7	5	47.8
Marriott Dr	29	12.4	28	13.4
Creedmoor Rd	12	44.0	13	40.7
	34	5.0	34	4.8
	40	1.5	40	1.4
Total	7	927.0	7	1055.1

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

No Improvements PM (2035)
6/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	322	3512	407	492	3693	1743	1018	1878	388	1239	1266	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.984				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6305	0	3433	5085	1583	3433	3539	1583	3467	3514	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6305	0	3433	5085	1583	3433	3539	1583	3467	3514	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				284					7	
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		1166			1075			604			1604	
Travel Time (s)		17.7			16.3			11.8			24.3	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	3512	407	492	3693	1743	1018	1878	388	1239	1266	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	3919	0	492	3693	1743	1018	1878	388	1239	1432	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	30.0	60.0		25.0	60.0		45.0	60.0	25.0	35.0	17.4	
Total Split (s)	30.0	66.0	0.0	25.0	61.0	0.0	45.0	60.0	25.0	35.0	50.0	0.0
Total Split (%)	16.1%	35.5%	0.0%	13.4%	32.8%	0.0%	24.2%	32.3%	13.4%	18.8%	26.9%	0.0%
Maximum Green (s)	23.0	59.0		18.0	54.0		38.0	53.0	18.0	28.0	43.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	25.0	61.0		20.0	56.0	186.0	40.0	55.0	80.0	30.0	45.0	
Actuated g/C Ratio	0.13	0.33		0.11	0.30	1.00	0.22	0.30	0.43	0.16	0.24	
v/c Ratio	1.35	1.89		1.33	2.41	1.10	1.38	1.80	0.57	2.22	1.67	
Control Delay	239.2	432.5		201.4	658.9	75.0	225.1	391.1	30.0	583.9	348.2	
Queue Delay	0.0	9.5		25.1	0.0	0.0	0.0	0.0	0.0	108.9	0.0	
Total Delay	239.2	442.0		226.5	658.9	75.0	225.1	391.1	30.0	692.8	348.2	
LOS	F	F		F	F	E	F	F	C	F	F	

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

No Improvements PM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		426.6			451.3			297.0			508.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~513	~2127		~398	~2714	~1373	~861	~1817	340	~1250	~1341	
Queue Length 95th (ft)	#728	#2139		m227	m#1797	m1309	m#960	#1951	m369	#1388	#1480	
Internal Link Dist (ft)		1086			995			524			1524	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	238	2079		369	1531	1583	738	1046	681	559	855	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	23		15	0	0	0	0	0	55	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.35	1.91		1.39	2.41	1.10	1.38	1.80	0.57	2.46	1.67	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 6 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 185
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.41
 Intersection Signal Delay: 422.8
 Intersection LOS: F
 Intersection Capacity Utilization 193.1%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

→ ø2	↖ ø1	↓ ø4	↗ ø3
66 s	25 s	50 s	45 s
↖ ø5	← ø6	↑ ø8	↘ ø7
30 s	61 s	60 s	35 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

No Improvements PM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	4831	272	412	5716	112	152	9	291	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Fr		0.992			0.997				0.850		0.877	
Flt Protected	0.950			0.950				0.955		0.950		
Satd. Flow (prot)	1752	6293	0	1770	6389	0	0	1788	1591	1778	1642	0
Flt Permitted	0.950			0.950				0.668		0.507		
Satd. Flow (perm)	1752	6293	0	1770	6389	0	0	1251	1591	949	1642	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			4						59	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1075			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	4831	272	412	5716	112	152	9	291	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	5103	0	412	5828	0	0	161	291	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	105.0	0.0	35.0	124.6	0.0	46.0	46.0	35.0	46.0	46.0	0.0
Total Split (%)	8.3%	56.5%	0.0%	18.8%	67.0%	0.0%	24.7%	24.7%	18.8%	24.7%	24.7%	0.0%
Maximum Green (s)	8.4	98.0		28.0	117.6		39.0	39.0	28.0	39.0	39.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	10.1	100.0		30.0	122.7			41.0	76.0	41.0	41.0	
Actuated g/C Ratio	0.05	0.54		0.16	0.66			0.22	0.41	0.22	0.22	
v/c Ratio	0.38	1.51		1.45	1.38			0.58	0.45	1.38	0.18	
Control Delay	72.2	248.0		242.0	198.9			74.6	42.6	248.8	18.2	
Queue Delay	0.0	12.6		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	72.2	260.7		242.0	198.9			74.6	42.6	248.8	18.2	
LOS	E	F		F	F			E	D	F	B	
Approach Delay		259.3			201.7			54.0			202.8	
Approach LOS		F			F			D			F	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

No Improvements PM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	45	~2488		~694	~2827			178	257	~466	13	
Queue Length 95th (ft)	m28	m80		m226	m47			269	352	#674	61	
Internal Link Dist (ft)		995			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	98	3387		285	4216			276	650	209	408	
Starvation Cap Reductn	0	62		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.37	1.53		1.45	1.38			0.58	0.45	1.38	0.18	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 140 (75%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.51
 Intersection Signal Delay: 220.6
 Intersection Capacity Utilization 132.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

φ2	φ1	φ4
105 s	35 s	46 s
φ6	φ5	
124.6 s	15.4 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

No Improvements PM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	503	4751	157	1641	5860	1875	211	891	1472	1527	586	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.995				0.850			0.850		0.966	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6312	0	3433	5085	1583	1752	3504	1567	5040	3453	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6312	0	3433	5085	1583	1752	3504	1567	5037	3453	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				3					19	
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			371			434			524	
Travel Time (s)		24.5			5.6			8.5			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	503	4751	157	1641	5860	1875	211	891	1472	1527	586	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	503	4908	0	1641	5860	1875	211	891	1472	1527	755	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		1.0	10.0	6.0	6.0	6.0	1.0	6.0	6.0	
Minimum Split (s)	13.5	17.5		8.0	17.5	13.5	14.0	42.0	8.0	13.5	13.5	
Total Split (s)	21.0	68.0	0.0	41.0	88.0	32.0	29.0	45.0	41.0	32.0	48.0	0.0
Total Split (%)	11.3%	36.6%	0.0%	22.0%	47.3%	17.2%	15.6%	24.2%	22.0%	17.2%	25.8%	0.0%
Maximum Green (s)	14.0	61.0		34.0	81.0	25.0	22.0	38.0	34.0	25.0	41.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	None
Act Effct Green (s)	16.0	63.0		36.0	83.0	110.0	24.7	40.0	81.0	27.0	42.3	
Actuated g/C Ratio	0.09	0.34		0.19	0.45	0.59	0.13	0.22	0.44	0.15	0.23	
v/c Ratio	1.72	2.29		2.47	2.58	2.00	0.91	1.18	2.16	2.09	0.94	
Control Delay	373.5	612.1		690.6	735.5	475.7	109.3	146.8	549.2	523.4	70.4	
Queue Delay	0.0	93.0		11.5	0.0	223.4	0.0	127.1	0.0	0.0	109.7	
Total Delay	373.5	705.1		702.1	735.5	699.1	109.3	273.9	549.2	523.4	180.2	
LOS	F	F		F	F	F	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

No Improvements PM (2035)
 6/21/2010



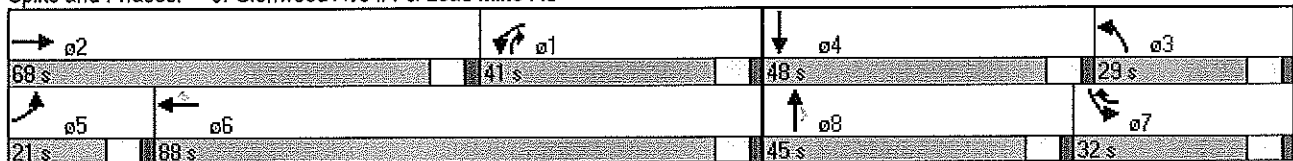
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		674.2			722.4			417.9			409.9	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~472	~2815		~1724	~4424	~3591	272	~688	~2888	~1052	321	
Queue Length 95th (ft)	m#269	m#1674		m#693	m#1807	m#900	m#336	m#723	m#2895	m#1132	m#416	
Internal Link Dist (ft)		1540			291			354			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	292	2141		664	2269	937	232	754	682	732	813	
Starvation Cap Reductn	0	0		0	0	0	0	147	0	0	70	
Spillback Cap Reductn	0	178		104	0	454	0	0	0	0	209	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.72	2.50		2.93	2.58	3.88	0.91	1.47	2.16	2.09	1.25	

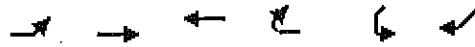
Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 141 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.58
 Intersection Signal Delay: 632.9
 Intersection Capacity Utilization 204.2%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd





Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	5050	5063	0	0	4313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		640	
Travel Time (s)		6.7	3.9		17.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5050	5063	0	0	4313
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5050	5063	0	0	4313
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	74.0	0.0	0.0	112.0
Total Split (%)	0.0%	0.0%	39.8%	0.0%	0.0%	60.2%
Maximum Green (s)			67.0			105.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		186.0	69.0			107.0
Actuated g/C Ratio		1.00	0.37			0.58
v/c Ratio		1.01	1.79			2.07
Control Delay		30.8	385.7			505.9
Queue Delay		169.9	0.0			11.3
Total Delay		200.8	385.7			517.1
LOS		F	F			F
Approach Delay		200.8	385.7			
Approach LOS		F	F			
Queue Length 50th (ft)		~2077	~2293			~3625
Queue Length 95th (ft)		m0	m#1546			#3621
Internal Link Dist (ft)		364	179		560	



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	2827			2087
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		1377	0			25
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		1.40	1.79			2.09

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 38 (20%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.07
 Intersection Signal Delay: 360.2
 Intersection Capacity Utilization 167.6%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off-Ramp to WB Glenwood Ave

← ø6 74 s	↖ ø4 112 s
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Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

No Improvements PM (2035)

6/21/2010

	→	↘	↙	←	↗	↖
Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↖↗	
Volume (vph)	2258	0	0	3142	2192	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	3931	0	0	5263	3416	0
Flt Permitted					0.950	
Satd. Flow (perm)	3931	0	0	5263	3416	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	458	
Travel Time (s)	5.8			7.5	12.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2258	0	0	3142	2192	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2258	0	0	3142	2192	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	91.0	0.0	0.0	91.0	95.0	0.0
Total Split (%)	48.9%	0.0%	0.0%	48.9%	51.1%	0.0%
Maximum Green (s)	84.0			84.0	88.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	86.0			86.0	90.0	
Actuated g/C Ratio	0.46			0.46	0.48	
v/c Ratio	1.24			1.29	1.33	
Control Delay	151.7			174.8	189.5	
Queue Delay	43.2			0.0	0.0	
Total Delay	194.8			174.8	189.5	
LOS	F			F	F	
Approach Delay	194.8			174.8	189.5	
Approach LOS	F			F	F	
Queue Length 50th (ft)	~1795			~1783	~1779	
Queue Length 95th (ft)	m#1766			#1830	#1891	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

No Improvements PM (2035)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Internal Link Dist (ft)	301			418	378	
Turn Bay Length (ft)						
Base Capacity (vph)	1818			2433	1653	
Starvation Cap Reductn	131			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.34			1.29	1.33	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 4 (2%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 185.0
 Intersection Capacity Utilization 331.9%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
91 s	95 s

Lanes, Volumes, Timings

No Improvements PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.957				0.850		0.999	
Flt Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1587	0	1717	3433	1536	1823	5233	0
Flt Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1577	1624	1582	0	1717	3433	1503	1822	5233	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			18		9				243		1	
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2495	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	24.0	30.0	30.0	0.0	24.0	128.0	30.0	14.0	118.0	0.0
Total Split (%)	7.5%	7.5%	12.9%	16.1%	16.1%	0.0%	12.9%	68.8%	16.1%	7.5%	63.4%	0.0%
Maximum Green (s)	7.0	7.0	17.0	23.0	23.0		17.0	121.0	23.0	7.0	111.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	22.8	27.8	27.8		15.6	123.0	150.8	9.0	116.4	
Actuated g/C Ratio		0.05	0.12	0.15	0.15		0.08	0.66	0.81	0.05	0.63	
v/c Ratio		0.47	0.29	0.99	0.97		0.70	1.10	0.53	0.75	0.56	
Control Delay		104.1	36.4	131.0	122.2		85.0	77.2	3.9	129.7	21.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	270.7	2.8	0.0	0.0	
Total Delay		104.1	36.4	131.0	122.2		85.0	347.9	6.7	129.7	21.1	
LOS		F	D	F	F		F	F	A	F	C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		63.6			126.6			269.4			24.9	
Approach LOS		E			F			F			C	
Queue Length 50th (ft)		50	37	~352	~326		122	~1814	107	81	455	
Queue Length 95th (ft)		97	76	#560	#530		m71	m567	m50	#174	515	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		87	240	244	245		175	2270	1269	88	3274	
Starvation Cap Reductn		0	0	0	0		0	806	463	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.47	0.25	0.99	0.97		0.58	1.70	0.84	0.75	0.56	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 24 (13%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 173.5
 Intersection Capacity Utilization 107.4%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service G






















~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

↑ ø2	↘ ø1	↗ ø3	↙ ø4
128 s	14 s	14 s	30 s
↘ ø5	↓ ø6		
24 s	118 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

No Improvements PM (2035)
6/21/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	561	93	2585	150	409	1998	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Friction		0.892				0.850		0.992			0.994	
Fit Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1653	0	0	1788	2787	1805	5146	0	3416	3500	0
Fit Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1653	0	0	1788	2787	1805	5146	0	3416	3500	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		54				32		8			5	
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	561	93	2585	150	409	1998	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	561	93	2735	0	409	2085	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	21.0	21.0	0.0	25.0	25.0	29.0	16.0	111.0	0.0	29.0	124.0	0.0
Total Split (%)	11.3%	11.3%	0.0%	13.4%	13.4%	15.6%	8.6%	59.7%	0.0%	15.6%	66.7%	0.0%
Maximum Green (s)	14.0	14.0		18.0	18.0	22.0	9.0	104.0		22.0	117.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	16.0	16.0			19.1	49.0	11.0	106.0		24.9	119.8	
Actuated g/C Ratio	0.09	0.09			0.10	0.26	0.06	0.57		0.13	0.64	
v/c Ratio	0.91	0.52			0.83	0.74	0.87	0.93		0.89	0.92	
Control Delay	134.9	48.9			113.7	65.8	123.3	16.1		45.3	22.3	
Queue Delay	0.0	0.0			0.0	0.0	0.0	64.2		0.0	33.6	
Total Delay	134.9	48.9			113.7	65.8	123.3	80.3		45.3	56.0	
LOS	F	D			F	E	F	F		D	E	
Approach Delay		98.8			76.0			81.7			54.2	
Approach LOS		F			E			F			D	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

No Improvements PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	171	54			185	341	115	645		234	542	
Queue Length 95th (ft)	#317	124			#306	423	m116	m547		m125	m174	
Internal Link Dist (ft)		104			168			329			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)	151	192			192	758	107	2936		457	2257	
Starvation Cap Reductn	0	0			0	0	0	545		0	251	
Spillback Cap Reductn	0	0			0	0	0	0		0	313	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.91	0.52			0.79	0.74	0.87	1.14		0.89	1.07	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 4 (2%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 70.8
 Intersection Capacity Utilization 93.1%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø4	ø3
111 s	29 s	25 s	21 s
ø5	ø6		
16 s	124 s		

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

No Improvements PM (2035)
6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶↶	↷		↶↶↶	↶	↷↷
Volume (vph)	1137	241	132	1437	1230	1154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Frt		0.850				0.850
Flt Protected	0.950			0.996		
Satd. Flow (prot)	3399	1567	0	5116	1844	2759
Flt Permitted	0.950			0.639		
Satd. Flow (perm)	3399	1567	0	3282	1844	2759
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		85				
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	434	
Travel Time (s)	4.2			7.3	8.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1137	241	132	1437	1230	1154
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1137	241	0	1569	1230	1154
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	62.0	62.0	124.0	124.0	124.0	62.0
Total Split (%)	33.3%	33.3%	66.7%	66.7%	66.7%	33.3%
Maximum Green (s)	55.0	55.0	117.0	117.0	117.0	55.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	57.0	57.0		119.0	119.0	186.0
Actuated g/C Ratio	0.31	0.31		0.64	0.64	1.00
v/c Ratio	1.09	0.45		3.22dl	1.04	0.42
Control Delay	114.5	35.7		9.2	53.7	7.6
Queue Delay	197.0	61.6		6.4	190.2	0.0
Total Delay	311.5	97.2		15.7	244.0	7.6
LOS	F	F		B	F	A
Approach Delay	274.0			15.7	129.5	
Approach LOS	F			B	F	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

No Improvements PM (2035)
 6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	~803	153		251	~1086	257
Queue Length 95th (ft)	#941	245		m141	m184	m0
Internal Link Dist (ft)	134			296	354	
Turn Bay Length (ft)						175
Base Capacity (vph)	1042	539		2100	1180	2759
Starvation Cap Reductn	0	0		484	302	0
Spillback Cap Reductn	302	319		44	348	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	1.54	1.10		0.97	1.48	0.42

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 175 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 133.4
 Intersection LOS: F
 Intersection Capacity Utilization 140.1%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd

φ2	φ4
124 s	62 s
φ6	
124 s	

Lanes, Volumes, Timings
9: Crabtree Valley Ave & Creedmoor Rd.

No Improvements PM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↑	↔	↔	↔↔↔		↔	↔↔	
Volume (vph)	36	0	0	172	17	517	14	2275	537	494	1701	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frnt						0.850		0.971				
Flt Protected		0.950		0.950			0.950			0.950		
Satd. Flow (prot)	0	1770	0	1770	1863	1583	1770	4925	0	1770	3539	0
Flt Permitted		0.746		0.759			0.950			0.950		
Satd. Flow (perm)	0	1390	0	1414	1863	1583	1770	4925	0	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						3		46				
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1556			404			409	
Travel Time (s)		2.9			23.6			6.1			6.2	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	0	0	172	17	517	14	2275	537	494	1701	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	172	17	517	14	2812	0	494	1703	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	26.0	26.0	0.0	26.0	26.0	55.0	14.0	105.0	0.0	55.0	146.0	0.0
Total Split (%)	14.0%	14.0%	0.0%	14.0%	14.0%	29.6%	7.5%	56.5%	0.0%	29.6%	78.5%	0.0%
Maximum Green (s)	19.0	19.0		19.0	19.0	48.0	7.0	98.0		48.0	139.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		21.0		21.0	21.0	76.0	9.0	100.0		50.0	149.4	
Actuated g/C Ratio		0.11		0.11	0.11	0.41	0.05	0.54		0.27	0.80	
v/c Ratio		0.23		1.08	0.08	0.80	0.16	1.05		1.04	0.60	
Control Delay		79.3		155.4	64.6	49.0	89.4	74.3		81.8	2.3	
Queue Delay		0.0		0.0	0.0	0.0	0.0	48.4		227.3	0.7	
Total Delay		79.3		155.4	64.6	49.0	89.4	122.7		309.1	3.0	
LOS		E		F	E	D	F	F		F	A	
Approach Delay		79.3			75.3			122.5			71.8	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

No Improvements PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		E			E			F			E	
Queue Length 50th (ft)		41		~236	17	433	17	~1359		~652	64	
Queue Length 95th (ft)		83		m#391	m36	m610	45	#1419		m#767	130	
Internal Link Dist (ft)		109			1476			324			329	
Turn Bay Length (ft)							40					
Base Capacity (vph)		157		160	210	649	86	2669		476	2843	
Starvation Cap Reductn		0		0	0	0	0	0		161	694	
Spillback Cap Reductn		0		0	0	0	0	256		0	0	
Storage Cap Reductn		0		0	0	0	0	0		0	0	
Reduced v/c Ratio		0.23		1.08	0.08	0.80	0.16	1.17		1.57	0.79	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 172 (92%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay: 97.1
 Intersection Capacity Utilization 106.3%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

↑ ø2	↖ ø1	→ ø4
105 s	55 s	26 s
↓ ø6	↗ ø5	← ø8
146 s	14 s	26 s

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

No Improvements PM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	261	195	217	27	81	388	388	1264	20	319	913	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98							0.99		
Frts			0.850		0.894			0.998			0.969	
Flt Protected	0.950				0.997		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1660	0	1770	1859	0	1770	1805	0
Flt Permitted	0.950				0.876		0.950			0.950		
Satd. Flow (perm)	1770	1863	1548	0	1459	0	1770	1859	0	1759	1805	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			74		86			1			9	
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			156			909			285	
Travel Time (s)		18.1			4.3			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	261	195	217	27	81	388	388	1264	20	319	913	238
Shared Lane Traffic (%)												
Lane Group Flow (vph)	261	195	217	0	496	0	388	1284	0	319	1151	0
Turn Type	Prot		pm+ov	Perm			Prot			Prot		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases			4	8								
Detector Phase	7	4	5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	20.0	20.0		14.0	20.0		14.0	20.0	
Total Split (s)	24.0	65.0	32.0	41.0	41.0	0.0	32.0	93.0	0.0	28.0	89.0	0.0
Total Split (%)	12.9%	34.9%	17.2%	22.0%	22.0%	0.0%	17.2%	50.0%	0.0%	15.1%	47.8%	0.0%
Maximum Green (s)	17.0	58.0	25.0	34.0	34.0		25.0	86.0		21.0	82.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag		Lag	Lead	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	19.0	60.0	87.0		36.0		27.0	88.0		23.0	84.0	
Actuated g/C Ratio	0.10	0.32	0.47		0.19		0.15	0.47		0.12	0.45	
v/c Ratio	1.44	0.32	0.28		1.41		1.51	1.46		1.46	1.40	
Control Delay	275.6	44.4	16.1		241.2		296.8	248.8		256.4	219.3	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	51.5	
Total Delay	275.6	44.4	16.1		241.2		296.8	248.8		256.4	270.8	
LOS	F	D	B		F		F	F		F	F	
Approach Delay		125.0			241.2			260.0			267.7	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

No Improvements PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~429	179	86		~724		~656	~2144		~530	~1865	
Queue Length 95th (ft)	#632	199	120		#967		#884	#2413		m#538	m#1812	
Internal Link Dist (ft)		1112			76			829				205
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	181	601	769		352		257	880		219	820	
Starvation Cap Reductn	0	0	0		0		0	0		0	62	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.44	0.32	0.28		1.41		1.51	1.46		1.46	1.52	

Intersection Summary

Area Type: Other
 Cycle Length: 186
 Actuated Cycle Length: 186
 Offset: 183 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.51
 Intersection Signal Delay: 239.4
 Intersection Capacity Utilization 146.2%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2	↘ ø1	→ ø4	
93 s	28 s	65 s	
↓ ø6	↙ ø5	← ø8	↗ ø7
89 s	32 s	41 s	24 s

Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

No Improvements PM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	535	356	144	475	88	135	293	33	105	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Fr		0.940			0.977			0.985			0.909	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3327	0	1770	3458	0	1770	1835	0	1770	1693	0
Fit Permitted	0.421			0.271			0.232			0.375		
Satd. Flow (perm)	784	3327	0	505	3458	0	432	1835	0	699	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		258			35			7				94
Link Speed (mph)		45			45			35				25
Link Distance (ft)		569			1192			291				153
Travel Time (s)		8.6			18.1			5.7				4.2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	535	356	144	475	88	135	293	33	105	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	891	0	144	563	0	135	326	0	105	429	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	54.0	54.0	0.0	54.0	54.0	0.0	39.0	39.0	0.0	39.0	39.0	0.0
Total Split (%)	58.1%	58.1%	0.0%	58.1%	58.1%	0.0%	41.9%	41.9%	0.0%	41.9%	41.9%	0.0%
Maximum Green (s)	47.0	47.0		47.0	47.0		32.0	32.0		32.0	32.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	55.0	55.0		55.0	55.0		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.59	0.59		0.59	0.59		0.30	0.30		0.30	0.30	
v/c Ratio	0.41	0.43		0.48	0.27		1.04	0.58		0.50	0.74	
Control Delay	13.3	8.6		15.7	6.9		121.9	30.3		33.5	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.3	8.6		15.7	6.9		121.9	30.3		33.5	30.1	
LOS	B	A		B	A		F	C		C	C	
Approach Delay		9.4			8.7			57.1			30.8	
Approach LOS		A			A			E			C	
Queue Length 50th (ft)	68	131		33	55		78	154		49	173	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

No Improvements PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m61	m99		m85	m104		#186	222		95	264	
Internal Link Dist (ft)		489			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	466	2082		300	2069		159	681		258	684	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.41	0.43		0.48	0.27		0.85	0.48		0.41	0.63	

Intersection Summary

Area Type: Other
 Cycle Length: 93
 Actuated Cycle Length: 93
 Offset: 24 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 21.2
 Intersection Capacity Utilization 85.2%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service E

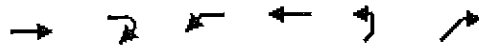
95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø4
54 s	39 s
ø6	ø8
54 s	39 s

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

No Improvements PM (2035)
 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↑	↑↑	↑↑	
Volume (veh/h)	891	140	369	501	205	192
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	891	140	369	501	205	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	569					
pX, platoon unblocked						
vC, conflicting volume			891		1950	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			891		1950	516
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			51		0	62
cM capacity (veh/h)			757		29	504

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	594	437	369	250	250	397
Volume Left	0	0	369	0	0	205
Volume Right	0	140	0	0	0	192
cSH	1700	1700	757	1700	1700	53
Volume to Capacity	0.35	0.26	0.49	0.15	0.15	7.48
Queue Length 95th (ft)	0	0	68	0	0	Err
Control Delay (s)	0.0	0.0	14.2	0.0	0.0	Err
Lane LOS	B			F		
Approach Delay (s)	0.0		6.0		Err	
Approach LOS					F	

Intersection Summary						
Average Delay			1729.7			
Intersection Capacity Utilization			82.7%		ICU Level of Service	E
Analysis Period (min)			15			

Network Totals

Number of Intersections	31
Control Delay / Veh (s/v)	131
Queue Delay / Veh (s/v)	13
Total Delay / Veh (s/v)	144
Total Delay (hr)	12413
Stops / Veh	0.21
Stops (#)	65850
Average Speed (mph)	3
Total Travel Time (hr)	13295
Distance Traveled (mi)	42009
Fuel Consumed (gal)	11270
Fuel Economy (mpg)	3.7
CO Emissions (kg)	787.79
NOx Emissions (kg)	153.27
VOC Emissions (kg)	182.58
Unserved Vehicles (#)	28429
Vehicles in dilemma zone (#)	1075
Performance Index	12596.3

Total Network Performance By Run

Run Number	10	1	11	2	3	4	5
Total Delay (hr)	15424.0	15601.8	15456.8	15599.0	15085.0	15124.0	15528.4
Delay / Veh (s)	3326.3	3543.0	3262.7	3376.6	3221.0	3245.9	3306.6
Stop Delay (hr)	15101.3	15288.7	15124.6	15261.3	14749.3	14788.3	15202.4
St Del/Veh (s)	3256.7	3471.9	3192.5	3303.5	3149.3	3173.8	3237.2
Total Stops	76201	71800	76767	79401	77495	76390	77153
Stop/Veh	4.56	4.53	4.50	4.77	4.60	4.55	4.56
Travel Dist (mi)	19423.0	18545.4	19484.5	19076.5	19452.3	19467.3	19419.3
Travel Time (hr)	15867.2	16025.1	15902.4	16037.7	15530.8	15570.1	15973.5
Avg Speed (mph)	6	6	6	6	6	6	6
Fuel Used (gal)	4225.5	4236.8	4238.9	4256.2	4153.1	4157.5	4253.8
Fuel Eff. (mpg)	4.6	4.4	4.6	4.5	4.7	4.7	4.6
HC Emissions (g)	18687	19256	19741	19497	19354	19546	20113
CO Emissions (g)	719436	718702	736527	724431	725821	726238	743776
NOx Emissions (g)	42648	42439	44626	44626	44205	44333	45030
Vehicles Entered	17433	16651	17841	17501	17794	17513	17674
Vehicles Exited	15954	15055	16270	15762	15927	16035	16139
Hourly Exit Rate	15954	15055	16270	15762	15927	16035	16139
Input Volume	397994	397994	397994	397994	397994	397994	397994
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	885	895	938	932	912	855	928
Denied Entry After	26791	27492	26253	26758	25838	26419	26319

Total Network Performance By Run

Run Number	6	8	9	Avg
Total Delay (hr)	15098.1	15457.6	15128.3	15350.3
Delay / Veh (s)	3198.7	3420.2	3169.2	3304.1
Stop Delay (hr)	14759.2	15145.5	14782.5	15020.3
St Del/Veh (s)	3126.9	3351.2	3096.7	3233.1
Total Stops	78382	70567	80066	76420
Stop/Veh	4.61	4.34	4.66	4.57
Travel Dist (mi)	19743.8	18596.7	20130.4	19333.9
Travel Time (hr)	15548.5	15884.5	15588.8	15792.9
Avg Speed (mph)	6	6	6	6
Fuel Used (gal)	4164.2	4206.9	4186.1	4207.9
Fuel Eff. (mpg)	4.7	4.4	4.8	4.6
HC Emissions (g)	19118	18874	19641	19383
CO Emissions (g)	730123	708785	738599	727244
NOx Emissions (g)	44455	42503	45519	44038
Vehicles Entered	17878	17021	17979	17526
Vehicles Exited	16107	15519	16392	15917
Hourly Exit Rate	16107	15519	16392	15917
Input Volume	397994	397994	397994	397994
% of Volume	4	4	4	4
Denied Entry Before	869	930	895	904
Denied Entry After	25990	26841	26285	26499

Arterial Level of Service: EB Glenwood Ave #1

Approach	Phase	Delay (s)	Travel Time (s)	Dist (ft)	Arterial Speed (mph)	Queue (ft)	PLU (ft)
	EB	3148.2	3215.7	0.0	3	3	3075.7
	25	384.7	399.7	0.2	2	2	371.1
Creedmoor Rd	1	493.7	511.0	0.2	2	2	455.3
Crabtree Mall Entr	2	272.8	290.4	0.2	3	3	249.6
Blue Ridge Rd	3	354.8	379.4	0.3	3	3	347.3
Crabtree View Pl	32	6.8	12.6	0.1	20	20	6.8
WB I-440 On-Ramp fro	18	2.7	8.3	0.1	29	32	2.1
I-440 WB Off-Ramp to	4	3.4	10.6	0.1	29	31	2.5
WB I-440 Off-Ramp to	38	1.3	3.9	0.0	45	57	0.5
WB I-440 On-Ramp fro	44	2.6	6.5	0.0	24	32	1.0
EB I-440 On-Ramp fro	23	8.3	12.0	0.0	11	23	2.0
I-440 EB Ramp	5	41.3	47.2	0.1	6	8	28.0
EB I-440 Off-Ramp to	41	4.8	10.4	0.1	33	34	4.5
Total		4726.2	4893.8	2.1	3	3	4544.3

Arterial Level of Service: EB Glenwood Ave #1

Approach	Phase 1 Speed	Phase 1 Delay	Phase 11 Speed	Phase 11 Delay	Phase 2 Speed	Phase 2 Delay	Phase 3 Speed
	3	3170.2	3	3151.7	3	3102.7	3
	2	393.8	2	384.5	2	379.4	2
Creedmoor Rd	2	490.4	2	505.0	2	492.4	2
Crabtree Mall Entr	2	322.7	3	265.5	2	280.8	3
Blue Ridge Rd	3	365.3	3	340.4	3	350.2	3
Crabtree View Pl	20	6.8	20	7.0	20	6.8	20
WB I-440 On-Ramp fro	33	1.7	29	2.9	32	2.0	32
I-440 WB Off-Ramp to	33	1.9	27	4.1	31	2.5	32
WB I-440 Off-Ramp to	57	0.5	38	2.0	50	0.9	48
WB I-440 On-Ramp fro	32	1.0	21	3.5	25	2.2	25
EB I-440 On-Ramp fro	19	3.5	10	9.2	13	6.6	11
I-440 EB Ramp	6	34.3	6	40.3	6	34.7	6
EB I-440 Off-Ramp to	33	4.8	33	4.6	33	4.6	32
Total	3	4802.9	3	4704.3	3	4726.0	3

Arterial Level of Service: EB Glenwood Ave #1

Street/Segment	Plan A Delay	Plan A Speed	Plan B Delay	Plan B Speed	Plan C Delay	Plan C Speed	Plan D Delay
	3441.7	1	3441.7	1	3471.7	1	3341.7
	380.8	2	388.2	2	416.1	2	368.1
Creedmoor Rd	502.1	2	494.9	1	547.4	2	471.8
Crabtree Mall Entr	254.4	3	255.6	2	296.9	3	274.6
Blue Ridge Rd	341.4	3	348.7	3	360.8	3	336.8
Crabtree View Pl	6.6	20	6.8	20	6.8	20	6.8
WB I-440 On-Ramp fro	2.2	35	1.5	32	2.1	31	2.4
I-440 WB Off-Ramp to	2.4	34	1.7	32	2.4	31	2.7
WB I-440 Off-Ramp to	1.1	57	0.5	57	0.5	55	0.6
WB I-440 On-Ramp fro	2.3	25	2.4	30	1.2	28	1.7
EB I-440 On-Ramp fro	8.9	10	9.2	17	4.2	13	6.4
I-440 EB Ramp	39.1	5	48.0	6	35.5	5	42.8
EB I-440 Off-Ramp to	4.9	32	5.1	33	4.5	32	4.9
Total	4413.0	3	4871.1	3	5150.2	3	4362.4

Arterial Level of Service: EB Glenwood Ave #1

Street/Segment	Plan A Speed	Plan B Delay	Plan C Speed	Plan D Delay
	1	3441.7	1	3341.7
	2	411.4	2	359.2
Creedmoor Rd	1	532.2	2	455.1
Crabtree Mall Entr	2	294.0	3	241.2
Blue Ridge Rd	2	421.2	3	343.8
Crabtree View Pl	19	7.3	20	6.7
WB I-440 On-Ramp fro	17	9.1	33	1.7
I-440 WB Off-Ramp to	16	12.2	32	2.2
WB I-440 Off-Ramp to	21	5.9	51	0.9
WB I-440 On-Ramp fro	12	8.7	26	2.1
EB I-440 On-Ramp fro	4	26.4	12	7.4
I-440 EB Ramp	3	73.5	6	39.1
EB I-440 Off-Ramp to	30	5.5	34	4.4
Total	3	5325.9	3	4458.1

Arterial Level of Service: WB Glenwood Ave #1

Link Name	Queue	Delay (Sec)	Travel (Sec)	LOS	Arrival	Post-IO	Exit
I-440 EB Ramp	5	172.4	180.2	0.1	2	2	136.1
EB I-440 On-Ramp fro	23	39.0	42.7	0.1	6	7	34.4
WB I-440 On-Ramp fro	44	50.6	56.2	0.0	2	3	38.8
WB I-440 Off-Ramp to	38	43.9	47.3	0.0	3	4	37.6
I-440 WB Off-Ramp to	4	54.2	57.3	0.0	3	4	46.6
WB I-440 On-Ramp fro	18	35.5	41.5	0.1	7	7	34.4
Crabtree View Pl	32	84.1	91.6	0.1	3	3	87.2
Lead Mine Rd	3	63.9	69.0	0.1	4	4	65.3
Marriott Dr	2	109.4	135.1	0.3	8	9	92.2
Creedmoor Rd	1	117.6	133.7	0.2	5	6	109.1
	25	7.7	26.3	0.2	30	31	7.4
	68	1.7	16.8	0.2	40	40	1.6
Total		5742.1	5875.6	1.6	5	5	5064.5

Arterial Level of Service: WB Glenwood Ave #1

Link Name	Queue	Delay (Sec)	Travel (Sec)	LOS	Arrival	Post-IO	Exit
I-440 EB Ramp	2	193.9	2	165.8	2	144.7	2
EB I-440 On-Ramp fro	5	45.5	5	43.9	8	30.3	5
WB I-440 On-Ramp fro	3	48.0	2	51.1	3	41.4	2
WB I-440 Off-Ramp to	3	43.5	3	42.2	4	38.8	3
I-440 WB Off-Ramp to	3	52.3	3	53.2	4	46.6	3
WB I-440 On-Ramp fro	7	40.4	6	41.6	7	37.8	7
Crabtree View Pl	3	90.1	3	77.4	3	82.9	2
Lead Mine Rd	3	67.5	3	76.3	3	71.6	4
Marriott Dr	6	144.3	6	146.6	6	150.3	8
Creedmoor Rd	5	141.1	5	122.9	6	115.0	4
	30	8.1	30	8.1	30	7.6	30
	40	1.7	40	1.6	39	1.7	39
Total	4	6091.4	5	5818.1	5	4799.3	4

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay
I-440 EB Ramp	4642.8	2	5045.8	2	4425.8	2	5199.8
EB I-440 On-Ramp fro	189.7	2	154.8	2	151.7	2	206.8
WB I-440 On-Ramp fro	45.0	6	37.6	7	36.1	5	43.6
WB I-440 Off-Ramp to	54.4	3	43.1	3	45.3	2	61.9
I-440 WB Off-Ramp to	44.0	4	40.4	3	42.0	3	51.3
WB I-440 On-Ramp fro	54.5	3	54.9	3	52.7	3	60.5
Crabtree View Pl	40.5	9	26.2	7	39.4	8	33.9
Lead Mine Rd	94.3	3	79.5	2	94.3	3	85.3
Marriott Dr	64.5	4	61.9	4	64.2	4	56.6
Creedmoor Rd	116.1	8	104.1	11	72.8	8	109.8
	168.2	5	129.7	7	89.6	6	110.1
	7.8	29	8.6	31	7.0	30	7.8
	1.9	39	1.8	40	1.6	40	1.7
Total	5523.7	5	5788.4	5	5122.6	4	6029.0

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 3 Speed	Run 4 Delay	Run 5 Speed	Run 6 Delay
I-440 EB Ramp	1	5045.8	2	4558.4
EB I-440 On-Ramp fro	1	292.2	2	156.4
WB I-440 On-Ramp fro	5	49.9	7	32.0
WB I-440 Off-Ramp to	1	93.1	3	44.1
I-440 WB Off-Ramp to	2	71.3	4	37.4
WB I-440 On-Ramp fro	2	85.7	4	47.2
Crabtree View Pl	8	33.9	9	25.9
Lead Mine Rd	3	86.8	3	63.9
Marriott Dr	4	53.0	4	59.7
Creedmoor Rd	10	79.7	10	85.8
	7	94.0	6	99.6
	31	7.0	31	7.3
	40	1.5	40	1.5
Total	3	10283.8	5	5215.1

**Crabtree Valley Ave Improvements
(2009)**

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑		↖↖	↑↑↑	↖	↖↖	↑↑	↖	↖↖	↑↑	↖↖
Volume (vph)	47	1614	89	324	1498	458	191	360	118	954	952	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	500		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00		0.97	0.99	1.00	
Frt		0.992				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6348	0	3433	5085	1583	3433	3539	1583	3467	3511	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1767	6348	0	3428	5085	1562	3421	3539	1537	3432	3511	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		1166			1075			606			1602	
Travel Time (s)		17.7			16.3			11.8			24.3	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	1754	97	352	1628	498	208	391	128	1037	1035	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	1851	0	352	1628	498	208	391	128	1037	1146	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	33.3		14.3	31.3		14.4	24.4	14.3	14.4	24.4	
Total Split (s)	14.3	59.0	0.0	24.0	68.7	0.0	18.2	26.0	24.0	59.0	66.8	0.0
Total Split (%)	8.5%	35.1%	0.0%	14.3%	40.9%	0.0%	10.8%	15.5%	14.3%	35.1%	39.8%	0.0%
Maximum Green (s)	7.0	51.7		16.7	61.4		10.8	18.6	16.7	51.6	59.4	
Yellow Time (s)	5.5	5.5		5.5	5.5		5.5	5.5	5.5	5.5	5.5	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9	1.8	1.9	1.9	
Lost Time Adjust (s)	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.4	-2.4	-2.3	-2.4	-2.4	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			10.0			10.0	
Pedestrian Calls (#/hr)		6			6			0			6	
Act Effct Green (s)	9.3	54.9		19.0	67.5	168.0	13.2	20.9	39.9	53.1	60.9	
Actuated g/C Ratio	0.06	0.33		0.11	0.40	1.00	0.08	0.12	0.24	0.32	0.36	
v/c Ratio	0.52	0.89		0.91	0.80	0.32	0.77	0.89	0.35	0.95	0.90	
Control Delay	96.3	60.3		83.9	35.2	0.5	79.3	75.7	35.0	72.6	61.1	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	96.3	60.3		83.9	35.2	0.5	79.3	75.7	35.0	72.6	61.1	
LOS	F	E		F	D	A	E	E	C	E	E	
Approach Delay		61.3			35.1			69.6			66.6	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)	56	569		186	312	0	119	228	91	572	623	
Queue Length 95th (ft)	107	618		#289	384	0	#136	#303	51	#701	723	
Internal Link Dist (ft)		1086			995			526			1522	
Turn Bay Length (ft)	500			400		260	310		175	450		
Base Capacity (vph)	98	2075		388	2042	1562	270	442	370	1114	1292	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.52	0.89		0.91	0.80	0.32	0.77	0.88	0.35	0.93	0.89	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 164 (98%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 54.8
 Intersection LOS: D
 Intersection Capacity Utilization 89.4%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

ρ2	ρ1	ρ3	ρ4
59 s	24 s	18.2 s	66.8 s
ρ5	ρ6	ρ8	ρ7
14.3 s	69.7 s	26 s	59 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↑	↗	↔	↖	
Volume (vph)	8	2654	24	35	2233	68	26	2	45	82	6	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.98	0.97	0.98	0.98	
Frt		0.999			0.996				0.850		0.885	
Fit Protected	0.950			0.950				0.955		0.950		
Satd. Flow (prot)	1752	6334	0	1770	6370	0	0	1788	1591	1778	1619	0
Fit Permitted	0.950			0.950				0.737		0.738		
Satd. Flow (perm)	1749	6334	0	1768	6370	0	0	1358	1544	1358	1619	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1075			1624			201				281
Travel Time (s)		16.3			24.6			5.5				5.5
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2885	26	38	2427	74	28	2	49	89	7	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	2911	0	38	2501	0	0	30	49	89	30	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			4				4
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	4	4		4
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	13.4	40.4		13.3	40.3		41.6	41.6	41.6	41.6	41.6	
Total Split (s)	14.0	109.0	0.0	16.0	111.0	0.0	43.0	43.0	43.0	43.0	43.0	0.0
Total Split (%)	8.3%	64.9%	0.0%	9.5%	66.1%	0.0%	25.6%	25.6%	25.6%	25.6%	25.6%	0.0%
Maximum Green (s)	7.6	102.6		9.7	104.7		35.4	35.4	35.4	35.4	35.4	
Yellow Time (s)	3.0	4.3		3.0	4.5		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	3.4	2.1		3.3	1.8		3.7	3.7	3.7	3.7	3.7	
Lost Time Adjust (s)	-1.4	-1.4	0.0	-1.3	1.3	0.0	0.0	-2.6	0.0	-2.6	-2.6	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	7.6	4.0	7.6	5.0	7.6	5.0	5.0	4.0
Lead/Lag	Lag	Lead		Lag	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		4.0			4.0		10.0	10.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)		6			6		24	24	24	24	24	
Act Effct Green (s)	10.3	124.9		10.6	130.7			20.1	17.5	20.1	20.1	
Actuated g/C Ratio	0.06	0.74		0.06	0.78			0.12	0.10	0.12	0.12	
v/c Ratio	0.08	0.62		0.34	0.50			0.19	0.30	0.55	0.15	
Control Delay	67.1	3.1		49.4	2.8			68.2	73.8	82.2	67.0	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Improvements AM (2009)
 6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	67.1	3.1		49.4	2.8			68.2	73.8	82.2	67.0	
LOS	E	A		D	A			E	E	F	E	
Approach Delay		3.3			3.5			71.7			78.3	
Approach LOS		A			A			E			E	
Queue Length 50th (ft)	9	42		38	1			30	51	94	30	
Queue Length 95th (ft)	m11	322		m44	m19			65	95	154	64	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	112	4710		123	4957			307	325	307	366	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.08	0.62		0.31	0.50			0.10	0.15	0.29	0.08	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 153 (91%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 5.9
 Intersection LOS: A
 Intersection Capacity Utilization 79.1%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

→ ø2	↙ ø1	↕ ø4
109 s	16 s	43 s
← ø6	↗ ø5	
111 s	14 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	306	2422	52	448	2230	458	21	116	91	1386	448	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.98	0.97		0.98	0.99	0.99	
Frt		0.997				0.850			0.850		0.976	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6322	0	3433	5085	1583	1752	3504	1567	5040	3447	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3397	6322	0	3432	5085	1547	1701	3504	1533	5012	3447	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1624			371			433			524	
Travel Time (s)		24.6			5.6			8.4			10.2	
Confl. Peds. (#/hr)	6		6	6		6	24		6	6		24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	333	2633	57	487	2424	498	23	126	99	1507	487	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	333	2690	0	487	2424	498	23	126	99	1507	579	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	41.0		13.5	34.0	13.0	14.0	13.0	13.5	13.0	25.5	
Total Split (s)	21.0	76.0	0.0	28.0	83.0	51.0	14.0	13.0	28.0	51.0	50.0	0.0
Total Split (%)	12.5%	45.2%	0.0%	16.7%	49.4%	30.4%	8.3%	7.7%	16.7%	30.4%	29.8%	0.0%
Maximum Green (s)	13.5	69.0		20.5	76.0	44.0	6.0	6.0	20.5	44.0	43.0	
Yellow Time (s)	5.0	4.5		5.0	4.5	4.5	5.0	4.5	5.0	4.5	4.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	3.0	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.5	-2.0	0.0	-2.0	-2.0	-2.0	-3.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.5	5.0	5.0	5.0	5.0	5.5	5.0	5.0	4.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		6			6						24	
Act Effct Green (s)	16.0	71.0		22.5	78.0	124.0	9.0	8.0	30.0	46.0	50.6	
Actuated g/C Ratio	0.10	0.42		0.13	0.46	0.74	0.05	0.05	0.18	0.27	0.30	
v/c Ratio	1.03	1.01		1.06	1.03	0.43	0.24	0.75	0.36	1.09	0.56	
Control Delay	103.6	42.5		116.0	60.1	4.6	94.6	84.0	54.8	103.7	48.1	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Improvements AM (2009)
 6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	30.1	0.3	
Total Delay	103.6	42.5		116.0	60.1	4.6	94.6	84.0	54.8	133.8	48.5	
LOS	F	D		F	E	A	F	F	D	F	D	
Approach Delay		49.3			60.0			73.3			110.1	
Approach LOS		D			E			E			F	
Queue Length 50th (ft)	~196	~589		~302	~1026	71	14	76	108	~664	310	
Queue Length 95th (ft)	#305	#937		#425	#1099	114	m50	#124	169	#737	330	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	324	2672		460	2361	1152	94	167	278	1380	1038	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	83	115	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.03	1.01		1.06	1.03	0.43	0.24	0.75	0.36	1.16	0.63	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 160 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 135
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 68.6
 Intersection Capacity Utilization 97.3%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service F

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

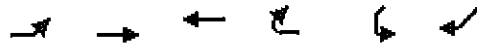
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ø6 83 s	ø5 21 s	ø7 51 s	ø8 13 s

Lanes, Volumes, Timings

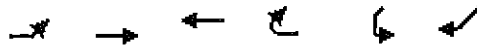
Crabtree Valley Ave Improvements AM (2009)

4: Glenwood Ave #1 & I-440 WB Off-Ramp to WB Glenwood Ave

6/18/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	2798	1610	0	0	1526
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Flt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3041	1750	0	0	1659
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	3041	1750	0	0	1659
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			13.1			13.1
Total Split (s)	0.0	0.0	30.0	0.0	0.0	54.0
Total Split (%)	0.0%	0.0%	35.7%	0.0%	0.0%	64.3%
Maximum Green (s)			23.9			47.9
Yellow Time (s)			5.0			5.0
All-Red Time (s)			1.1			1.1
Lost Time Adjust (s)	0.0	0.0	-1.1	0.0	0.0	-1.1
Total Lost Time (s)	4.0	4.0	5.0	4.0	4.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		84.0	27.3			46.7
Actuated g/C Ratio		1.00	0.32			0.56
v/c Ratio		0.61	0.71			0.82
Control Delay		0.2	17.8			19.2
Queue Delay		0.0	0.0			0.0
Total Delay		0.2	17.8			19.2
LOS		A	B			B
Approach Delay		0.2	17.8			
Approach LOS		A	B			
Queue Length 50th (ft)		0	172			277
Queue Length 95th (ft)		m0	197			348
Internal Link Dist (ft)		364	179		559	

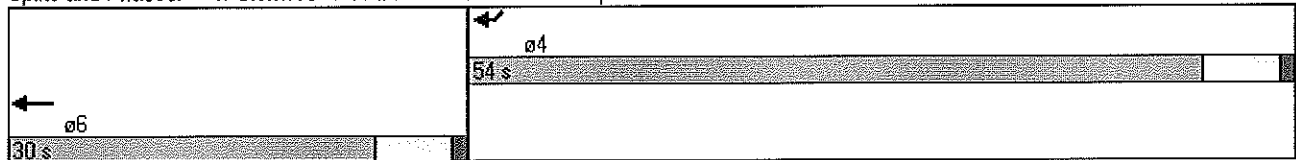


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	2473			2116
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.61	0.71			0.78

Intersection Summary

Area Type: Other
 Cycle Length: 84
 Actuated Cycle Length: 84
 Offset: 3 (4%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 9.8
 Intersection Capacity Utilization 79.6%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service D
 m Volume for 95th percentile queue is metered by upstream signal.

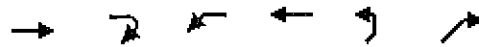
Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off-Ramp to WB Glenwood Ave



Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Off-Ramp

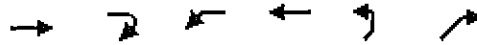
Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	1705	0	0	1040	674	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Ped Bike Factor					0.99	
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Flt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3367	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Confl. Peds. (#/hr)					12	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1853	0	0	1130	733	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1853	0	0	1130	733	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	17.9			17.9	13.0	
Total Split (s)	58.0	0.0	0.0	58.0	26.0	0.0
Total Split (%)	69.0%	0.0%	0.0%	69.0%	31.0%	0.0%
Maximum Green (s)	52.1			52.1	20.0	
Yellow Time (s)	5.0			5.0	4.0	
All-Red Time (s)	0.9			0.9	2.0	
Lost Time Adjust (s)	-0.9	0.0	0.0	-0.9	-1.0	0.0
Total Lost Time (s)	5.0	4.0	4.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Walk Time (s)	7.0			7.0		
Flash Dont Walk (s)	4.0			4.0		
Pedestrian Calls (#/hr)	12			12		
Act Effct Green (s)	53.5			53.5	20.5	
Actuated g/C Ratio	0.64			0.64	0.24	
v/c Ratio	0.84			0.34	0.88	
Control Delay	20.5			7.4	44.3	
Queue Delay	0.0			0.0	0.0	
Total Delay	20.5			7.4	44.3	
LOS	C			A	D	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Off-Ramp



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Approach Delay	20.5			7.4	44.3	
Approach LOS	C			A	D	
Queue Length 50th (ft)	668			91	190	
Queue Length 95th (ft)	821			115	#284	
Internal Link Dist (ft)	301			418	376	
Turn Bay Length (ft)						
Base Capacity (vph)	2210			3355	854	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.84			0.34	0.86	

Intersection Summary

Area Type: Other
 Cycle Length: 84
 Actuated Cycle Length: 84
 Offset: 0 (0%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 21.2
 Intersection Capacity Utilization 89.8%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Off-Ramp

06	08
58 s	26 s

Lanes, Volumes, Timings

Crabtree Valley Ave Improvements AM (2009)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔		↔	↕	↔	↔	↕	
Volume (vph)	3	1	15	377	2	15	4	728	148	36	1527	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor		0.99	0.97	0.99	0.99				0.96		1.00	
Frt			0.850		0.989				0.850			
Fit Protected		0.964		0.950	0.956		0.950		0.950			
Satd. Flow (prot)	0	1814	1599	1631	1620	0	1717	3433	1536	1823	5238	0
Fit Permitted		0.964		0.950	0.956		0.121		0.295			
Satd. Flow (perm)	0	1802	1550	1613	1604	0	219	3433	1477	566	5238	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1	16	410	2	16	4	791	161	39	1660	2
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	4	16	213	215	0	4	791	161	39	1662	0
Turn Type	Split		pm+ov	Split			pm+pt		pm+ov	pm+pt		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3				2		2	6		
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	13.0	13.0	13.2	33.0	33.0		13.2	20.2	33.0	13.2	20.2	
Total Split (s)	13.0	13.0	15.0	49.0	49.0	0.0	15.0	91.0	49.0	15.0	91.0	0.0
Total Split (%)	7.7%	7.7%	8.9%	29.2%	29.2%	0.0%	8.9%	54.2%	29.2%	8.9%	54.2%	0.0%
Maximum Green (s)	7.0	7.0	8.8	43.0	43.0		8.8	84.8	43.0	8.8	84.8	
Yellow Time (s)	4.0	4.0	4.7	4.0	4.0		4.7	4.7	4.0	4.7	4.7	
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0		1.5	1.5	2.0	1.5	1.5	
Lost Time Adjust (s)	0.0	-1.0	0.0	-1.0	-1.0	0.0	-1.2	-1.2	-1.2	-1.2	-1.2	0.0
Total Lost Time (s)	6.0	5.0	6.2	5.0	5.0	4.0	5.0	5.0	4.8	5.0	5.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			6	12		6	
Act Effct Green (s)		8.0	8.4	28.2	28.2		118.5	116.7	145.2	119.3	119.3	
Actuated g/C Ratio		0.05	0.05	0.17	0.17		0.71	0.69	0.86	0.71	0.71	
v/c Ratio		0.05	0.20	0.78	0.79		0.02	0.33	0.13	0.08	0.45	
Control Delay		77.8	78.6	85.3	86.8		9.5	8.8	2.0	11.6	13.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.4	0.0	0.0	0.2	
Total Delay		77.8	78.6	85.3	86.8		9.5	9.2	2.0	11.6	13.1	
LOS		E	E	F	F		A	A	A	B	B	
Approach Delay		78.4			86.1			8.0			13.1	
Approach LOS		E			F			A			B	
Queue Length 50th (ft)		4	17	240	243		1	62	3	13	279	
Queue Length 95th (ft)		18	41	323	326		m4	m335	m72	38	463	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		86	96	427	424		246	2384	1392	477	3720	
Starvation Cap Reductn		0	0	0	0		0	1002	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	892	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.05	0.17	0.50	0.51		0.02	0.57	0.12	0.08	0.59	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 115 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 22.0
 Intersection LOS: C
 Intersection Capacity Utilization 63.3%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
15 s	91 s	13 s	49 s
ø6	ø5		
91 s	15 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Crabtree Valley Ave Improvements AM (2009)

6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	1	5	2	36	21	633	25	39	1357	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.98			0.99	0.98	1.00	1.00		0.99	1.00	
Frt		0.850				0.850		0.994			0.999	
Fit Protected					0.966		0.950			0.950		
Satd. Flow (prot)	1853	1537	0	0	1799	2787	1805	5151	0	3416	3517	0
Fit Permitted					0.966		0.950			0.950		
Satd. Flow (perm)	1853	1537	0	0	1783	2734	1799	5151	0	3386	3517	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			855			267	
Travel Time (s)		5.0			8.5			16.7			5.2	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1	5	2	39	23	688	27	42	1475	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1	0	0	7	39	23	715	0	42	1484	0
Turn Type	Split			Split	pm+ov	Prot				Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	40.0	40.0		38.5	38.5	14.0	14.0	41.0		14.0	41.0	
Total Split (s)	40.0	40.0	0.0	38.5	38.5	14.0	14.0	75.5	0.0	14.0	75.5	0.0
Total Split (%)	23.8%	23.8%	0.0%	22.9%	22.9%	8.3%	8.3%	44.9%	0.0%	8.3%	44.9%	0.0%
Maximum Green (s)	34.0	34.0		31.0	31.0	7.0	7.0	68.5		7.0	68.5	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		3.5	3.5	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	0.0	-2.5	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	7.5	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	17.0	17.0						14.0			14.0	
Pedestrian Calls (#/hr)	12	12						6			6	
Act Effct Green (s)		14.8			9.5	32.7	9.2	116.1		30.8	141.5	
Actuated g/C Ratio		0.09			0.06	0.19	0.05	0.69		0.18	0.84	
v/c Ratio		0.01			0.07	0.07	0.23	0.20		0.07	0.50	
Control Delay		63.0			76.8	41.4	99.5	13.4		35.1	3.5	

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Crabtree Valley Ave Improvements AM (2009)
6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.2	
Total Delay		63.0			76.8	41.4	99.5	13.4		35.1	3.7	
LOS		E			E	D	F	B		D	A	
Approach Delay		63.0			46.8			16.1			4.6	
Approach LOS		E			D			B			A	
Queue Length 50th (ft)		1			7	21	25	58		15	296	
Queue Length 95th (ft)		8			26	21	62	153		m11	155	
Internal Link Dist (ft)		104			168			775			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)		320			359	542	100	3600		626	2961	
Starvation Cap Reductn		0			0	0	0	0		0	595	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.00			0.02	0.07	0.23	0.20		0.07	0.63	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 91 (54%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.50
 Intersection Signal Delay: 9.1
 Intersection Capacity Utilization 54.5%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø3	ø4
75.5 s	14 s	40 s	38.5 s
ø5	ø6		
14 s	75.5 s		

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↖	↑↑	↗	↘	↑↑
Volume (vph)	102	80	599	84	128	1235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		0	0	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor	0.98	0.98		0.98	1.00	
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.374	
Satd. Flow (perm)	3361	1545	3539	1545	694	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45			45
Link Distance (ft)	543		889			855
Travel Time (s)	8.2		13.5			13.0
Confl. Peds. (#/hr)	6	6		6	6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	87	651	91	139	1342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	111	87	651	91	139	1342
Turn Type		pm+ov		pm+ov	pm+pt	
Protected Phases	8	1	2	8	1	6
Permitted Phases		8		2	6	
Detector Phase	8	1	2	8	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	43.0	21.0	104.0	43.0	21.0	125.0
Total Split (%)	25.6%	12.5%	61.9%	25.6%	12.5%	74.4%
Maximum Green (s)	36.0	14.0	97.0	36.0	14.0	118.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		7.0
Flash Dont Walk (s)	17.0		10.0	17.0		10.0
Pedestrian Calls (#/hr)	12		6	12		6
Act Effct Green (s)	17.2	27.4	125.6	142.8	140.8	140.8
Actuated g/C Ratio	0.10	0.16	0.75	0.85	0.84	0.84
v/c Ratio	0.32	0.34	0.25	0.07	0.21	0.45
Control Delay	77.1	63.3	7.6	1.6	5.2	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	77.1	63.3	7.6	1.6	5.2	6.3
LOS	E	E	A	A	A	A
Approach Delay	71.1		6.8			6.2
Approach LOS	E		A			A
Queue Length 50th (ft)	64	86	91	9	2	7
Queue Length 95th (ft)	78	117	167	19	63	236
Internal Link Dist (ft)	463		809			775
Turn Bay Length (ft)	250					
Base Capacity (vph)	777	309	2645	1472	684	2965
Starvation Cap Reductn	0	0	0	0	0	215
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.28	0.25	0.06	0.20	0.49

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 123 (73%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.45
 Intersection Signal Delay: 11.7
 Intersection Capacity Utilization 50.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service A

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø1	ø2		
21 s	104 s		
ø6		ø8	
125 s		43 s	

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Improvements AM (2009)
6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	7	17	5	14	46	47	130	8	22	540	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95	0.94								0.95		
Frt		0.896			0.885			0.991			0.969	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1564	0	1770	1649	0	1770	1846	0	1770	1805	0
Flt Permitted	0.950			0.391			0.274			0.662		
Satd. Flow (perm)	3275	1564	0	728	1649	0	510	1846	0	1176	1805	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1187			133			907			285	
Travel Time (s)		18.0			3.6			17.7			5.6	
Confl. Peds. (#/hr)	12		12				12			12		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	8	18	5	15	50	51	141	9	24	587	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	246	26	0	5	65	0	51	150	0	24	740	0
Turn Type	Prot			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases				8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		4.0	7.0		12.0	12.0		12.0	12.0	
Minimum Split (s)	14.0	41.0		11.0	41.0		41.0	41.0		41.0	41.0	
Total Split (s)	25.0	55.0	0.0	11.0	41.0	0.0	102.0	102.0	0.0	102.0	102.0	0.0
Total Split (%)	14.9%	32.7%	0.0%	6.5%	24.4%	0.0%	60.7%	60.7%	0.0%	60.7%	60.7%	0.0%
Maximum Green (s)	18.0	48.0		4.0	34.0		95.0	95.0		95.0	95.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lag	Lag		Lead	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Walk Time (s)		7.0								7.0	7.0	
Flash Dont Walk (s)		7.0								10.0	10.0	
Pedestrian Calls (#/hr)		12								12	12	
Act Effct Green (s)	19.3	35.5		14.0	14.0		119.7	119.7		119.7	119.7	
Actuated g/C Ratio	0.11	0.21		0.08	0.08		0.71	0.71		0.71	0.71	
v/c Ratio	0.62	0.08		0.05	0.47		0.14	0.11		0.03	0.58	
Control Delay	63.7	35.7		68.8	83.8		10.2	8.7		1.5	8.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.5	

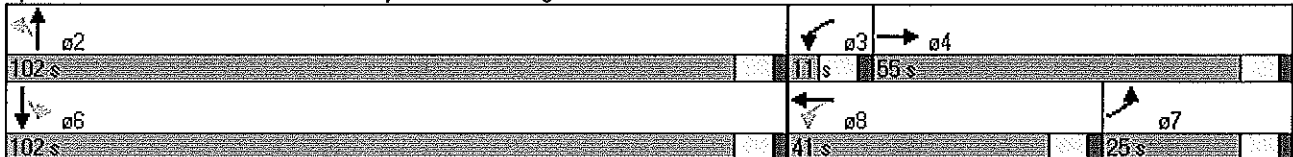


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	63.7	35.7		68.8	83.8		10.2	8.7		1.5	8.6	
LOS	E	D		E	F		B	A		A	A	
Approach Delay		61.0			82.7			9.1			8.4	
Approach LOS		E			F			A			A	
Queue Length 50th (ft)	96	15		5	70		17	48		1	114	
Queue Length 95th (ft)	188	39		20	121		42	89		m2	m132	
Internal Link Dist (ft)		1107			53			827			205	
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	428	465		110	353		363	1315		838	1286	
Starvation Cap Reductn	0	0		0	0		0	0		0	202	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.57	0.06		0.05	0.18		0.14	0.11		0.03	0.68	

Intersection Summary






















Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 140 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 23.4
 Intersection LOS: C
 Intersection Capacity Utilization 60.5%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



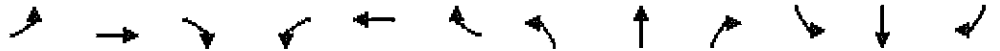
Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Improvements AM (2009)
6/18/2010

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	168	26	11	151	40	18	14	24	58	12	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor	0.98	0.99		0.98	0.99		0.99	0.98		0.97	0.98	
Frt		0.980			0.969			0.905			0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3443	0	1770	3390	0	1770	1654	0	3433	1620	0
Flt Permitted	0.622			0.620			0.952			0.950		
Satd. Flow (perm)	1130	3443	0	1126	3390	0	1747	1654	0	3337	1620	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		982			1187			291			153	
Travel Time (s)		14.9			18.0			5.7			4.2	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	183	28	12	164	43	20	15	26	63	13	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	211	0	12	207	0	20	41	0	63	50	0
Turn Type	Perm			Perm			pm+pt			Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8					
Detector Phase	2	2		6	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	38.0	38.0		38.0	38.0		8.0	38.0		8.0	38.0	
Total Split (s)	77.0	77.0	0.0	77.0	77.0	0.0	25.0	53.0	0.0	38.0	66.0	0.0
Total Split (%)	45.8%	45.8%	0.0%	45.8%	45.8%	0.0%	14.9%	31.5%	0.0%	22.6%	39.3%	0.0%
Maximum Green (s)	73.0	73.0		73.0	73.0		21.0	49.0		34.0	62.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			10.0			10.0	
Pedestrian Calls (#/hr)	6	6		6	6			6			6	
Act Effct Green (s)	139.1	139.1		139.1	139.1		10.3	10.3		8.5	13.5	
Actuated g/C Ratio	0.83	0.83		0.83	0.83		0.06	0.06		0.05	0.08	
v/c Ratio	0.05	0.07		0.01	0.07		0.19	0.41		0.36	0.38	
Control Delay	2.6	2.3		6.3	5.6		76.5	85.9		82.4	81.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Improvements AM (2009)
 6/18/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	2.6	2.3		6.3	5.6		76.5	85.9		82.4	81.0	
LOS	A	A		A	A		E	F		F	F	
Approach Delay		2.4			5.6			82.8			81.8	
Approach LOS		A			A			F			F	
Queue Length 50th (ft)	6	15		4	36		21	44		35	54	
Queue Length 95th (ft)	12	21		m8	47		51	86		61	100	
Internal Link Dist (ft)		902			1107			211			73	
Turn Bay Length (ft)	400			500			100					
Base Capacity (vph)	936	2851		932	2807		221	482		695	598	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.07		0.01	0.07		0.09	0.09		0.09	0.08	

Intersection Summary

Area Type: Other
 Cycle Length: 168
 Actuated Cycle Length: 168
 Offset: 3 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 24.8
 Intersection Capacity Utilization 34.4%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

77 s	25 s	66 s
77 s	53 s	38 s

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Improvements AM (2009)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/18/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑↑	↑	↗↗
Volume (veh/h)	0	33	0	228	670	278
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	0	248	728	302
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				661	433	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	811	728	728			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	692	596	596			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	100			
cM capacity (veh/h)	322	381	834			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	36	83	83	83	728	151	151
Volume Left	0	0	0	0	0	0	0
Volume Right	36	0	0	0	0	151	151
cSH	381	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.05	0.05	0.05	0.43	0.09	0.09
Queue Length 95th (ft)	8	0	0	0	0	0	0
Control Delay (s)	15.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C						
Approach Delay (s)	15.4	0.0			0.0		
Approach LOS	C						

Intersection Summary	
Average Delay	0.4
Intersection Capacity Utilization	45.3%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Improvements AM (2009)
 11: Crabtree Valley Ave & Mall Parking Deck 6/18/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↗		↖	↗	
Volume (veh/h)	10	216	2	5	176	22	1	5	4	18	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	235	2	5	191	24	1	5	4	20	5	5
Pedestrians		6			6			6			6	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					982							
pX, platoon unblocked												
vC, conflicting volume	221			241			384	496	130	372	483	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	221			241			384	496	130	372	483	120
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	96	99	99
cM capacity (veh/h)	1338			1316			526	463	886	537	471	900

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	11	157	80	5	128	88	1	10	20	11
Volume Left	11	0	0	5	0	0	1	0	20	0
Volume Right	0	0	2	0	0	24	0	4	0	5
cSH	1338	1700	1700	1316	1700	1700	526	588	537	619
Volume to Capacity	0.01	0.09	0.05	0.00	0.08	0.05	0.00	0.02	0.04	0.02
Queue Length 95th (ft)	1	0	0	0	0	0	0	1	3	1
Control Delay (s)	7.7	0.0	0.0	7.7	0.0	0.0	11.9	11.2	12.0	10.9
Lane LOS	A			A			B	B	B	B
Approach Delay (s)	0.3			0.2			11.3		11.6	
Approach LOS							B		B	

Intersection Summary	
Average Delay	1.2
Intersection Capacity Utilization	24.6%
ICU Level of Service	A
Analysis Period (min)	15

Network Totals

Number of Intersections	32
Control Delay / Veh (s/v)	10
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	10
Total Delay (hr)	404
Stops / Veh	0.15
Stops (#)	21321
Average Speed (mph)	25
Total Travel Time (hr)	815
Distance Traveled (mi)	20238
Fuel Consumed (gal)	1239
Fuel Economy (mpg)	16.3
CO Emissions (kg)	86.64
NOx Emissions (kg)	16.86
VOC Emissions (kg)	20.08
Unserviced Vehicles (#)	224
Vehicles in dilemma zone (#)	988
Performance Index	463.7

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	1663.8	1941.8	1916.7	1892.1	1857.8	1875.2	2136.5
Delay / Veh (s)	318.9	387.4	385.4	380.8	372.1	374.6	438.2
Stop Delay (hr)	1404.9	1670.4	1664.9	1643.0	1603.0	1604.5	1888.0
St Del/Veh (s)	269.2	333.3	334.8	330.7	321.1	320.5	387.3
Total Stops	39007	40604	38501	36539	38090	41415	38673
Stop/Veh	2.08	2.25	2.15	2.04	2.12	2.30	2.20
Travel Dist (mi)	24796.9	24182.8	24002.1	23734.0	24011.3	24287.6	23423.0
Travel Time (hr)	2197.4	2465.8	2437.4	2405.3	2377.6	2401.4	2643.7
Avg Speed (mph)	15	16	16	16	15	15	15
Fuel Used (gal)	1259.2	1302.1	1292.9	1280.3	1278.4	1288.7	1319.3
Fuel Eff. (mpg)	19.7	18.6	18.6	18.5	18.8	18.8	17.8
HC Emissions (g)	14487	14128	14510	13814	14035	13931	13955
CO Emissions (g)	633624	615381	624307	614220	615107	614836	602912
NOx Emissions (g)	49129	47453	48293	46476	47144	46907	46438
Vehicles Entered	19243	18414	18146	18172	18330	18261	17893
Vehicles Exited	18325	17672	17660	17602	17617	17781	17210
Hourly Exit Rate	18325	17672	17660	17602	17617	17781	17210
Input Volume	198904	198904	198904	198904	198904	198904	198904
% of Volume	9	9	9	9	9	9	9
Denied Entry Before	23	68	20	35	59	18	23
Denied Entry After	1803	2791	2723	2598	2669	2599	3019

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	2134.8	2112.7	1913.3	1944.5
Delay / Veh (s)	438.3	423.4	380.0	389.3
Stop Delay (hr)	1900.1	1832.1	1668.2	1687.9
St Del/Veh (s)	390.1	367.2	331.3	337.9
Total Stops	37375	42653	36897	38978
Stop/Veh	2.13	2.37	2.04	2.17
Travel Dist (mi)	23395.0	23904.3	24137.0	23987.4
Travel Time (hr)	2643.8	2629.7	2435.5	2463.8
Avg Speed (mph)	16	14	16	15
Fuel Used (gal)	1316.7	1331.4	1300.5	1297.0
Fuel Eff. (mpg)	17.8	18.0	18.6	18.5
HC Emissions (g)	13520	13449	15126	14095
CO Emissions (g)	600857	599810	644183	616524
NOx Emissions (g)	45251	45555	49688	47233
Vehicles Entered	17920	18316	18474	18318
Vehicles Exited	17152	17613	17778	17640
Hourly Exit Rate	17152	17613	17778	17640
Input Volume	198904	198904	198904	198904
% of Volume	9	9	9	9
Denied Entry Before	36	1	31	31
Denied Entry After	3002	2939	2557	2669

Arterial Level of Service: EB Glenwood Ave #1

From Street	Node	Delay (Sec)	Travel Time (Sec)	Delay (Sec)	Arterial Speed (mph)	Plan 1 Delay (Sec)	Plan 1 Delay (Sec)
	24	2.5	53.0	0.5	43	43	43
	25	0.7	15.6	0.2	43	43	0.7
Creedmoor Rd	1	82.1	99.2	0.2	8	9	71.3
Crabtree Mall Entr	2	13.6	30.6	0.2	24	25	12.0
Blue Ridge Rd	3	90.1	114.9	0.3	10	11	72.4
Crabtree View Pl	32	6.8	12.5	0.1	20	20	6.8
WB I-440 On-Ramp fro	18	3.5	8.9	0.1	27	31	2.4
I-440 WB Off-Ramp to	4	4.2	11.3	0.1	27	33	2.2
WB I-440 Off-Ramp to	38	1.9	4.5	0.0	40	51	0.9
WB I-440 On-Ramp fro	44	3.4	7.5	0.1	25	31	1.8
EB I-440 On-Ramp fro	23	5.4	8.9	0.0	12	20	1.8
I-440 EB Off-Ramp	5	20.8	26.6	0.1	10	13	13.5
EB I-440 Off-Ramp to	41	3.6	9.1	0.1	37	38	3.4
Total		238.6	402.7	2.1	18	21	191.6

Arterial Level of Service: EB Glenwood Ave #1

From Street	Plan 11 Delay (Sec)	Plan 11 Delay (Sec)	Plan 12 Delay (Sec)	Plan 12 Delay (Sec)	Plan 13 Delay (Sec)	Plan 13 Delay (Sec)	Plan 14 Delay (Sec)
	43	2.5	43	2.5	43	2.5	43
	42	0.8	42	0.7	43	0.8	42
Creedmoor Rd	8	88.0	9	72.2	10	65.7	7
Crabtree Mall Entr	24	13.2	25	11.9	26	11.8	25
Blue Ridge Rd	8	105.9	10	81.9	12	68.0	10
Crabtree View Pl	20	6.7	21	6.5	21	6.6	20
WB I-440 On-Ramp fro	30	2.7	28	3.1	30	2.6	29
I-440 WB Off-Ramp to	29	3.4	30	3.1	29	3.3	28
WB I-440 Off-Ramp to	42	1.6	47	1.2	43	1.6	40
WB I-440 On-Ramp fro	24	3.4	28	2.6	27	2.8	24
EB I-440 On-Ramp fro	11	6.4	13	5.0	15	3.6	11
I-440 EB Off-Ramp	9	23.3	10	20.4	12	15.8	9
EB I-440 Off-Ramp to	37	3.7	38	3.5	38	3.5	36
Total	17	261.8	20	214.6	21	188.1	17

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Plan 4 Speed	Plan 5 Speed	Plan 5 Delay	Plan 6 Speed	Plan 6 Delay	Plan 7 Speed	Plan 7 Delay
	2.8	42	2.8	43	2.4	43	2.8
	0.8	42	0.7	43	0.7	43	0.6
Creedmoor Rd	103.4	7	94.1	8	80.0	9	70.1
Crabtree Mall Entr	12.8	25	12.2	21	17.5	26	11.7
Blue Ridge Rd	90.7	9	100.2	10	87.5	12	64.2
Crabtree View Pl	6.8	20	7.0	19	7.6	22	6.0
WB I-440 On-Ramp fro	2.9	29	2.9	23	5.2	28	3.3
I-440 WB Off-Ramp to	3.6	31	2.8	22	6.6	25	5.1
WB I-440 Off-Ramp to	1.8	49	1.0	32	2.9	35	2.5
WB I-440 On-Ramp fro	3.5	29	2.2	20	4.9	21	4.8
EB I-440 On-Ramp fro	6.5	15	3.8	9	8.0	9	8.1
I-440 EB Off-Ramp	22.9	11	18.2	8	25.5	8	27.9
EB I-440 Off-Ramp to	3.8	37	3.6	36	3.9	36	3.8
Total	262.1	18	251.4	18	253.0	20	210.6

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Plan 6 Speed	Plan 6 Delay	Plan 6 Speed	Plan 6 Delay
	43	2.4	43	2.8
	43	0.7	42	0.8
Creedmoor Rd	9	72.9	7	100.6
Crabtree Mall Entr	24	13.7	20	18.9
Blue Ridge Rd	7	133.4	9	94.8
Crabtree View Pl	19	7.7	21	6.5
WB I-440 On-Ramp fro	19	7.1	30	2.6
I-440 WB Off-Ramp to	18	9.5	32	2.5
WB I-440 Off-Ramp to	26	4.3	49	1.0
WB I-440 On-Ramp fro	19	5.7	29	2.2
EB I-440 On-Ramp fro	9	8.0	17	2.7
I-440 EB Off-Ramp	9	24.3	12	16.2
EB I-440 Off-Ramp to	36	3.9	39	3.2
Total	16	293.6	18	254.6

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Queue	Delay	Travel	Dist	Arts	Per 1	Per 1
	Length	(Sec)	(Sec)	(mi)	(Sec)	(Sec)	(Sec)
EB I-440 On-Ramp fro	41	21.5	25.1	0.2	21	6	133.1
I-440 EB Off-Ramp	5	37.8	45.4	0.1	7	3	103.1
EB I-440 On-Ramp fro	23	20.2	24.4	0.1	11	5	44.6
WB I-440 On-Ramp fro	44	23.5	27.5	0.0	4	2	40.6
WB I-440 Off-Ramp to	38	34.9	39.2	0.1	5	4	47.8
I-440 WB Off-Ramp to	4	44.8	47.9	0.0	4	3	58.4
WB I-440 On-Ramp fro	18	35.5	41.5	0.1	7	8	29.7
Crabtree View Pl	32	75.1	82.5	0.1	3	3	74.8
Lead Mine Rd	3	51.5	56.5	0.1	4	5	48.8
Marriott Dr	2	12.6	37.7	0.3	29	31	11.1
Creedmoor Rd	1	44.4	60.5	0.2	12	12	43.1
	25	5.2	23.5	0.2	34	34	5.1
	64	1.5	16.4	0.2	40	41	1.3
Total		408.5	539.4	1.6	11	8	641.6

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Per 10	Per 10	Per 2	Per 2	Per 3	Per 3	Per 4
	Queue	Delay	Queue	Delay	Queue	Delay	Queue
EB I-440 On-Ramp fro	44	0.7	41	1.4	44	0.7	40
I-440 EB Off-Ramp	16	13.1	10	27.9	17	12.4	7
EB I-440 On-Ramp fro	16	12.1	13	15.4	17	10.9	10
WB I-440 On-Ramp fro	5	17.9	5	18.9	5	16.8	4
WB I-440 Off-Ramp to	5	32.4	5	29.7	5	30.4	5
I-440 WB Off-Ramp to	4	42.6	4	36.9	4	42.8	4
WB I-440 On-Ramp fro	7	35.4	9	26.9	8	33.9	7
Crabtree View Pl	3	70.7	3	71.6	3	73.3	3
Lead Mine Rd	5	51.2	4	52.7	5	50.2	4
Marriott Dr	30	11.9	26	16.8	30	11.4	30
Creedmoor Rd	12	46.3	11	50.6	13	41.5	12
	33	5.5	33	5.9	34	4.7	33
	40	1.6	40	1.8	41	1.3	40
Total	12	341.4	12	356.7	13	330.2	11

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On-Ramp fro	7.1	43	0.9	17	23.1	31	6.8
I-440 EB Off-Ramp	42.9	10	24.8	5	58.5	8	35.8
EB I-440 On-Ramp fro	21.8	9	24.6	9	26.4	10	21.1
WB I-440 On-Ramp fro	24.7	4	26.4	4	24.6	4	26.4
WB I-440 Off-Ramp to	32.7	4	37.3	4	37.1	4	40.9
I-440 WB Off-Ramp to	43.6	4	46.9	3	47.9	3	49.4
WB I-440 On-Ramp fro	36.4	7	37.1	7	38.9	6	44.9
Crabtree View Pl	71.8	3	74.7	3	86.3	3	84.1
Lead Mine Rd	51.6	4	54.1	4	56.0	5	49.2
Marriott Dr	12.0	30	11.7	30	11.6	27	16.0
Creedmoor Rd	43.7	12	46.6	12	42.5	13	41.2
	5.4	34	5.0	34	5.0	35	4.7
	1.6	41	1.4	40	1.5	41	1.4
Total	395.1	11	391.6	10	459.3	11	421.9

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 4 Speed	Run 5 Delay	Run 6 Speed	Run 7 Delay
EB I-440 On-Ramp fro	11	41.0	44	17
I-440 EB Off-Ramp	6	51.4	15	15.3
EB I-440 On-Ramp fro	11	20.2	20	8.6
WB I-440 On-Ramp fro	3	28.0	6	13.8
WB I-440 Off-Ramp to	4	39.3	7	23.6
I-440 WB Off-Ramp to	3	47.5	5	35.1
WB I-440 On-Ramp fro	6	42.6	9	29.1
Crabtree View Pl	3	75.5	3	70.3
Lead Mine Rd	5	49.4	4	52.0
Marriott Dr	30	11.5	30	11.6
Creedmoor Rd	12	42.8	12	44.9
	34	4.9	34	5.3
	40	1.6	41	1.5
Total	10	463.7	13	311.7

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Improvements PM (2009)
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	170	1875	187	257	1930	911	523	966	199	652	666	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%			-2%	
Storage Length (ft)	500		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	0.99		0.97	1.00	1.00	
Frt		0.986				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6303	0	3433	5085	1583	3433	3539	1583	3467	3500	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1768	6303	0	3429	5085	1562	3410	3539	1531	3450	3500	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		1166			1075			606			1602	
Travel Time (s)		17.7			16.3			11.8			24.3	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	2038	203	279	2098	990	568	1050	216	709	724	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	2241	0	279	2098	990	568	1050	216	709	819	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	33.3		14.3	31.3		14.4	24.4	14.3	14.4	24.4	
Total Split (s)	24.0	79.7	0.0	22.3	78.0	0.0	39.1	57.0	22.3	41.0	58.9	0.0
Total Split (%)	12.0%	39.9%	0.0%	11.2%	39.0%	0.0%	19.6%	28.5%	11.2%	20.5%	29.5%	0.0%
Maximum Green (s)	16.7	72.4		15.0	70.7		31.7	49.6	15.0	33.6	51.5	
Yellow Time (s)	5.5	5.5		5.5	5.5		5.5	5.5	5.5	5.5	5.5	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9	1.8	1.9	1.9	
Lost Time Adjust (s)	-2.3	-2.3	0.0	-2.3	-2.3	0.0	-2.4	-2.4	-2.3	-2.4	-2.4	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			10.0			10.0	
Pedestrian Calls (#/hr)		6			6			0			6	
Act Effct Green (s)	19.0	74.7		17.3	73.0	200.0	34.1	52.0	69.3	36.0	53.9	
Actuated g/C Ratio	0.10	0.37		0.09	0.36	1.00	0.17	0.26	0.35	0.18	0.27	
v/c Ratio	1.10	0.95		0.94	1.13	0.63	0.97	1.14	0.40	1.14	0.87	
Control Delay	176.2	70.9		106.8	111.9	6.6	97.1	129.2	36.3	149.0	80.5	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010

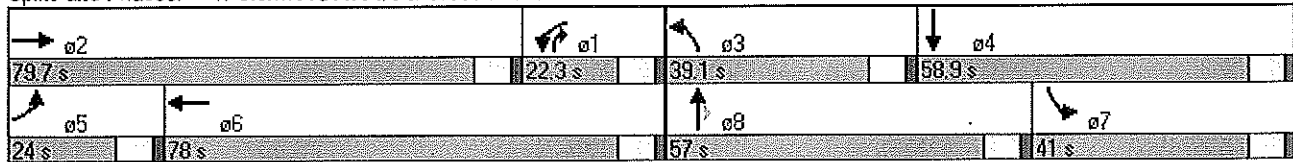


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.2		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	176.2	71.1		106.8	111.9	6.6	97.1	129.2	36.3	149.0	80.5	
LOS	F	E		F	F	A	F	F	D	F	F	
Approach Delay		79.2			80.5			108.3			112.3	
Approach LOS		E			F			F			F	
Queue Length 50th (ft)	~275	837		187	~1156	37	382	~851	202	~557	547	
Queue Length 95th (ft)	#457	880		m#262	#1235	877	#505	#980	138	#693	636	
Internal Link Dist (ft)		1086			995			526			1522	
Turn Bay Length (ft)	500			400		260	310		175	450		
Base Capacity (vph)	168	2354		297	1856	1562	585	920	535	624	943	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	8		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.10	0.96		0.94	1.13	0.63	0.97	1.14	0.40	1.14	0.87	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 19 (10%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.14
 Intersection Signal Delay: 91.0
 Intersection Capacity Utilization 108.7%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Improvements PM (2009)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	2562	144	215	2938	59	129	5	371	152	7	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%			-1%	
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.98	0.97	0.99	0.97	
Frt		0.992			0.997				0.850		0.879	
Flt Protected	0.950			0.950				0.954		0.950		
Satd. Flow (prot)	1752	6268	0	1770	6379	0	0	1786	1591	1778	1602	0
Flt Permitted	0.950			0.950				0.703		0.576		
Satd. Flow (perm)	1751	6268	0	1768	6379	0	0	1291	1539	1064	1602	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1075			1624			201			281	
Travel Time (s)		16.3			24.6			5.5			5.5	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	2785	157	234	3193	64	140	5	403	165	8	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	2942	0	234	3257	0	0	145	403	165	42	0
Turn Type	Prot			Prot			Perm		Perm	Perm		
Protected Phases	5	2		1	6			4			4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	13.4	40.4		13.3	40.3		41.6	41.6	41.6	41.6	41.6	
Total Split (s)	13.4	103.0	0.0	34.0	123.6	0.0	63.0	63.0	63.0	63.0	63.0	0.0
Total Split (%)	6.7%	51.5%	0.0%	17.0%	61.8%	0.0%	31.5%	31.5%	31.5%	31.5%	31.5%	0.0%
Maximum Green (s)	7.0	96.6		27.7	117.3		55.4	55.4	55.4	55.4	55.4	
Yellow Time (s)	3.0	4.3		3.0	4.5		3.9	3.9	3.9	3.9	3.9	
All-Red Time (s)	3.4	2.1		3.3	1.8		3.7	3.7	3.7	3.7	3.7	
Lost Time Adjust (s)	-1.4	-1.4	0.0	-1.3	1.3	0.0	0.0	-2.6	0.0	-2.6	-2.6	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	7.6	4.0	7.6	5.0	7.6	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		4.0			4.0		10.0	10.0	10.0	10.0	10.0	
Pedestrian Calls (#/hr)		6			6		24	24	24	24	24	
Act Effct Green (s)	8.4	100.0		28.5	122.8			56.6	54.0	56.6	56.6	
Actuated g/C Ratio	0.04	0.50		0.14	0.61			0.28	0.27	0.28	0.28	
v/c Ratio	0.28	0.94		0.93	0.83			0.40	0.97	0.55	0.09	
Control Delay	119.3	14.7		66.2	16.1			61.4	107.9	68.4	52.8	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.6		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	119.3	15.3		66.2	16.1			61.4	107.9	68.4	52.8	
LOS	F	B		E	B			E	F	E	D	
Approach Delay		16.0			19.4			95.6			65.2	
Approach LOS		B			B			F			E	
Queue Length 50th (ft)	27	454		295	278			154	525	184	41	
Queue Length 95th (ft)	m28	m378		m254	m244			232	#751	277	77	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	74	3133		257	3917			374	426	309	465	
Starvation Cap Reductn	0	42		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.28	0.95		0.91	0.83			0.39	0.95	0.53	0.09	

Intersection Summary

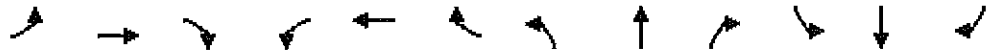
Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 2 (1%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 25.1
 Intersection Capacity Utilization 90.6%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

φ2	φ1	φ4
103 s	34 s	63 s
φ5	φ6	
13.4 s	123.6 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

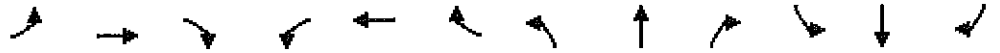
Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑		↔↔	↑↑↑	↔	↔	↑↑	↔	↔↔↔	↑↑	
Volume (vph)	368	2640	77	864	3084	987	40	273	510	799	307	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.97	0.96		0.98	0.99	0.98	
Frt		0.996				0.850			0.850		0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6314	0	3433	5085	1583	1752	3504	1567	5040	3389	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3398	6314	0	3432	5085	1544	1677	3504	1539	5001	3389	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35				35
Link Distance (ft)		1624			371			433				524
Travel Time (s)		24.6			5.6			8.4				10.2
Confl. Peds. (#/hr)	6		6	6		6	24		6	6		24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	2870	84	939	3352	1073	43	297	554	868	334	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	400	2954	0	939	3352	1073	43	297	554	868	430	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	41.0		13.5	34.0	13.0	14.0	13.0	13.5	13.0	25.5	
Total Split (s)	25.0	94.0	0.0	51.0	120.0	36.0	14.0	19.0	51.0	36.0	41.0	0.0
Total Split (%)	12.5%	47.0%	0.0%	25.5%	60.0%	18.0%	7.0%	9.5%	25.5%	18.0%	20.5%	0.0%
Maximum Green (s)	17.5	87.0		43.5	113.0	29.0	6.0	12.0	43.5	29.0	34.0	
Yellow Time (s)	5.0	4.5		5.0	4.5	4.5	5.0	4.5	5.0	4.5	4.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	3.0	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.5	-2.0	0.0	-2.0	-2.0	-2.0	-3.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.5	5.0	5.0	5.0	5.0	5.5	5.0	5.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		6			6						24	
Act Effct Green (s)	20.0	89.0		45.5	115.0	146.0	9.0	14.0	59.0	31.0	38.8	
Actuated g/C Ratio	0.10	0.44		0.23	0.58	0.73	0.04	0.07	0.30	0.16	0.19	
v/c Ratio	1.18	1.05		1.20	1.15	0.95	0.54	1.21	1.20	1.11	0.65	
Control Delay	176.8	53.2		156.8	109.8	23.7	102.2	182.4	163.9	137.8	76.2	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010



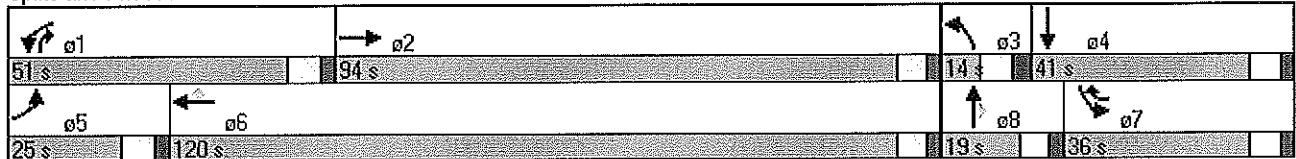
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	29.9	4.4	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	176.8	53.2		156.8	139.7	28.1	102.2	182.4	163.9	137.8	76.2	
LOS	F	D		F	F	C	F	F	F	F	E	
Approach Delay		67.9			120.4			167.1			117.4	
Approach LOS		E			F			F			F	
Queue Length 50th (ft)	~326	~1249		~770	~1920	710	58	~254	~853	~462	291	
Queue Length 95th (ft)	m#368	#1278		m#594	m1236	m345	m84	#352	#1144	#559	357	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	340	2810		781	2924	1133	79	245	460	781	657	
Starvation Cap Reductn	0	0		0	162	39	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	11	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.18	1.05		1.20	1.21	0.98	0.54	1.21	1.20	1.11	0.65	

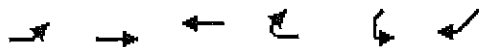
Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 25 (13%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 107.7
 Intersection Capacity Utilization 110.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd





Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	2537	2665	0	0	2270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2758	2897	0	0	2467
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	2758	2897	0	0	2467
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			13.1			13.1
Total Split (s)	0.0	0.0	55.0	0.0	0.0	45.0
Total Split (%)	0.0%	0.0%	55.0%	0.0%	0.0%	45.0%
Maximum Green (s)			48.9			38.9
Yellow Time (s)			5.0			5.0
All-Red Time (s)			1.1			1.1
Lost Time Adjust (s)	0.0	0.0	-1.1	0.0	0.0	-1.1
Total Lost Time (s)	4.0	4.0	5.0	4.0	4.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		100.0	50.0			40.0
Actuated g/C Ratio		1.00	0.50			0.40
v/c Ratio		0.55	0.76			1.70
Control Delay		0.0	25.7			343.0
Queue Delay		0.0	0.0			0.0
Total Delay		0.0	25.7			343.0
LOS		A	C			F
Approach Delay		0.0	25.7			
Approach LOS		A	C			
Queue Length 50th (ft)		0	485			~1018
Queue Length 95th (ft)		m0	499			#1132
Internal Link Dist (ft)		364	179		559	



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	3810			1451
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	54			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.55	0.77			1.70

Intersection Summary

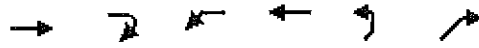
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 41 (41%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.70
 Intersection Signal Delay: 113.4
 Intersection LOS: F
 Intersection Capacity Utilization 92.2%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off-Ramp to WB Glenwood Ave

<p>← φ6 55 s</p>	<p>→ φ4 45 s</p>
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Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Off-Ramp

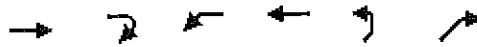
Crabtree Valley Ave Improvements PM (2009)
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Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	1144	0	0	1654	1154	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Ped Bike Factor					0.99	
Fr						
Fit Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Fit Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3385	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Confl. Peds. (#/hr)					12	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1243	0	0	1798	1254	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1243	0	0	1798	1254	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	17.9			17.9	13.0	
Total Split (s)	115.0	0.0	0.0	115.0	85.0	0.0
Total Split (%)	57.5%	0.0%	0.0%	57.5%	42.5%	0.0%
Maximum Green (s)	109.1			109.1	79.0	
Yellow Time (s)	5.0			5.0	4.0	
All-Red Time (s)	0.9			0.9	2.0	
Lost Time Adjust (s)	-0.9	0.0	0.0	-0.9	-1.0	0.0
Total Lost Time (s)	5.0	4.0	4.0	5.0	5.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Walk Time (s)	7.0			7.0		
Flash Dont Walk (s)	4.0			4.0		
Pedestrian Calls (#/hr)	12			12		
Act Effct Green (s)	112.4			112.4	77.6	
Actuated g/C Ratio	0.56			0.56	0.39	
v/c Ratio	0.64			0.61	0.95	
Control Delay	43.8			30.5	73.7	
Queue Delay	0.2			0.0	0.0	
Total Delay	44.0			30.5	73.7	
LOS	D			C	E	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Off-Ramp

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Approach Delay	44.0			30.5	73.7	
Approach LOS	D			C	E	
Queue Length 50th (ft)	676			583	808	
Queue Length 95th (ft)	742			627	912	
Internal Link Dist (ft)	301			418	376	
Turn Bay Length (ft)						
Base Capacity (vph)	1950			2959	1366	
Starvation Cap Reductn	182			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.70			0.61	0.92	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 172 (86%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 47.0
 Intersection Capacity Utilization 175.5%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service H

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Off-Ramp

06	08
115 s	85 s

Lanes, Volumes, Timings

Crabtree Valley Ave Improvements PM (2009)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010

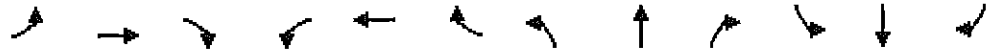
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	21	216	0	36	28	1245	355	35	957	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor		0.99	0.97	0.99	0.98				0.96			
Frt			0.850		0.957				0.850			
Flt Protected		0.958		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1802	1599	1631	1575	0	1717	3433	1536	1823	5238	0
Flt Permitted		0.958		0.950	0.966		0.235			0.173		
Satd. Flow (perm)	0	1785	1546	1609	1561	0	425	3433	1472	332	5238	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45				45
Link Distance (ft)		220			1261			524				689
Travel Time (s)		6.0			24.6			7.9				10.4
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	2	23	235	0	39	30	1353	386	38	1040	0
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	15	23	139	135	0	30	1353	386	38	1040	0
Turn Type	Split		pm+ov	Split			pm+pt		pm+ov	pm+pt		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3				2		2	6		
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	13.0	13.0	13.2	33.0	33.0		13.2	20.2	33.0	13.2	20.2	
Total Split (s)	14.0	14.0	15.0	41.0	41.0	0.0	15.0	130.0	41.0	15.0	130.0	0.0
Total Split (%)	7.0%	7.0%	7.5%	20.5%	20.5%	0.0%	7.5%	65.0%	20.5%	7.5%	65.0%	0.0%
Maximum Green (s)	8.0	8.0	8.8	35.0	35.0		8.8	123.8	35.0	8.8	123.8	
Yellow Time (s)	4.0	4.0	4.7	4.0	4.0		4.7	4.7	4.0	4.7	4.7	
All-Red Time (s)	2.0	2.0	1.5	2.0	2.0		1.5	1.5	2.0	1.5	1.5	
Lost Time Adjust (s)	0.0	-1.0	0.0	-1.0	-1.0	0.0	-1.2	-1.2	-1.2	-1.2	-1.2	0.0
Total Lost Time (s)	6.0	5.0	6.2	5.0	5.0	4.0	5.0	5.0	4.8	5.0	5.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			6	12		6	
Act Effct Green (s)		8.1	11.2	23.5	23.5		148.1	148.1	172.0	149.3	148.1	
Actuated g/C Ratio		0.04	0.06	0.12	0.12		0.74	0.74	0.86	0.75	0.74	
v/c Ratio		0.21	0.26	0.72	0.73		0.08	0.53	0.30	0.12	0.27	
Control Delay		99.6	69.3	105.2	106.2		8.7	11.5	2.2	12.5	10.1	

Lanes, Volumes, Timings

Crabtree Valley Ave Improvements PM (2009)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0	0.0	0.0		0.0	2.2	0.4	0.0	0.0	
Total Delay		99.6	69.3	105.2	106.2		8.7	13.7	2.7	12.5	10.1	
LOS		F	E	F	F		A	B	A	B	B	
Approach Delay		81.3			105.7			11.2			10.2	
Approach LOS		F			F			B			B	
Queue Length 50th (ft)		20	24	189	184		9	320	61	15	176	
Queue Length 95th (ft)		50	49	268	262		m11	m363	m68	33	232	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		81	102	294	284		379	2541	1311	325	3878	
Starvation Cap Reductn		0	0	0	0		0	1001	500	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.19	0.23	0.47	0.48		0.08	0.88	0.48	0.12	0.27	

Intersection Summary

Area Type: Other

Cycle Length: 200

Actuated Cycle Length: 200

Offset: 168 (84%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.9

Intersection LOS: B

Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø2	ø1	ø3	ø4
130 s	15 s	14 s	41 s
ø5	ø6		
15 s	130 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	↖
Volume (vph)	13	0	0	67	1	295	1	1380	77	210	1065	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor	0.99				0.99	0.98	0.99	1.00		1.00	1.00	
Frt						0.850		0.992			0.999	
Flt Protected	0.950				0.953		0.950			0.950		
Satd. Flow (prot)	1761	1853	0	0	1775	2787	1805	5138	0	3416	3517	0
Flt Permitted	0.950				0.953		0.950			0.950		
Satd. Flow (perm)	1737	1853	0	0	1749	2736	1795	5138	0	3405	3517	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			855			267	
Travel Time (s)		5.0			8.5			16.7			5.2	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	0	0	73	1	321	1	1500	84	228	1158	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	0	0	0	74	321	1	1584	0	228	1167	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	40.0	40.0		38.5	38.5	14.0	14.0	41.0		14.0	41.0	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	28.0	14.0	92.0	0.0	28.0	106.0	0.0
Total Split (%)	20.0%	20.0%	0.0%	20.0%	20.0%	14.0%	7.0%	46.0%	0.0%	14.0%	53.0%	0.0%
Maximum Green (s)	34.0	34.0		32.5	32.5	21.0	7.0	85.0		21.0	99.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		3.5	3.5	3.0	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	0.0	0.0	-2.5	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	7.5	5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	17.0	17.0						14.0			14.0	
Pedestrian Calls (#/hr)	12	12						6			6	
Act Effct Green (s)	14.8				15.2	36.8	9.0	133.6		21.6	157.4	
Actuated g/C Ratio	0.07				0.08	0.18	0.04	0.67		0.11	0.79	
v/c Ratio	0.11				0.55	0.63	0.01	0.46		0.62	0.42	
Control Delay	83.5				103.2	64.0	96.0	18.1		69.6	7.1	

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0				0.0	0.0	0.0	0.2		0.0	0.2	
Total Delay	83.5				103.2	64.0	96.0	18.2		69.6	7.3	
LOS	F				F	E	F	B		E	A	
Approach Delay					71.3			18.3			17.5	
Approach LOS					E			B			B	
Queue Length 50th (ft)	18				96	198	1	351		126	174	
Queue Length 95th (ft)	43				157	210	m2	433		m158	m376	
Internal Link Dist (ft)		104			168			775			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)	308				311	533	81	3432		398	2767	
Starvation Cap Reductn	0				0	0	0	738		0	754	
Spillback Cap Reductn	0				0	0	0	0		0	0	
Storage Cap Reductn	0				0	0	0	0		0	0	
Reduced v/c Ratio	0.05				0.24	0.60	0.01	0.59		0.57	0.58	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 134 (67%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 24.4
 Intersection Capacity Utilization 60.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø3	ø4
92 s	28 s	40 s	40 s
ø5	ø6		
14 s	106 s		

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↙	↑↑	↘	↘	↑↑
Volume (vph)	127	186	1272	193	174	958
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		0	0	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor	0.99	0.98		0.98		
Frt		0.850		0.850		
Fit Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	1770	3539
Fit Permitted	0.950				0.133	
Satd. Flow (perm)	3390	1553	3539	1553	248	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45			45
Link Distance (ft)	543		889			855
Travel Time (s)	8.2		13.5			13.0
Confl. Peds. (#/hr)	6	6		6	6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	202	1383	210	189	1041
Shared Lane Traffic (%)						
Lane Group Flow (vph)	138	202	1383	210	189	1041
Turn Type		pm+ov		pm+ov	pm+pt	
Protected Phases	8	1	2	8	1	6
Permitted Phases		8		2	6	
Detector Phase	8	1	2	8	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	14.0	45.0	41.0	14.0	59.0
Total Split (%)	41.0%	14.0%	45.0%	41.0%	14.0%	59.0%
Maximum Green (s)	34.0	7.0	38.0	34.0	7.0	52.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		7.0
Flash Dont Walk (s)	17.0		10.0	17.0		10.0
Pedestrian Calls (#/hr)	12		6	12		6
Act Effct Green (s)	13.8	23.4	61.6	75.4	76.2	76.2
Actuated g/C Ratio	0.14	0.23	0.62	0.75	0.76	0.76
v/c Ratio	0.29	0.55	0.63	0.18	0.56	0.39
Control Delay	33.0	29.8	14.9	2.7	23.3	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	33.0	29.8	14.9	2.7	23.3	3.3
LOS	C	C	B	A	C	A
Approach Delay	31.1		13.2			6.4
Approach LOS	C		B			A
Queue Length 50th (ft)	48	102	244	22	49	93
Queue Length 95th (ft)	57	150	456	36	130	296
Internal Link Dist (ft)	463		809			775
Turn Bay Length (ft)	250					
Base Capacity (vph)	1236	367	2179	1260	335	2696
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.55	0.63	0.17	0.56	0.39

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 95 (95%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 12.5
 Intersection Capacity Utilization 65.7%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

↑ ø2	↙ ø1	
45 s	14 s	
↓ ø6	↘ ø8	
59 s	41 s	

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	496	41	114	3	9	43	145	403	7	46	445	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.92										
Frt		0.890			0.876			0.997			0.967	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1531	0	1770	1632	0	1770	1857	0	1770	1801	0
Fit Permitted	0.950			0.650			0.315			0.428		
Satd. Flow (perm)	3340	1531	0	1211	1632	0	587	1857	0	797	1801	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1187			133			907			285	
Travel Time (s)		18.0			3.6			17.7			5.6	
Confl. Peds. (#/hr)	12		12				12			12		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	539	45	124	3	10	47	158	438	8	50	484	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	539	169	0	3	57	0	158	446	0	50	621	0
Turn Type	Prot			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases				8			2			6		
Detector Phase	7	4		3	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		4.0	7.0		12.0	12.0		12.0	12.0	
Minimum Split (s)	14.0	41.0		11.0	41.0		41.0	41.0		41.0	41.0	
Total Split (s)	46.0	76.0	0.0	11.0	41.0	0.0	113.0	113.0	0.0	113.0	113.0	0.0
Total Split (%)	23.0%	38.0%	0.0%	5.5%	20.5%	0.0%	56.5%	56.5%	0.0%	56.5%	56.5%	0.0%
Maximum Green (s)	39.0	69.0		4.0	34.0		106.0	106.0		106.0	106.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Walk Time (s)		7.0								7.0	7.0	
Flash Dont Walk (s)		7.0								10.0	10.0	
Pedestrian Calls (#/hr)		12								12	12	
Act Effct Green (s)	38.7	51.7		22.0	14.4		131.9	131.9		131.9	131.9	
Actuated g/C Ratio	0.19	0.26		0.11	0.07		0.66	0.66		0.66	0.66	
v/c Ratio	0.81	0.43		0.02	0.49		0.41	0.36		0.10	0.52	
Control Delay	49.1	29.6		75.0	102.1		21.6	17.4		5.2	7.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.4	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	49.1	29.6		75.0	102.1		21.6	17.4		5.2	8.1	
LOS	D	C		E	F		C	B		A	A	
Approach Delay		44.5			100.7			18.5			7.8	
Approach LOS		D			F			B			A	
Queue Length 50th (ft)	325	104		4	74		93	252		7	94	
Queue Length 95th (ft)	422	261		16	128		185	391		m9	m168	
Internal Link Dist (ft)		1107			53			827			205	
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	725	544		165	294		387	1225		526	1188	
Starvation Cap Reductn	0	0		0	0		0	0		0	202	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.74	0.31		0.02	0.19		0.41	0.36		0.10	0.63	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 199 (100%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 26.4
 Intersection Capacity Utilization 74.4%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

 113 s	 76 s	 11 s
 113 s	 46 s	 41 s

Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Improvements PM (2009)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↕		↙	↕		↙	↕		↙↘	↕	
Volume (vph)	101	254	46	23	171	86	43	93	10	386	89	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor	0.98	0.99		0.98	0.98		0.99	1.00		0.97	0.98	
Fr		0.977			0.950			0.985			0.909	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3425	0	1770	3293	0	1770	1829	0	3433	1660	0
Fit Permitted	0.576			0.545			0.202			0.950		
Satd. Flow (perm)	1049	3425	0	996	3293	0	373	1829	0	3329	1660	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35				25
Link Distance (ft)		982			1187			291				153
Travel Time (s)		14.9			18.0			5.7				4.2
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	276	50	25	186	93	47	101	11	420	97	149
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	326	0	25	279	0	47	112	0	420	246	0
Turn Type	Perm			Perm			pm+pt			Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6			8					
Detector Phase	2	2		6	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		2.0	2.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	41.0	41.0		41.0	41.0		38.0	41.0		14.0	41.0	
Total Split (s)	74.0	74.0	0.0	74.0	74.0	0.0	42.0	60.0	0.0	66.0	84.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	0.0%	21.0%	30.0%	0.0%	33.0%	42.0%	0.0%
Maximum Green (s)	67.0	67.0		67.0	67.0		35.0	53.0		59.0	77.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0
Lead/Lag							Lag	Lead		Lag	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	7.0	7.0		7.0	7.0			10.0			10.0	
Pedestrian Calls (#/hr)	6	6		6	6			0			6	
Act Effct Green (s)	133.1	133.1		133.1	133.1		33.2	19.8		32.1	41.4	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.17	0.10		0.16	0.21	
v/c Ratio	0.16	0.14		0.04	0.13		0.30	0.62		0.76	0.72	
Control Delay	14.1	13.2		21.6	19.6		66.6	100.5		89.4	86.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Improvements PM (2009)
 6/21/2010

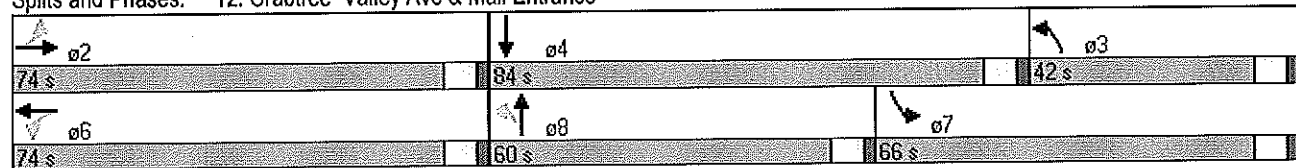


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	14.1	13.2		21.6	19.6		66.6	100.5		89.4	86.2	
LOS	B	B		C	B		E	F		F	F	
Approach Delay		13.4			19.7			90.5			88.2	
Approach LOS		B			B			F			F	
Queue Length 50th (ft)	55	84		15	92		46	144		277	313	
Queue Length 95th (ft)	105	122		142	161		78	214		330	400	
Internal Link Dist (ft)		902			1107			211			73	
Turn Bay Length (ft)	400			500			100					
Base Capacity (vph)	698	2279		663	2191		364	503		1047	656	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.14		0.04	0.13		0.13	0.22		0.40	0.38	

Intersection Summary

Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 181 (91%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 54.3
 Intersection Capacity Utilization 60.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance



HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Improvements PM (2009)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/21/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations		↗		↑↑↑	↑	↘↘	
Volume (veh/h)	0	127	0	824	490	758	
Sign Control	Stop			Free	Free		
Grade	2%			-2%	2%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	138	0	896	533	824	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage (veh)							
Upstream signal (ft)				661	433		
pX, platoon unblocked	0.94	0.94	0.94				
vC, conflicting volume	831	533	533				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	787	469	469				
tC, single (s)	6.8	6.9	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	100	73	100				
cM capacity (veh/h)	308	507	1022				

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	138	299	299	299	533	412	412
Volume Left	0	0	0	0	0	0	0
Volume Right	138	0	0	0	0	412	412
cSH	507	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.27	0.18	0.18	0.18	0.31	0.24	0.24
Queue Length 95th (ft)	27	0	0	0	0	0	0
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B						
Approach Delay (s)	14.7	0.0					0.0
Approach LOS	B						

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Improvements PM (2009)
 11: Crabtree Valley Ave & Mall Parking Deck 6/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑		↙	↑↑		↙	↑		↙	↑	
Volume (veh/h)	40	333	5	13	239	99	9	5	8	61	5	65
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	362	5	14	260	108	10	5	9	66	5	71
Pedestrians		6			6			6			6	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)					982							
pX, platoon unblocked												
vC, conflicting volume	373			368			695	859	196	633	803	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	373			368			695	859	196	633	803	196
IC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
IC, 2 stage (s)												
iF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			97	98	99	80	98	91
cM capacity (veh/h)	1176			1181			280	275	805	336	297	805

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	43	241	126	14	173	194	10	14	66	76
Volume Left	43	0	0	14	0	0	10	0	66	0
Volume Right	0	0	5	0	0	108	0	9	0	71
cSH	1176	1700	1700	1181	1700	1700	280	463	336	717
Volume to Capacity	0.04	0.14	0.07	0.01	0.10	0.11	0.03	0.03	0.20	0.11
Queue Length 95th (ft)	3	0	0	1	0	0	3	2	18	9
Control Delay (s)	8.2	0.0	0.0	8.1	0.0	0.0	18.3	13.0	18.3	10.6
Lane LOS	A			A			C	B	C	B
Approach Delay (s)	0.9			0.3			15.2		14.2	
Approach LOS							C		B	

Intersection Summary	
Average Delay	3.0
Intersection Capacity Utilization	34.5%
ICU Level of Service	A
Analysis Period (min)	15

Network Totals

Number of Intersections	32
Control Delay / Veh (s/v)	39
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	40
Total Delay (hr)	1764
Stops / Veh	0.21
Stops (#)	34092
Average Speed (mph)	10
Total Travel Time (hr)	2227
Distance Traveled (mi)	22072
Fuel Consumed (gal)	2435
Fuel Economy (mpg)	9.1
CO Emissions (kg)	170.17
NOx Emissions (kg)	33.11
VOC Emissions (kg)	39.44
Unserviced Vehicles (#)	2312
Vehicles in dilemma zone (#)	847
Performance Index	1859.0

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	3843.2	3622.9	3614.2	3622.5	3557.3	3961.9	3270.6
Delay / Veh (s)	767.7	699.4	715.3	714.9	709.5	782.0	628.0
Stop Delay (hr)	3504.6	3264.1	3289.5	3293.4	3224.5	3612.4	2933.3
St Del/Veh (s)	700.1	630.2	651.0	649.9	643.1	713.0	563.2
Total Stops	60847	65893	59424	58454	58920	62837	60533
Stop/Veh	3.38	3.53	3.27	3.20	3.26	3.45	3.23
Travel Dist (mi)	23779.2	24481.8	23836.2	24064.1	23803.6	23986.3	24442.6
Travel Time (hr)	4376.1	4174.2	4150.2	4160.9	4090.1	4498.5	3820.5
Avg Speed (mph)	10	11	11	11	10	10	11
Fuel Used (gal)	1731.4	1710.5	1686.1	1694.3	1667.9	1768.0	1626.8
Fuel Eff. (mpg)	13.7	14.3	14.1	14.2	14.3	13.6	15.0
HC Emissions (g)	15312	14920	14279	14791	13885	14306	15151
CO Emissions (g)	627007	627750	613717	624753	605692	613603	634635
NOx Emissions (g)	48421	48403	46699	47880	45632	46574	48999
Vehicles Entered	18681	19252	18727	18886	18761	18980	19385
Vehicles Exited	17363	18043	17653	17601	17339	17497	18111
Hourly Exit Rate	17363	18043	17653	17601	17339	17497	18111
Input Volume	223477	223477	223477	223477	223477	223477	223477
% of Volume	8	8	8	8	8	8	8
Denied Entry Before	25	73	59	71	85	54	16
Denied Entry After	4923	4864	5024	4814	4956	5199	4437

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	3657.1	3523.6	3626.2	3630.0
Delay / Veh (s)	713.9	688.5	720.2	713.4
Stop Delay (hr)	3302.1	3188.6	3295.7	3290.8
St Del/Veh (s)	644.6	623.0	654.6	646.8
Total Stops	63776	61469	59237	61137
Stop/Veh	3.46	3.34	3.27	3.34
Travel Dist (mi)	24266.0	24110.4	23924.0	24069.4
Travel Time (hr)	4202.1	4066.9	4163.2	4170.3
Avg Speed (mph)	10	11	11	11
Fuel Used (gal)	1705.4	1673.8	1688.2	1695.2
Fuel Eff. (mpg)	14.2	14.4	14.2	14.2
HC Emissions (g)	14913	14407	14507	14647
CO Emissions (g)	622494	615545	612264	619746
NOx Emissions (g)	48265	47075	46920	47487
Vehicles Entered	19160	18987	18793	18956
Vehicles Exited	17727	17864	17460	17668
Hourly Exit Rate	17727	17864	17460	17668
Input Volume	223477	223477	223477	223477
% of Volume	8	8	8	8
Denied Entry Before	52	70	66	58
Denied Entry After	4746	4627	4903	4847

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	64	5.4	56.2	0.6	40	38	9.3
	25	14.4	29.4	0.2	23	16	26.9
Creedmoor Rd	1	118.3	135.3	0.2	6	6	124.0
Crabtree Mall Entr	2	40.1	57.4	0.2	13	14	35.5
Blue Ridge Rd	3	88.7	113.5	0.3	10	10	87.0
Crabtree View PI	32	9.5	15.2	0.1	17	16	9.9
WB I-440 On-Ramp fro	18	3.7	9.2	0.1	27	28	3.3
I-440 WB Off-Ramp to	4	4.0	11.1	0.1	27	28	3.7
WB I-440 Off-Ramp to	38	1.5	4.1	0.0	43	46	1.3
WB I-440 On-Ramp fro	44	2.9	7.0	0.1	27	28	2.6
EB I-440 On-Ramp fro	23	3.6	7.1	0.0	15	17	2.7
I-440 EB Off-Ramp	5	40.1	46.0	0.1	6	6	39.6
EB I-440 Off-Ramp to	41	3.4	8.9	0.1	38	38	3.4
Total		335.7	500.1	2.1	15	14	349.0

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Run 1 Speed	Run 1 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed
	34	14.9	42	1.6	42	1.8	41
	14	33.5	42	1.1	26	10.9	19
Creedmoor Rd	7	98.7	8	82.5	7	92.7	5
Crabtree Mall Entr	14	34.5	15	33.3	15	31.9	12
Blue Ridge Rd	10	85.4	12	70.5	13	60.4	8
Crabtree View PI	16	9.6	17	9.6	18	8.6	16
WB I-440 On-Ramp fro	26	3.8	28	3.1	26	4.0	28
I-440 WB Off-Ramp to	27	4.3	29	3.4	28	4.0	29
WB I-440 Off-Ramp to	42	1.6	47	1.2	42	1.6	47
WB I-440 On-Ramp fro	26	3.0	28	2.4	26	3.0	28
EB I-440 On-Ramp fro	16	3.3	19	2.3	14	4.1	15
I-440 EB Off-Ramp	5	43.6	6	35.6	5	41.9	6
EB I-440 Off-Ramp to	38	3.4	39	3.1	38	3.5	39
Total	15	339.6	18	251.8	17	270.4	14

Arterial Level of Service: EB Glenwood Ave #1

Link Street	Flow #	Flow %	Flow #	Flow %	Flow #	Flow %	Flow #
	4.3	41	4.0	41	3.8	42	3.5
	20.7	18	22.9	26	10.2	32	5.5
Creedmoor Rd	131.5	5	152.5	5	128.2	5	135.4
Crabtree Mall Entr	45.7	12	45.1	13	40.0	9	67.2
Blue Ridge Rd	106.4	10	81.8	8	111.0	8	112.5
Crabtree View Pl	9.7	17	9.2	16	10.6	18	8.6
WB I-440 On-Ramp fro	3.2	26	3.8	28	3.3	26	3.9
I-440 WB Off-Ramp to	3.5	27	4.1	29	3.4	27	4.4
WB I-440 Off-Ramp to	1.2	44	1.4	47	1.2	42	1.6
WB I-440 On-Ramp fro	2.5	27	2.7	28	2.6	26	3.0
EB I-440 On-Ramp fro	3.5	15	3.5	16	3.2	16	3.2
I-440 EB Off-Ramp	39.6	5	42.1	6	36.4	6	38.0
EB I-440 Off-Ramp to	3.3	39	3.3	39	3.3	39	3.2
Total	375.2	14	376.4	14	357.1	13	389.7

Arterial Level of Service: EB Glenwood Ave #1

Link Street	Flow #	Flow %	Flow #	Flow %
	42	3.5	42	3.5
	26	10.6	39	2.0
Creedmoor Rd	5	131.0	7	104.4
Crabtree Mall Entr	14	35.9	15	32.7
Blue Ridge Rd	10	89.3	10	83.8
Crabtree View Pl	16	9.7	17	9.3
WB I-440 On-Ramp fro	22	5.7	28	3.1
I-440 WB Off-Ramp to	23	6.0	29	3.6
WB I-440 Off-Ramp to	34	2.7	46	1.3
WB I-440 On-Ramp fro	22	4.2	28	2.6
EB I-440 On-Ramp fro	11	6.0	15	3.8
I-440 EB Off-Ramp	5	43.3	6	41.1
EB I-440 Off-Ramp to	37	3.6	38	3.5
Total	14	351.5	16	294.7

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Nodes	Delay (sec)	Travel Time (sec)	Delay (PI)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB I-440 On-Ramp fro	41	294.5	291.2	0.2	5	5	103.4
I-440 EB Off-Ramp	5	94.1	101.8	0.1	3	4	85.4
EB I-440 On-Ramp fro	23	27.4	31.6	0.1	8	9	24.8
WB I-440 On-Ramp fro	44	26.4	30.4	0.0	4	4	25.1
WB I-440 Off-Ramp to	38	32.5	36.8	0.1	5	5	31.4
I-440 WB Off-Ramp to	4	34.3	37.3	0.0	5	5	33.2
WB I-440 On-Ramp fro	18	23.5	29.5	0.1	10	9	26.9
Crabtree View Pl	32	49.7	57.1	0.1	4	4	53.2
Lead Mine Rd	3	30.9	36.0	0.1	7	8	27.0
Marriott Dr	2	33.7	59.1	0.3	19	19	31.5
Creedmoor Rd	1	58.8	74.8	0.2	10	10	58.7
	25	7.0	25.3	0.2	31	31	7.1
	64	2.0	16.9	0.2	39	39	2.1
Total		684.9	816.8	1.6	9	9	595.6

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 10 Speed	Run 10 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed
EB I-440 On-Ramp fro	10	53.8	4	566.0	9	81.8	5
I-440 EB Off-Ramp	4	77.7	3	117.4	4	79.4	3
EB I-440 On-Ramp fro	9	24.2	6	36.1	9	24.0	7
WB I-440 On-Ramp fro	4	25.4	3	29.6	4	23.8	3
WB I-440 Off-Ramp to	5	30.2	5	35.6	6	28.8	5
I-440 WB Off-Ramp to	5	32.4	5	35.8	5	32.9	4
WB I-440 On-Ramp fro	11	20.4	10	24.4	10	23.8	10
Crabtree View Pl	4	50.4	4	48.2	4	53.5	4
Lead Mine Rd	6	37.1	8	28.3	7	30.3	8
Marriott Dr	18	36.9	19	32.5	19	32.6	20
Creedmoor Rd	9	66.8	10	57.6	9	63.3	9
	31	7.4	31	7.1	31	7.2	31
	39	2.0	39	2.0	39	2.2	39
Total	10	464.5	8	1020.4	10	483.6	8

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On-Ramp fro	413.8	5	206.7	5	272.6	5	179.8
I-440 EB Off-Ramp	113.9	3	89.8	3	99.4	3	95.5
EB I-440 On-Ramp fro	30.7	9	26.1	7	31.0	9	25.8
WB I-440 On-Ramp fro	29.2	3	27.3	3	26.7	4	24.3
WB I-440 Off-Ramp to	34.6	5	33.8	5	33.4	5	30.7
I-440 WB Off-Ramp to	36.7	5	34.6	5	35.4	5	32.0
WB I-440 On-Ramp fro	23.4	10	24.1	11	22.1	12	19.4
Crabtree View PI	49.4	4	51.4	5	45.0	5	43.3
Lead Mine Rd	28.3	6	34.7	8	28.6	7	31.0
Marriott Dr	30.6	18	35.4	19	32.3	18	35.1
Creedmoor Rd	63.0	10	56.6	10	55.0	10	55.4
	7.1	31	7.1	32	6.9	31	7.1
	2.1	39	2.0	39	2.1	39	2.3
Total	862.7	9	629.5	9	690.4	9	581.6

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 6 Speed	Run 6 Delay	Run 8 Speed	Run 8 Delay
EB I-440 On-Ramp fro	4	407.5	5	303.4
I-440 EB Off-Ramp	4	87.7	3	103.8
EB I-440 On-Ramp fro	9	24.9	8	29.0
WB I-440 On-Ramp fro	4	24.5	3	28.5
WB I-440 Off-Ramp to	5	32.0	5	34.9
I-440 WB Off-Ramp to	5	35.0	5	35.2
WB I-440 On-Ramp fro	10	24.5	9	26.5
Crabtree View PI	4	48.8	4	53.9
Lead Mine Rd	7	29.5	6	34.0
Marriott Dr	18	35.4	18	34.8
Creedmoor Rd	10	54.7	10	55.1
	33	6.2	32	6.4
	40	1.7	39	2.0
Total	9	812.5	8	807.5

**2035 Creedmoor Road Interchange
(without U-Turns on Glenwood Ave)**

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	120	136	423	611	282	865	348	657	216	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		300	275		310			450		
Storage Lanes	1	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	1.00	*0.95	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Frnt		*0.910				0.850			0.850		0.985	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3221	0	3433	3539	1583	3433	3539	1583	3467	3521	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3221	0	3433	3539	1583	3433	3539	1583	3467	3521	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								637			1586	
Travel Time (s)								12.4			24.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	136	423	611	282	865	348	657	216	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	559	0	611	282	865	348	657	216	1813	2004	0
Turn Type	Prot	custom		Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						Free			8 1			
Detector Phase	5	2		1	6		3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4		14.4	17.4	
Total Split (s)	24.8	30.0	0.0	26.0	31.2	0.0	19.0	26.0	52.0	60.0	67.0	0.0
Total Split (%)	17.5%	21.1%	0.0%	18.3%	22.0%	0.0%	13.4%	18.3%	36.6%	42.3%	47.2%	0.0%
Maximum Green (s)	17.8	23.0		19.0	24.2		12.0	19.0		53.0	60.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	4.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lag	Lag		Lead	Lead		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	24.9	23.0		19.0	17.1	142.0	12.0	21.4	45.0	53.0	62.4	
Actuated g/C Ratio	0.18	0.16		0.13	0.12	1.00	0.08	0.15	0.32	0.37	0.44	
v/c Ratio	0.39	1.62dr		1.33	0.66	0.55	1.20	1.23	0.43	1.40	1.30	
Control Delay	56.9	114.9		199.9	58.7	0.6	164.5	161.5	27.4	220.1	172.1	
Queue Delay	0.0	0.8		0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Total Delay	56.9	115.7		199.9	58.7	0.6	164.5	161.5	27.4	220.1	175.1	
LOS	E	F		F	E	A	F	F	C	F	F	
Approach Delay								138.6			196.5	
Approach LOS								F			F	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Length 50th (ft)	99	~301		~385	144	0	~193	~380	125	~1152	~1241	
Queue Length 95th (ft)	170	#423		m#456	m162	m0	m#291	m#500	m148	#1286	#1376	
Internal Link Dist (ft)								557				1506
Turn Bay Length (ft)				300	275	275	310		175	450		
Base Capacity (vph)	310	522		459	603	1583	290	533	502	1294	1547	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	1		0	0	0	0	0	0	0	8	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	1.07		1.33	0.47	0.55	1.20	1.23	0.43	1.40	1.30	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 22 (15%), Referenced to phase 2:EBR and 6:WBR, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.40
 Intersection Signal Delay: 151.2
 Intersection LOS: F
 Intersection Capacity Utilization 125.7%
 ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
 dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.

ø1 26 s	ø2 30 s	ø4 67 s	ø3 19 s
ø6 31.2 s	ø5 24.8 s	ø7 60 s	ø8 26 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Creedmoor Rd SPUI_No U-turns AM (2035)

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↑	↗	↖	↓	↘
Volume (vph)	14	4757	43	66	4230	128	33	4	50	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	150		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.996				0.850		0.882	
Fit Protected	0.950			0.950				0.957		0.950		
Satd. Flow (prot)	1752	6337	0	1770	6382	0	0	1792	1591	1778	1651	0
Fit Permitted	0.950			0.950				0.727		0.733		
Satd. Flow (perm)	1752	6337	0	1770	6382	0	0	1361	1591	1372	1651	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		343			1624			201				281
Travel Time (s)		5.2			24.6			5.5				5.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	4757	43	66	4230	128	33	4	50	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4800	0	66	4358	0	0	37	50	156	51	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	103.0	0.0	15.3	102.9	0.0	23.7	23.7	15.3	23.7	23.7	0.0
Total Split (%)	10.8%	72.5%	0.0%	10.8%	72.5%	0.0%	16.7%	16.7%	10.8%	16.7%	16.7%	0.0%
Maximum Green (s)	8.4	96.0		8.3	95.9		16.7	16.7	8.3	16.7	16.7	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	9.6	101.4		10.0	107.5			18.4	33.4	18.4	18.4	
Actuated g/C Ratio	0.07	0.71		0.07	0.76			0.13	0.24	0.13	0.13	
v/c Ratio	0.12	1.06		0.53	0.90			0.21	0.13	0.88	0.24	
Control Delay	54.2	46.2		92.0	15.5			58.5	43.7	102.1	58.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	54.2	46.2		92.0	15.5			58.5	43.7	102.1	58.6	
LOS	D	D		F	B			E	D	F	E	
Approach Delay		46.3			16.7			50.0			91.4	
Approach LOS		D			B			D			F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	13	~1464		57	407			31	37	143	43	
Queue Length 95th (ft)	m25	m1141		m33	m23			67	74	#274	86	
Internal Link Dist (ft)		263			1544			121			201	
Turn Bay Length (ft)	150			475								
Base Capacity (vph)	128	4525		128	4831			179	377	181	217	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.11	1.06		0.52	0.90			0.21	0.13	0.86	0.24	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 40 (28%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 33.5
 Intersection LOS: C
 Intersection Capacity Utilization 100.5%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1 15.3 s	ø2 103 s	ø4 23.7 s
ø6 102.9 s	ø5 15.4 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	516	4263	184	984	4107	870	105	385	507	2578	876	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.994				0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6306	0	3433	5085	1583	1752	3504	1567	5040	3471	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6306	0	3433	5085	1583	1752	3504	1567	5037	3471	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35				35
Link Distance (ft)		1624			371			433				524
Travel Time (s)		24.6			5.6			8.4				10.2
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	516	4263	184	984	4107	870	105	385	507	2578	876	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	4447	0	984	4107	870	105	385	507	2578	1089	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	17.5		13.5	17.5	13.5	14.0	13.5	13.5	13.5	13.5	
Total Split (s)	19.0	58.0	0.0	27.0	66.0	41.0	14.0	16.0	27.0	41.0	43.0	0.0
Total Split (%)	13.4%	40.8%	0.0%	19.0%	46.5%	28.9%	9.9%	11.3%	19.0%	28.9%	30.3%	0.0%
Maximum Green (s)	12.0	51.0		20.0	59.0	34.0	7.0	9.0	20.0	34.0	36.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	14.0	53.0		22.0	61.0	102.0	9.0	11.0	33.0	36.0	38.0	
Actuated g/C Ratio	0.10	0.37		0.15	0.43	0.72	0.06	0.08	0.23	0.25	0.27	
v/c Ratio	1.54	1.89		1.85	1.88	0.77	0.95	1.42	1.39	2.02	1.17	
Control Delay	281.3	425.9		411.7	419.1	10.7	134.8	253.7	225.5	486.9	126.7	
Queue Delay	0.0	9.5		119.9	0.0	0.0	0.0	24.2	0.0	0.0	20.7	
Total Delay	281.3	435.4		531.6	419.1	10.7	134.8	278.0	225.5	486.9	147.5	
LOS	F	F		F	F	B	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		419.4			378.1			236.2			386.1	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~344	~1864		~707	~2110	253	93	~247	~576	~1320	~625	
Queue Length 95th (ft)	m#319	m#1726		m#490	m#1467	m193	m#219	#357	#798	m#1351	m#646	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	335	2354		532	2184	1137	111	271	364	1278	929	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	36	
Spillback Cap Reductn	0	26		67	0	0	0	10	0	0	24	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.54	1.91		2.12	1.88	0.77	0.95	1.48	1.39	2.02	1.22	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 2 (1%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.02
 Intersection Signal Delay: 384.0
 Intersection LOS: F
 Intersection Capacity Utilization 170.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

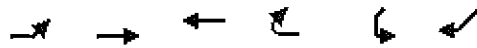
Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø2	ø1	ø4	ø3
58 s	27 s	43 s	14 s
ø5	ø6	ø7	ø8
19 s	66 s	41 s	16 s

Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010

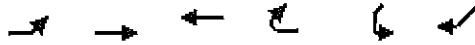


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	5276	3060	0	0	2901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Flt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5276	3060	0	0	2901
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5276	3060	0	0	2901
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	50.0	0.0	0.0	92.0
Total Split (%)	0.0%	0.0%	35.2%	0.0%	0.0%	64.8%
Maximum Green (s)			43.0			85.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		142.0	45.0			87.0
Actuated g/C Ratio		1.00	0.32			0.61
v/c Ratio		1.06	1.27			1.30
Control Delay		41.3	153.6			167.5
Queue Delay		115.0	0.0			0.0
Total Delay		156.3	153.6			167.5
LOS		F	F			F
Approach Delay		156.3	153.6			
Approach LOS		F	F			
Queue Length 50th (ft)		~1289	~868			~1504
Queue Length 95th (ft)		m0	m#739			#1598
Internal Link Dist (ft)		364	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	2415			2223
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		978	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		1.32	1.27			1.30

Intersection Summary

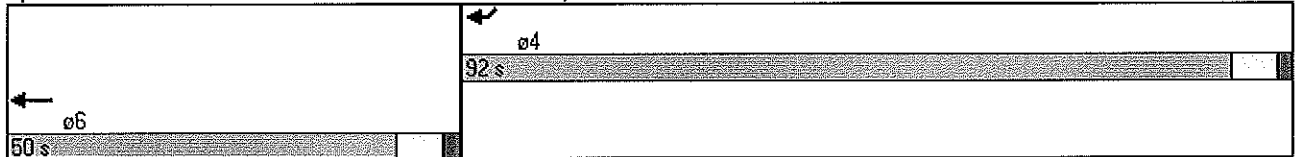
Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 2 (1%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.30
 Intersection Signal Delay: 158.5
 Intersection Capacity Utilization 144.5%
 Analysis Period (min) 15

Intersection LOS: F

ICU Level of Service H

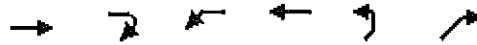
- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

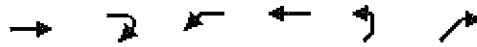


Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Creedmoor Rd SPUI_No U-turns AM (2035)
6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	3222	0	0	1976	1281	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Fit						
Fit Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Fit Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3222	0	0	1976	1281	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3222	0	0	1976	1281	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	99.0	0.0	0.0	99.0	43.0	0.0
Total Split (%)	69.7%	0.0%	0.0%	69.7%	30.3%	0.0%
Maximum Green (s)	92.0			92.0	36.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	94.0			94.0	38.0	
Actuated g/C Ratio	0.66			0.66	0.27	
v/c Ratio	1.40			0.57	1.40	
Control Delay	206.8			13.8	226.0	
Queue Delay	9.5			0.0	0.0	
Total Delay	216.3			13.8	226.0	
LOS	F			B	F	
Approach Delay	216.3			13.8	226.0	
Approach LOS	F			B	F	
Queue Length 50th (ft)	~2106			338	~814	
Queue Length 95th (ft)	m#1953			376	#950	
Internal Link Dist (ft)	301			418	376	



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	2296			3484	914	
Starvation Cap Reductn	34			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.42			0.57	1.40	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 2 (1%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.40
 Intersection Signal Delay: 156.4
 Intersection Capacity Utilization 249.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
99 s	43 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI_No U-turns AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↗	↖	↔		↖	↕	↗	↖	↕	↗
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1625	0	1717	3433	1536	1823	5233	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1576	1626	1621	0	1717	3433	1503	1821	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	14.0	35.0	35.0	0.0	14.0	79.0	35.0	14.0	79.0	0.0
Total Split (%)	9.9%	9.9%	9.9%	24.6%	24.6%	0.0%	9.9%	55.6%	24.6%	9.9%	55.6%	0.0%
Maximum Green (s)	7.0	7.0	7.0	28.0	28.0		7.0	72.0	28.0	7.0	72.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	12.6	30.0	30.0		9.0	84.8	114.8	9.4	82.4	
Actuated g/C Ratio		0.06	0.09	0.21	0.21		0.06	0.60	0.81	0.07	0.58	
v/c Ratio		0.15	0.45	1.10	1.08		0.61	0.69	0.23	0.57	0.96	
Control Delay		66.1	54.6	127.7	122.9		56.2	15.5	2.4	82.8	37.8	
Queue Delay		0.0	9.2	0.0	0.0		0.0	7.9	0.0	0.0	13.0	
Total Delay		66.1	63.7	127.7	122.9		56.2	23.3	2.4	82.8	50.7	
LOS		E	E	F	F		E	C	A	F	D	

Lanes, Volumes, Timings

Creedmoor Rd SPUI_No U-turns AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010

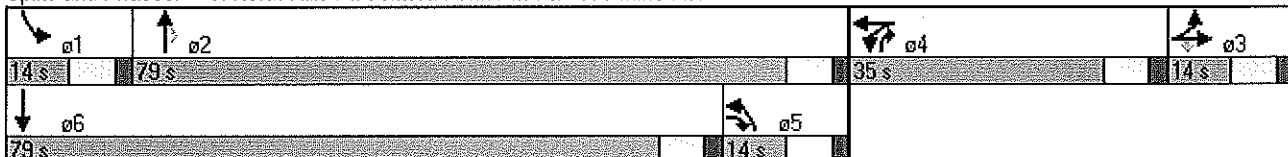


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		64.2			125.3			21.3				51.5
Approach LOS		E			F			C				D
Queue Length 50th (ft)		15	59	~414	~400		63	281	31	62		801
Queue Length 95th (ft)		42	68	#631	#614		m62	m274	m44	#127		#1164
Internal Link Dist (ft)		140			1181			444				609
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		115	141	345	343		109	2050	1222	121		3037
Starvation Cap Reductn		0	0	0	0		0	593	0	0		0
Spillback Cap Reductn		0	49	0	0		0	0	0	0		196
Storage Cap Reductn		0	0	0	0		0	0	0	0		0
Reduced v/c Ratio		0.15	0.70	1.10	1.08		0.61	0.98	0.23	0.57		1.02

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 86 (61%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 52.0
 Intersection LOS: D
 Intersection Capacity Utilization 95.7%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.



Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↖	↖	↖		↖	↗	↖
Volume (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Frt		0.878				0.850		0.994			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			271	
Travel Time (s)		5.0			8.5			8.0			5.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	69	145	1092	0	82	2838	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	14.0	14.0	0.0	15.5	15.5	15.0	15.0	97.5	0.0	15.0	97.5	0.0
Total Split (%)	9.9%	9.9%	0.0%	10.9%	10.9%	10.6%	10.6%	68.7%	0.0%	10.6%	68.7%	0.0%
Maximum Green (s)	7.0	7.0		8.5	8.5	8.0	8.0	90.5		8.0	90.5	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	9.0	9.0		9.5	9.5	21.1	13.2	96.9		9.4	93.1	
Actuated g/C Ratio	0.06	0.06		0.07	0.07	0.15	0.09	0.68		0.07	0.66	
v/c Ratio	0.96	1.08		0.28	0.28	0.17	0.87	0.31		0.36	1.24	
Control Delay	138.7	171.3		68.6	68.6	51.7	98.4	5.8		61.9	122.6	
Queue Delay	0.0	222.4		0.0	0.0	0.0	0.0	0.2		0.0	22.3	
Total Delay	138.7	393.6		68.6	68.6	51.7	98.4	5.9		61.9	145.0	
LOS	F	F		E	E	D	F	A		E	F	
Approach Delay		268.5			57.3			16.8			142.6	
Approach LOS		F			E			B			F	

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	101	~114			31	31	142	54		36	~1704	
Queue Length 95th (ft)	#227	#242			67	56	#310	100		m29	m451	
Internal Link Dist (ft)		104			168			329			191	
Turn Bay Length (ft)										200		
Base Capacity (vph)	112	103			136	427	167	3518		241	2295	
Starvation Cap Reductn	0	0			0	0	0	1294		0	61	
Spillback Cap Reductn	0	34			0	0	0	0		0	89	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.96	1.61			0.25	0.16	0.87	0.49		0.34	1.29	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 38 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.24
 Intersection Signal Delay: 112.0 Intersection LOS: F
 Intersection Capacity Utilization 112.0% ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

φ1	φ2	φ3	φ4
15 s	97.5 s	14 s	15.5 s
φ5	φ6		
15 s	97.5 s		

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

Creedmoor Rd SPUI_No U-turns AM (2035)
6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙↙	↘		↕↕↕	↕	↘↘
Volume (vph)	137	63	64	860	1701	343
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Fr _t		0.850				0.850
Flt Protected	0.950			0.997		
Satd. Flow (prot)	3399	1567	0	5121	1844	2759
Flt Permitted	0.950			0.652		
Satd. Flow (perm)	3399	1567	0	3349	1844	2759
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	433	
Travel Time (s)	4.2			7.3	8.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	137	63	64	860	1701	343
Shared Lane Traffic (%)						
Lane Group Flow (vph)	137	63	0	924	1701	343
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	14.0	14.0	128.0	128.0	128.0	14.0
Total Split (%)	9.9%	9.9%	90.1%	90.1%	90.1%	9.9%
Maximum Green (s)	7.0	7.0	121.0	121.0	121.0	7.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	9.0	9.0		123.0	123.0	142.0
Actuated g/C Ratio	0.06	0.06		0.87	0.87	1.00
v/c Ratio	0.64	0.64		1.19dl	1.07	0.12
Control Delay	78.9	92.5		1.5	64.6	0.0
Queue Delay	2.4	40.9		0.0	172.2	0.0
Total Delay	81.2	133.3		1.5	236.8	0.0
LOS	F	F		A	F	A
Approach Delay	97.6			1.5	197.0	
Approach LOS	F			A	F	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	64	58		38	~1483	0
Queue Length 95th (ft)	102	#127		m31	m748	m0
Internal Link Dist (ft)	134			296	353	
Turn Bay Length (ft)						175
Base Capacity (vph)	215	99		2901	1597	2759
Starvation Cap Reductn	0	0		0	428	0
Spillback Cap Reductn	23	33		0	65	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.71	0.95		0.32	1.46	0.12

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 136 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 133.7
 Intersection LOS: F
 Intersection Capacity Utilization 103.7%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd

ø2	ø4
128 s	14 s
ø6	
128 s	

Lanes, Volumes, Timings
9: Crabtree Valley Ave & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↵	↑	↗	↵	↗↗		↵	↗↗	
Volume (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frt						0.850		0.967				
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	1863	0	1770	1863	1583	1770	4903	0	1770	3539	0
Flt Permitted				0.757			0.950			0.950		
Satd. Flow (perm)	0	1863	0	1410	1863	1583	1770	4903	0	1770	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1553			404			409	
Travel Time (s)		2.9			23.5			6.1			6.2	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	126	4	202	5	1323	0	544	2288	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	21.0	21.0	0.0	21.0	21.0	64.0	14.0	57.0	0.0	64.0	107.0	0.0
Total Split (%)	14.8%	14.8%	0.0%	14.8%	14.8%	45.1%	9.9%	40.1%	0.0%	45.1%	75.4%	0.0%
Maximum Green (s)	14.0	14.0		14.0	14.0	57.0	7.0	50.0		57.0	100.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)				17.3	17.3	73.2	9.0	58.8		50.9	111.9	
Actuated g/C Ratio				0.12	0.12	0.52	0.06	0.41		0.36	0.79	
v/c Ratio				0.73	0.02	0.25	0.04	0.65		0.86	0.82	
Control Delay				82.6	53.8	21.6	63.6	36.5		54.0	6.2	
Queue Delay				0.0	0.0	0.0	0.0	0.0		30.7	5.8	
Total Delay				82.6	53.8	21.6	63.6	36.5		84.7	12.0	
LOS				F	D	C	E	D		F	B	
Approach Delay					45.2			36.6			26.0	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					D			D				C
Queue Length 50th (ft)				121	3	88	4	378		391	134	
Queue Length 95th (ft)				#230	m16	135	20	445		m278	m180	
Internal Link Dist (ft)		109			1473			324				329
Turn Bay Length (ft)							40					
Base Capacity (vph)				176	232	906	112	2029		735	2789	
Starvation Cap Reductn				0	0	0	0	0		212	457	
Spillback Cap Reductn				0	0	0	0	0		0	0	
Storage Cap Reductn				0	0	0	0	0		0	0	
Reduced v/c Ratio				0.72	0.02	0.22	0.04	0.65		1.04	0.98	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 84 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 30.6
 Intersection LOS: C
 Intersection Capacity Utilization 88.6%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø1	ø2	ø4
64 s	57 s	21 s
ø6	ø5	ø8
107 s	14 s	21 s

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	139	45	32	90	297	170	611	55	397	1041	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98							0.99		
Frt			0.850		0.904			0.988			0.964	
Flt Protected	0.950				0.996		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1677	0	1770	1840	0	1770	1796	0
Flt Permitted	0.950				0.963		0.950			0.950		
Satd. Flow (perm)	1770	1863	1548	0	1622	0	1770	1840	0	1750	1796	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			133			907			285	
Travel Time (s)		18.1			3.6			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	348	139	45	32	90	297	170	611	55	397	1041	326
Shared Lane Traffic (%)												
Lane Group Flow (vph)	348	139	45	0	419	0	170	666	0	397	1367	0
Turn Type	Prot		pm+ov	Perm			Prot			Prot		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases			4	8								
Detector Phase	7	4	5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	20.0	20.0		14.0	20.0		14.0	20.0	
Total Split (s)	23.0	54.0	16.0	31.0	31.0	0.0	16.0	60.0	0.0	28.0	72.0	0.0
Total Split (%)	16.2%	38.0%	11.3%	21.8%	21.8%	0.0%	11.3%	42.3%	0.0%	19.7%	50.7%	0.0%
Maximum Green (s)	16.0	47.0	9.0	24.0	24.0		9.0	53.0		21.0	65.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	18.0	49.0	60.0		26.0		11.0	55.0		23.0	67.0	
Actuated g/C Ratio	0.13	0.35	0.42		0.18		0.08	0.39		0.16	0.47	
v/c Ratio	1.55	0.22	0.07		1.41		1.24	0.93		1.38	1.61	
Control Delay	306.0	29.6	18.4		245.2		207.0	63.0		220.0	305.2	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	47.5	
Total Delay	306.0	29.6	18.4		245.2		207.0	63.0		220.0	352.6	
LOS	F	C	B		F		F	E		F	F	
Approach Delay		209.4			245.2			92.3			322.8	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Creedmoor Rd SPUI_No U-turns AM (2035)
 6/21/2010



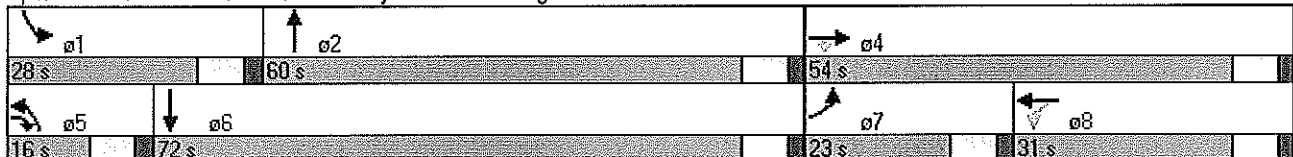
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~452	85	17		~519		~195	587		~488	~1819	
Queue Length 95th (ft)	#654	119	37		#732		#348	#835		m#450	m#1674	
Internal Link Dist (ft)		1112			53			827			205	
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	224	643	657		297		137	713		287	847	
Starvation Cap Reductn	0	0	0		0		0	0		0	52	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.55	0.22	0.07		1.41		1.24	0.93		1.38	1.72	

Intersection Summary

Area Type: Other
 Cycle Length: 142
 Actuated Cycle Length: 142
 Offset: 26 (18%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 242.4
 Intersection Capacity Utilization 144.8%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Creedmoor Rd SPUJ_No U-turns AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Volume (vph)	69	387	387	54	492	39	88	69	118	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.989			0.905			0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3274	0	1770	3500	0	1770	1686	0	1770	1656	0
Flt Permitted	0.455			0.340			0.700			0.577		
Satd. Flow (perm)	848	3274	0	633	3500	0	1304	1686	0	1075	1656	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		571			1192			291			153	
Travel Time (s)		8.7			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	387	387	54	492	39	88	69	118	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	774	0	54	531	0	88	187	0	27	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	43.0	43.0	0.0	43.0	43.0	0.0	28.0	28.0	0.0	28.0	28.0	0.0
Total Split (%)	60.6%	60.6%	0.0%	60.6%	60.6%	0.0%	39.4%	39.4%	0.0%	39.4%	39.4%	0.0%
Maximum Green (s)	36.0	36.0		36.0	36.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	45.9	45.9		45.9	45.9		15.1	15.1		15.1	15.1	
Actuated g/C Ratio	0.65	0.65		0.65	0.65		0.21	0.21		0.21	0.21	
v/c Ratio	0.13	0.37		0.13	0.23		0.32	0.52		0.12	0.25	
Control Delay	4.1	5.1		3.7	3.4		25.4	29.3		21.9	23.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.1	5.1		3.7	3.4		25.4	29.3		21.9	23.6	
LOS	A	A		A	A		C	C		C	C	
Approach Delay		5.0			3.4			28.0			23.2	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)	9	70		8	42		33	73		10	32	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Creedmoor Rd SPUI_No U-turns AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m17	98		m8	m43		64	119		27	62	
Internal Link Dist (ft)		491			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	548	2117		409	2263		422	546		348	536	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.37		0.13	0.23		0.21	0.34		0.08	0.16	

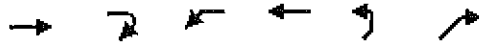
Intersection Summary

Area Type: Other
 Cycle Length: 71
 Actuated Cycle Length: 71
 Offset: 10 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.52
 Intersection Signal Delay: 9.1
 Intersection Capacity Utilization 66.5%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service C
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø4
43 s	28 s
ø6	ø8
43 s	28 s

HCM Unsignalized Intersection Capacity Analysis Creedmoor Rd SPUI_No U-turns AM (2035)
 11: Crabtree Valley Ave & Edwards Mill Rd 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↵	↑↑	↵	
Volume (veh/h)	732	100	342	303	29	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	732	100	342	303	29	112
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				571		
pX, platoon unblocked						
vC, conflicting volume			732		1618	416
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			732		1618	416
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			61		49	81
cM capacity (veh/h)			868		57	585

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	488	344	342	152	152	141
Volume Left	0	0	342	0	0	29
Volume Right	0	100	0	0	0	112
cSH	1700	1700	868	1700	1700	202
Volume to Capacity	0.29	0.20	0.39	0.09	0.09	0.70
Queue Length 95th (ft)	0	0	47	0	0	110
Control Delay (s)	0.0	0.0	11.8	0.0	0.0	56.1
Lane LOS			B			F
Approach Delay (s)	0.0		6.3			56.1
Approach LOS						F

Intersection Summary	
Average Delay	7.4
Intersection Capacity Utilization	60.9%
ICU Level of Service	B
Analysis Period (min)	15

Network Totals

Number of Intersections	33
Control Delay / Veh (s/v)	65
Queue Delay / Veh (s/v)	5
Total Delay / Veh (s/v)	69
Total Delay (hr)	5612
Stops / Veh	0.17
Stops (#)	49503
Average Speed (mph)	6
Total Travel Time (hr)	6403
Distance Traveled (mi)	38884
Fuel Consumed (gal)	6012
Fuel Economy (mpg)	6.5
CO Emissions (kg)	420.22
NOx Emissions (kg)	81.76
VOC Emissions (kg)	97.39
Unserviced Vehicles (#)	12520
Vehicles in dilemma zone (#)	1308
Performance Index	5749.2

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	322	306	407	492	369	1743	1018	1878	388	1239	1266	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		300	275		310			450		
Storage Lanes	1	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	1.00	*0.95	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Frnt		*0.910				0.850			0.850		0.983	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3221	0	3433	3539	1583	3433	3539	1583	3467	3514	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3221	0	3433	3539	1583	3433	3539	1583	3467	3514	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								637			1586	
Travel Time (s)								12.4			24.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	306	407	492	369	1743	1018	1878	388	1239	1266	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	713	0	492	369	1743	1018	1878	388	1239	1432	0
Turn Type	Prot	custom		Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						Free			8 1			
Detector Phase	5	2		1	6		3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4		14.4	17.4	
Total Split (s)	27.0	36.0	0.0	24.0	33.0	0.0	38.0	60.0	84.0	44.0	66.0	0.0
Total Split (%)	16.5%	22.0%	0.0%	14.6%	20.1%	0.0%	23.2%	36.6%	51.2%	26.8%	40.2%	0.0%
Maximum Green (s)	20.0	29.0		17.0	26.0		31.0	53.0		37.0	59.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	4.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Act Effct Green (s)	20.0	29.0		17.0	26.0	164.0	31.0	55.4	77.0	37.0	61.4	
Actuated g/C Ratio	0.12	0.18		0.10	0.16	1.00	0.19	0.34	0.47	0.23	0.37	
v/c Ratio	1.49	1.43dr		1.38	0.66	1.10	1.57	1.57	0.52	1.58	1.09	
Control Delay	289.4	179.6		211.2	40.7	72.9	298.7	290.3	23.3	308.3	100.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	289.4	179.6		211.2	40.7	72.9	298.7	290.3	23.3	308.3	100.0	
LOS	F	F		F	D	E	F	F	C	F	F	
Approach Delay								261.4			196.6	
Approach LOS								F			F	

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010

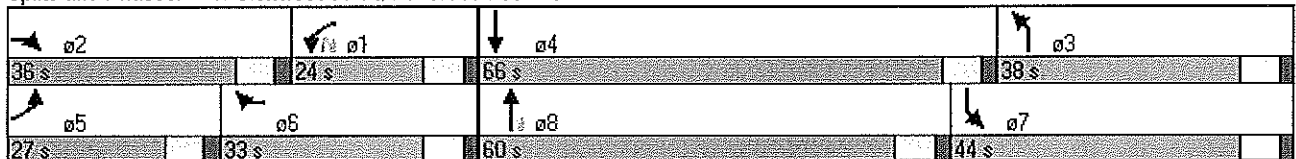


Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Length 50th (ft)	~476	~501		~361	187	~1178	~802	~1501	194	~971	~905	
Queue Length 95th (ft)	#680	#634		m#202	m131	m1178	m#927	#1630	m240	#1109	#1046	
Internal Link Dist (ft)								557				1506
Turn Bay Length (ft)				300	275	275	310		175	450		
Base Capacity (vph)	216	570		356	561	1583	649	1195	743	782	1316	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.49	1.25		1.38	0.66	1.10	1.57	1.57	0.52	1.58	1.09	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 56 (34%), Referenced to phase 2:EBR and 6:WBR, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.58
 Intersection Signal Delay: 192.9
 Intersection Capacity Utilization 145.1%
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
 dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.



Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔	↑	↔	↔	↔
Volume (vph)	36	4831	272	412	5716	112	152	9	291	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	150		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992			0.997				0.850			0.877
Fit Protected	0.950			0.950				0.955		0.950		
Satd. Flow (prot)	1752	6293	0	1770	6389	0	0	1788	1591	1778	1642	0
Fit Permitted	0.950			0.950				0.679		0.511		
Satd. Flow (perm)	1752	6293	0	1770	6389	0	0	1271	1591	957	1642	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		343			1624			201				281
Travel Time (s)		5.2			24.6			5.5				5.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	4831	272	412	5716	112	152	9	291	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	5103	0	412	5828	0	0	161	291	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	93.0	0.0	31.0	108.6	0.0	40.0	40.0	31.0	40.0	40.0	0.0
Total Split (%)	9.4%	56.7%	0.0%	18.9%	66.2%	0.0%	24.4%	24.4%	18.9%	24.4%	24.4%	0.0%
Maximum Green (s)	8.4	86.0		24.0	101.6		33.0	33.0	24.0	33.0	33.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	10.1	88.0		26.0	106.7			35.0	66.0	35.0	35.0	
Actuated g/C Ratio	0.06	0.54		0.16	0.65			0.21	0.40	0.21	0.21	
v/c Ratio	0.33	1.51		1.47	1.40			0.59	0.45	1.42	0.21	
Control Delay	76.1	259.3		264.7	197.8			68.3	38.7	258.2	55.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	76.1	259.3		264.7	197.8			68.3	38.7	258.2	55.0	
LOS	E	F		F	F			E	D	F	D	
Approach Delay		258.0			202.2			49.3			217.7	
Approach LOS		F			F			D			F	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	38	~2235		~599	~2500			157	228	~415	64	
Queue Length 95th (ft)	m62	m#1889		m179	m32			244	319	#613	114	
Internal Link Dist (ft)		263			1544			121			201	
Turn Bay Length (ft)	150			475								
Base Capacity (vph)	111	3377		281	4156			271	640	204	350	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.32	1.51		1.47	1.40			0.59	0.45	1.42	0.21	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 156 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.51
 Intersection Signal Delay: 220.5
 Intersection Capacity Utilization 132.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

$\phi 1$	$\phi 2$	$\phi 4$
31 s	93 s	40 s
$\phi 6$	$\phi 5$	
108.6 s	15.4 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	503	4751	157	1641	5860	1875	211	891	1472	1527	586	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.995				0.850			0.850		0.966	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6312	0	3433	5085	1583	1752	3504	1567	5040	3453	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6312	0	3433	5085	1583	1752	3504	1567	5037	3453	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35				35
Link Distance (ft)		1624			371			433				524
Travel Time (s)		24.6			5.6			8.4				10.2
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	503	4751	157	1641	5860	1875	211	891	1472	1527	586	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	503	4908	0	1641	5860	1875	211	891	1472	1527	755	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.5	17.5		13.5	17.5	13.5	14.0	13.5	13.5	13.5	13.5	
Total Split (s)	19.0	64.0	0.0	46.0	91.0	29.0	17.0	25.0	46.0	29.0	37.0	0.0
Total Split (%)	11.6%	39.0%	0.0%	28.0%	55.5%	17.7%	10.4%	15.2%	28.0%	17.7%	22.6%	0.0%
Maximum Green (s)	12.0	57.0		39.0	84.0	22.0	10.0	18.0	39.0	22.0	30.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	14.0	59.0		41.0	86.0	110.0	12.0	20.0	66.0	24.0	32.0	
Actuated g/C Ratio	0.09	0.36		0.25	0.52	0.67	0.07	0.12	0.40	0.15	0.20	
v/c Ratio	1.73	2.16		1.91	2.20	1.77	1.65	2.09	2.33	2.07	1.12	
Control Delay	363.4	548.0		445.0	563.5	369.1	346.1	522.9	624.8	514.0	120.1	
Queue Delay	0.0	0.9		71.7	0.0	152.5	0.0	0.0	0.0	0.0	43.6	
Total Delay	363.4	548.8		516.7	563.5	521.6	346.1	522.9	624.8	514.0	163.7	
LOS	F	F		F	F	F	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		531.6			546.9			566.7			398.1	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~408	~2485		~1403	~3728	~3019	~330	~801	~2602	~923	~493	
Queue Length 95th (ft)	m#231	m#1455		m480	m#1401	m690	m#397	m#834	m#2612	m#996	m#600	
Internal Link Dist (ft)		1544			291			353			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	290	2271		858	2667	1062	128	427	631	738	674	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	2		66	0	171	0	0	0	0	56	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.73	2.16		2.07	2.20	2.10	1.65	2.09	2.33	2.07	1.22	

Intersection Summary

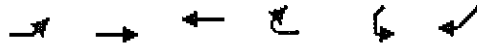
Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 104 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.33
 Intersection Signal Delay: 528.0
 Intersection LOS: F
 Intersection Capacity Utilization 204.2%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø2	ø1	ø3	ø4
64 s	46 s	17 s	37 s
ø5	ø6	ø8	ø7
19 s	91 s	25 s	29 s

Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

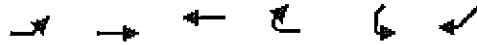
Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	5050	5063	0	0	4313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.91	0.81	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	4984	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	4984	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		444	259		639	
Travel Time (s)		6.7	3.9		17.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5050	5063	0	0	4313
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5050	5063	0	0	4313
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	65.0	0.0	0.0	99.0
Total Split (%)	0.0%	0.0%	39.6%	0.0%	0.0%	60.4%
Maximum Green (s)			58.0			92.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		164.0	60.0			94.0
Actuated g/C Ratio		1.00	0.37			0.57
v/c Ratio		1.01	1.82			2.07
Control Delay		26.5	395.1			508.3
Queue Delay		0.0	26.6			5.0
Total Delay		26.5	421.8			513.3
LOS		C	F			F
Approach Delay		26.5	421.8			
Approach LOS		C	F			
Queue Length 50th (ft)		~1828	~2020			~3191
Queue Length 95th (ft)		m0	m#1365			#3214
Internal Link Dist (ft)		364	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Creedmoor Rd SPUI_No U-turns PM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		4984	2788			2079
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	88			11
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		1.01	1.88			2.09

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 20 (12%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.07
 Intersection Signal Delay: 310.8
 Intersection Capacity Utilization 167.6%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service H

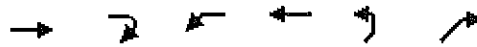
- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

	<p style="text-align: center;">ø4 99 s</p>
<p style="text-align: center;">ø6 65 s</p>	

Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	2258	0	0	3142	2192	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Frt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Frt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2258	0	0	3142	2192	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2258	0	0	3142	2192	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	83.0	0.0	0.0	83.0	81.0	0.0
Total Split (%)	50.6%	0.0%	0.0%	50.6%	49.4%	0.0%
Maximum Green (s)	76.0			76.0	74.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	78.0			78.0	76.0	
Actuated g/C Ratio	0.48			0.48	0.46	
v/c Ratio	1.37			1.26	1.38	
Control Delay	201.7			155.3	212.1	
Queue Delay	0.0			0.0	0.0	
Total Delay	201.7			155.3	212.1	
LOS	F			F	F	
Approach Delay	201.7			155.3	212.1	
Approach LOS	F			F	F	
Queue Length 50th (ft)	~1676			~1539	~1604	
Queue Length 95th (ft)	m#1661			#1600	#1726	
Internal Link Dist (ft)	301			418	376	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

Creedmoor Rd SPUI_No U-turns PM (2035)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	1649			2503	1583	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.37			1.26	1.38	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 150 (91%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.38
 Intersection Signal Delay: 185.5
 Intersection Capacity Utilization 331.9%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

ø6	ø8
83 s	81 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI_No U-turns PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↘	↙		↘	↗	↖	↘	↗	↖
Volume (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.957				0.850		0.999	
Fit Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1587	0	1717	3433	1536	1823	5233	0
Fit Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1577	1623	1582	0	1717	3433	1503	1822	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2495	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	23.0	26.0	26.0	0.0	23.0	110.0	26.0	14.0	101.0	0.0
Total Split (%)	8.5%	8.5%	14.0%	15.9%	15.9%	0.0%	14.0%	67.1%	15.9%	8.5%	61.6%	0.0%
Maximum Green (s)	7.0	7.0	16.0	19.0	19.0		16.0	103.0	19.0	7.0	94.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	21.7	23.8	23.8		14.5	105.0	128.8	9.0	99.5	
Actuated g/C Ratio		0.05	0.13	0.15	0.15		0.09	0.64	0.79	0.05	0.61	
v/c Ratio		0.41	0.29	1.02	1.03		0.66	1.14	0.57	0.66	0.57	
Control Delay		87.9	45.2	130.2	132.5		75.7	91.5	4.9	105.0	20.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	335.4	5.3	0.0	0.0	
Total Delay		87.9	45.2	130.2	132.5		75.7	426.9	10.2	105.0	20.7	
LOS		F	D	F	F		E	F	B	F	C	

Lanes, Volumes, Timings

Creedmoor Rd SPUI_No U-turns PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		62.4			131.3			330.2			23.6	
Approach LOS		E			F			F			C	
Queue Length 50th (ft)		43	45	~322	~316		108	~1674	145	71	419	
Queue Length 95th (ft)		88	81	#518	#511		m56	m402	m64	#147	483	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		99	245	237	230		188	2198	1185	100	3175	
Starvation Cap Reductn		0	0	0	0		0	873	438	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.41	0.25	1.02	1.03		0.54	1.88	0.90	0.66	0.57	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 160 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.14
 Intersection Signal Delay: 208.1
 Intersection LOS: F
 Intersection Capacity Utilization 107.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
14 s	110 s	14 s	26 s
ø5	ø6		
23 s	101 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	0	0	127	2	561	3	2675	150	409	2070	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Fr						0.850		0.992			0.999	
Fit Protected	0.950				0.953		0.950			0.950		
Satd. Flow (prot)	1761	1853	0	0	1775	2787	1805	5146	0	3416	3518	0
Fit Permitted	0.950				0.953		0.950			0.950		
Satd. Flow (perm)	1761	1853	0	0	1775	2787	1805	5146	0	3416	3518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			271	
Travel Time (s)		5.0			8.5			8.0			5.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	48	0	0	127	2	561	3	2675	150	409	2070	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	0	0	0	129	561	3	2825	0	409	2085	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	14.0	14.0	0.0	21.0	21.0	28.0	15.0	101.0	0.0	28.0	114.0	0.0
Total Split (%)	8.5%	8.5%	0.0%	12.8%	12.8%	17.1%	9.1%	61.6%	0.0%	17.1%	69.5%	0.0%
Maximum Green (s)	7.0	7.0		14.0	14.0	21.0	8.0	94.0		21.0	107.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	9.0				15.3	43.6	9.0	99.2		23.3	124.7	
Actuated g/C Ratio	0.05				0.09	0.27	0.05	0.60		0.14	0.76	
v/c Ratio	0.49				0.78	0.76	0.03	0.91		0.84	0.78	
Control Delay	93.0				101.8	62.8	82.0	19.4		48.7	2.5	
Queue Delay	0.0				0.2	0.0	0.0	35.9		0.0	1.1	
Total Delay	93.0				102.0	62.8	82.0	55.3		48.7	3.7	
LOS	F				F	E	F	E		D	A	
Approach Delay					70.1			55.3			11.0	
Approach LOS					E			E			B	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	51				137	315	3	498		214	49	
Queue Length 95th (ft)	99				#241	396	m3	m418		m190	m175	
Internal Link Dist (ft)		104			168			329				191
Turn Bay Length (ft)										200		
Base Capacity (vph)	97				173	742	110	3111		486	2675	
Starvation Cap Reductn	0				0	0	0	489		0	206	
Spillback Cap Reductn	0				1	0	0	0		0	338	
Storage Cap Reductn	0				0	0	0	0		0	0	
Reduced v/c Ratio	0.49				0.75	0.76	0.03	1.08		0.84	0.89	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 58 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 39.1
 Intersection Capacity Utilization 93.0%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø4	ø3
101 s	28 s	21 s	14 s
ø5	ø6		
15 s	114 s		

Lanes, Volumes, Timings
8: Crabtree Mall Entrance & Blue Ridge Rd

Creedmoor Rd SPUI_No U-turns PM (2035)
6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙↙	↗		↑↑↑	↑	↗↗
Volume (vph)	1137	241	132	1437	1230	1154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	2%			-2%	2%	
Storage Length (ft)	0	0	0			175
Storage Lanes	2	1	0			1
Taper Length (ft)	100	100	100			100
Lane Util. Factor	0.97	1.00	0.91	0.91	1.00	0.88
Fr		0.850				0.850
Fit Protected	0.950			0.996		
Satd. Flow (prot)	3399	1567	0	5116	1844	2759
Fit Permitted	0.950			0.640		
Satd. Flow (perm)	3399	1567	0	3287	1844	2759
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	35	
Link Distance (ft)	214			376	433	
Travel Time (s)	4.2			7.3	8.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1137	241	132	1437	1230	1154
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1137	241	0	1569	1230	1154
Turn Type		Perm	Perm			pm+ov
Protected Phases	4			2	6	4
Permitted Phases		4	2			6
Detector Phase	4	4	2	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0	14.0
Total Split (s)	55.0	55.0	109.0	109.0	109.0	55.0
Total Split (%)	33.5%	33.5%	66.5%	66.5%	66.5%	33.5%
Maximum Green (s)	48.0	48.0	102.0	102.0	102.0	48.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	C-Min	C-Min	None
Act Effct Green (s)	50.0	50.0		104.0	104.0	164.0
Actuated g/C Ratio	0.30	0.30		0.63	0.63	1.00
v/c Ratio	1.10	0.50		2.93dl	1.05	0.42
Control Delay	110.4	51.3		15.0	44.4	2.5
Queue Delay	243.3	1.1		2.2	249.5	0.0
Total Delay	353.7	52.3		17.2	293.9	2.5
LOS	F	D		B	F	A
Approach Delay	301.0			17.2	152.9	
Approach LOS	F			B	F	

Lanes, Volumes, Timings
 8: Crabtree Mall Entrance & Blue Ridge Rd

Creedmoor Rd SPUI_No U-turns PM (2035)
 6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 50th (ft)	~709	214		213	~1469	67
Queue Length 95th (ft)	#846	308		m141	m56	m0
Internal Link Dist (ft)	134			296	353	
Turn Bay Length (ft)						175
Base Capacity (vph)	1036	478		2084	1169	2759
Starvation Cap Reductn	0	0		362	409	0
Spillback Cap Reductn	345	88		71	2	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	1.65	0.62		0.91	1.62	0.42

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 154 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 151.2
 Intersection Capacity Utilization 140.1%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 8: Crabtree Mall Entrance & Blue Ridge Rd

p2	p4
109s	55s
p6	
109s	

Lanes, Volumes, Timings
9: Crabtree Valley Ave & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↙	↑	↗	↙	↗		↙	↗	
Volume (vph)	36	0	0	172	17	517	14	2275	537	494	1700	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frt						0.850		0.971				
Fit Protected		0.950		0.950			0.950			0.950		
Satd. Flow (prot)	0	1770	0	1770	1863	1583	1770	4925	0	1770	3539	0
Fit Permitted		0.746		0.754			0.950			0.950		
Satd. Flow (perm)	0	1390	0	1405	1863	1583	1770	4925	0	1770	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1553			404			409	
Travel Time (s)		2.9			23.5			6.1			6.2	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	0	0	172	17	517	14	2275	537	494	1700	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	172	17	517	14	2812	0	494	1702	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	23.0	23.0	0.0	23.0	23.0	47.0	14.0	94.0	0.0	47.0	127.0	0.0
Total Split (%)	14.0%	14.0%	0.0%	14.0%	14.0%	28.7%	8.5%	57.3%	0.0%	28.7%	77.4%	0.0%
Maximum Green (s)	16.0	16.0		16.0	16.0	40.0	7.0	87.0		40.0	120.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		18.0		18.0	18.0	65.0	9.0	89.0		42.0	133.2	
Actuated g/C Ratio		0.11		0.11	0.11	0.40	0.05	0.54		0.26	0.81	
v/c Ratio		0.24		1.12	0.08	0.82	0.14	1.05		1.09	0.59	
Control Delay		71.1		168.3	72.7	57.7	77.4	69.6		108.9	1.5	
Queue Delay		1.9		0.0	0.0	4.3	0.0	10.7		197.4	0.6	
Total Delay		73.0		168.3	72.7	62.0	77.4	80.3		306.3	2.1	
LOS		E		F	E	E	E	F		F	A	
Approach Delay		73.0			88.2			80.3			70.6	

Lanes, Volumes, Timings
9: Crabtree Valley Ave & Creedmoor Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		E			F			F			E	
Queue Length 50th (ft)		36		~204	14	387	15	~1201		~607	71	
Queue Length 95th (ft)		76		m#380	m38	680	41	#1272		#838	55	
Internal Link Dist (ft)		109			1473			324			329	
Turn Bay Length (ft)							40					
Base Capacity (vph)		153		154	204	627	97	2673		453	2875	
Starvation Cap Reductn		0		0	0	0	0	0		133	702	
Spillback Cap Reductn		53		0	0	60	0	64		0	0	
Storage Cap Reductn		0		0	0	0	0	0		0	0	
Reduced v/c Ratio		0.36		1.12	0.08	0.91	0.14	1.08		1.54	0.78	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 58 (35%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.12
 Intersection Signal Delay: 77.5
 Intersection Capacity Utilization 106.3%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

↑ ø2	↘ ø1	→ ø4
94 s	47 s	23 s
↓ ø6	↙ ø5	← ø8
127 s	14 s	23 s

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑	↗		↔		↙	↗		↙	↗	
Volume (vph)	261	195	217	27	81	388	388	1264	20	319	913	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	150		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98							0.99		
Fr t			0.850		0.894			0.998			0.969	
Flt Protected	0.950				0.997		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1660	0	1770	1859	0	1770	1805	0
Flt Permitted	0.950				0.951		0.950			0.950		
Satd. Flow (perm)	1770	1863	1548	0	1584	0	1770	1859	0	1758	1805	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			133			907			285	
Travel Time (s)		18.1			3.6			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	261	195	217	27	81	388	388	1264	20	319	913	238
Shared Lane Traffic (%)												
Lane Group Flow (vph)	261	195	217	0	496	0	388	1284	0	319	1151	0
Turn Type	Prot		pm+ov	Perm			Prot			Prot		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases			4	8								
Detector Phase	7	4	5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	20.0	20.0		14.0	20.0		14.0	20.0	
Total Split (s)	21.0	61.0	28.0	40.0	40.0	0.0	28.0	79.0	0.0	24.0	75.0	0.0
Total Split (%)	12.8%	37.2%	17.1%	24.4%	24.4%	0.0%	17.1%	48.2%	0.0%	14.6%	45.7%	0.0%
Maximum Green (s)	14.0	54.0	21.0	33.0	33.0		21.0	72.0		17.0	68.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag		Lead	Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	16.0	56.0	79.0		35.0		23.0	74.0		19.0	70.0	
Actuated g/C Ratio	0.10	0.34	0.48		0.21		0.14	0.45		0.12	0.43	
v/c Ratio	1.51	0.31	0.29		1.47		1.56	1.53		1.56	1.49	
Control Delay	298.9	38.4	25.4		268.9		315.4	277.5		306.1	256.2	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	48.6	
Total Delay	298.9	38.4	25.4		268.9		315.4	277.5		306.1	304.8	
LOS	F	D	C		F		F	F		F	F	
Approach Delay		135.2			268.9			286.3			305.1	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Creedmoor Rd SPUI_No U-turns PM (2035)
 6/21/2010

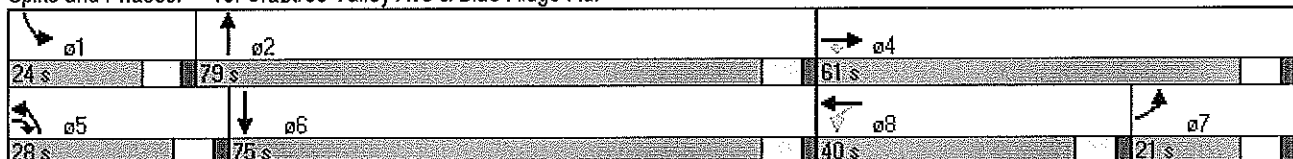


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F				F					F	
Queue Length 50th (ft)	~392	162	145		~727		~587	~1922		~492	~1703	
Queue Length 95th (ft)	#585	240	220		#960		#804	#2189		m#494	m#1642	
Internal Link Dist (ft)		1112				53		827				205
Turn Bay Length (ft)	500						150			150		
Base Capacity (vph)	173	636	751		338		248	839		205	770	
Starvation Cap Reductn	0	0	0		0		0	0		0	52	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.51	0.31	0.29		1.47		1.56	1.53		1.56	1.60	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 4 (2%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.56
 Intersection Signal Delay: 267.1
 Intersection LOS: F
 Intersection Capacity Utilization 146.2%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	535	356	144	475	88	135	293	33	105	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940			0.977			0.985			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3327	0	1770	3458	0	1770	1835	0	1770	1693	0
Flt Permitted	0.419			0.263			0.276			0.411		
Satd. Flow (perm)	780	3327	0	490	3458	0	514	1835	0	766	1693	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		571			1192			291			153	
Travel Time (s)		8.7			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	535	356	144	475	88	135	293	33	105	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	891	0	144	563	0	135	326	0	105	429	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	47.0	47.0	0.0	47.0	47.0	0.0	35.0	35.0	0.0	35.0	35.0	0.0
Total Split (%)	57.3%	57.3%	0.0%	57.3%	57.3%	0.0%	42.7%	42.7%	0.0%	42.7%	42.7%	0.0%
Maximum Green (s)	40.0	40.0		40.0	40.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	45.3	45.3		45.3	45.3		26.7	26.7		26.7	26.7	
Actuated g/C Ratio	0.55	0.55		0.55	0.55		0.33	0.33		0.33	0.33	
v/c Ratio	0.45	0.48		0.53	0.29		0.81	0.55		0.42	0.78	
Control Delay	11.2	10.1		23.0	11.8		59.9	25.8		26.2	35.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	11.2	10.1		23.0	11.8		59.9	25.8		26.2	35.2	
LOS	B	B		C	B		E	C		C	D	
Approach Delay		10.3			14.1			35.8			33.4	
Approach LOS		B			B			D			C	
Queue Length 50th (ft)	55	137		58	135		61	131		40	190	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Creedmoor Rd SPUI_No U-turns PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m61	m147		m66	m125		#154	203		84	290	
Internal Link Dist (ft)		491			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	433	1845		272	1918		189	675		282	622	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.44	0.48		0.53	0.29		0.71	0.48		0.37	0.69	

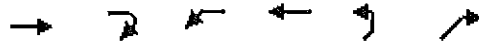
Intersection Summary

Area Type: Other
 Cycle Length: 82
 Actuated Cycle Length: 82
 Offset: 22 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 19.9
 Intersection Capacity Utilization 85.2%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø4
47 s	35 s
ø6	ø8
47 s	35 s

HCM Unsignalized Intersection Capacity Analysis Creedmoor Rd SPUI_No U-turns PM (2035)
 11: Crabtree Valley Ave & Edwards Mill Rd 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↵	↑↑	↵	
Volume (veh/h)	891	140	369	501	205	192
Sign Control	Free			Free Stop		
Grade	0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	891	140	369	501	205	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	571					
pX, platoon unblocked						
vC, conflicting volume			891			1950 516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			891			1950 516
tC, single (s)			4.1			6.8 6.9
tC, 2 stage (s)						
tF (s)			2.2			3.5 3.3
p0 queue free %			51			0 62
cM capacity (veh/h)			757			29 504

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	594	437	369	250	250	397
Volume Left	0	0	369	0	0	205
Volume Right	0	140	0	0	0	192
cSH	1700	1700	757	1700	1700	53
Volume to Capacity	0.35	0.26	0.49	0.15	0.15	7.48
Queue Length 95th (ft)	0	0	68	0	0	Err
Control Delay (s)	0.0	0.0	14.2	0.0	0.0	Err
Lane LOS			B			F
Approach Delay (s)	0.0		6.0			Err
Approach LOS						F

Intersection Summary						
Average Delay			1729.7			
Intersection Capacity Utilization			82.7%	ICU Level of Service	E	
Analysis Period (min)			15			

Network Totals

Number of Intersections	33
Control Delay / Veh (s/v)	107
Queue Delay / Veh (s/v)	7
Total Delay / Veh (s/v)	114
Total Delay (hr)	10289
Stops / Veh	0.20
Stops (#)	63608
Average Speed (mph)	4
Total Travel Time (hr)	11184
Distance Traveled (mi)	42603
Fuel Consumed (gal)	9713
Fuel Economy (mpg)	4.4
CO Emissions (kg)	678.94
NOx Emissions (kg)	132.10
VOC Emissions (kg)	157.35
Unserved Vehicles (#)	24108
Vehicles in dilemma zone (#)	1113
Performance Index	10465.7

2035 Lead Mine Rd Flyover

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑↑		↔	↑↑↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	120	2786	423	611	2827	865	348	657	216	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.980				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6280	0	3433	5085	1583	3433	3539	1583	3467	3521	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6280	0	3433	5085	1583	3433	3539	1583	3466	3521	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1166			1075			606			1605	
Travel Time (s)		17.7			16.3			9.2			24.3	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	2786	423	611	2827	865	348	657	216	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	3209	0	611	2827	865	348	657	216	1813	2004	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4	14.3	14.4	17.4	
Total Split (s)	15.0	61.0	0.0	26.0	72.0	0.0	19.0	28.0	26.0	57.0	66.0	0.0
Total Split (%)	8.7%	35.5%	0.0%	15.1%	41.9%	0.0%	11.0%	16.3%	15.1%	33.1%	38.4%	0.0%
Maximum Green (s)	8.0	54.0		19.0	65.0		12.0	21.0	19.0	50.0	59.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	10.0	56.0		21.0	67.0	172.0	14.0	23.0	44.0	52.0	61.0	
Actuated g/C Ratio	0.06	0.33		0.12	0.39	1.00	0.08	0.13	0.26	0.30	0.35	
v/c Ratio	1.17	1.57		1.46	1.43	0.55	1.25	1.39	0.53	1.73	1.60	
Control Delay	204.8	296.0		263.0	232.6	0.7	187.9	222.4	25.4	367.2	311.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.9	
Total Delay	204.8	296.0		263.0	232.6	0.7	187.9	222.4	25.4	367.2	324.4	
LOS	F	F		F	F	A	F	F	C	F	F	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		292.7			190.3			177.7				344.7
Approach LOS		F			F			F				F
Queue Length 50th (ft)	~160	~1483		~481	~1565	0	~236	~497	85	~1550	~1694	
Queue Length 95th (ft)	#305	#1526		m#609	#1636	0	#347	#639	m138	#1679	#1821	
Internal Link Dist (ft)		1086			995			526				1525
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	103	2045		419	1981	1583	279	473	405	1048	1249	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	22
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	1.57		1.46	1.43	0.55	1.25	1.39	0.53	1.73	1.63	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 128 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.73
 Intersection Signal Delay: 262.5
 Intersection LOS: F
 Intersection Capacity Utilization 151.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

ø1	ø2	ø3	ø4
26 s	61 s	19 s	66 s
ø5	ø6	ø8	ø7
15 s	72 s	28 s	57 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔	↑	↔	↓	↔
Volume (vph)	14	4757	43	66	4216	128	47	4	173	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Fr		0.999			0.996				0.850		0.882	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1752	6337	0	1770	6382	0	0	1790	1591	1778	1651	0
Flt Permitted	0.950			0.950				0.706		0.724		
Satd. Flow (perm)	1752	6337	0	1770	6382	0	0	1322	1591	1355	1651	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1075			1624			201				281
Travel Time (s)		16.3			24.6			5.5				5.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	4757	43	66	4216	128	47	4	173	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4800	0	66	4344	0	0	51	173	156	51	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	132.7	0.0	15.3	132.6	0.0	24.0	24.0	15.3	24.0	24.0	0.0
Total Split (%)	9.0%	77.2%	0.0%	8.9%	77.1%	0.0%	14.0%	14.0%	8.9%	14.0%	14.0%	0.0%
Maximum Green (s)	8.4	125.7		8.3	125.6		17.0	17.0	8.3	17.0	17.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	9.4	127.7		10.3	137.0		19.0	34.3	19.0	19.0	19.0	
Actuated g/C Ratio	0.05	0.74		0.06	0.80		0.11	0.20	0.11	0.11	0.11	
v/c Ratio	0.15	1.02		0.62	0.85		0.35	0.55	1.04	0.28	0.28	
Control Delay	79.0	35.2		51.6	20.8		78.2	69.2	154.9	74.7	74.7	
Queue Delay	0.0	19.4		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	79.0	54.7		51.6	20.8		78.2	69.2	154.9	74.7	74.7	
LOS	E	D		D	C		E	E	F	E	E	
Approach Delay		54.7			21.3		71.3				135.2	
Approach LOS		D			C		E				F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	15	~982		70	425			54	178	~189	54	
Queue Length 95th (ft)	m9	m178		m42	m99			104	265	#351	103	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	106	4705		106	5083			146	317	150	182	
Starvation Cap Reductn	0	212		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.13	1.07		0.62	0.85			0.35	0.55	1.04	0.28	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 88 (51%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 41.6
 Intersection LOS: D
 Intersection Capacity Utilization: 105.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø2	ø1	ø4
132.7 s	15.3 s	24 s
ø5	ø6	
15.4 s	132.6 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Leadmine Rd

Lead Mine Flyover AM (2035)
6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	569	4333	184	984	4107	870	91	332	769	0	876	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%			0%	
Storage Length (ft)	825		0	0		0	90		0	0		0
Storage Lanes	2		0	2		1	1		1	0		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frnt		0.994				0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	3399	6306	0	3433	5085	1583	1752	3504	1567	0	3437	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	3399	6306	0	3433	5085	1583	1752	3504	1567	0	3437	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			10	
Link Distance (ft)		1624			172			433			193	
Travel Time (s)		24.6			2.6			8.4			13.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	569	4333	184	984	4107	870	91	332	769	0	876	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	569	4517	0	984	4107	870	91	332	769	0	1089	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov			
Protected Phases	5	2		1	6		3	8	1		4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	6	3	8	1		4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	6.0	6.0	6.0		4.0	
Minimum Split (s)	13.5	17.5		13.5	17.5	17.5	13.5	13.5	13.5		20.0	
Total Split (s)	25.0	81.0	0.0	36.0	92.0	92.0	14.0	55.0	36.0	0.0	41.0	0.0
Total Split (%)	14.5%	47.1%	0.0%	20.9%	53.5%	53.5%	8.1%	32.0%	20.9%	0.0%	23.8%	0.0%
Maximum Green (s)	18.0	74.0		29.0	85.0	85.0	7.0	48.0	29.0		34.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0		5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead		Lead		Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes		Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0		3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None	None		None	
Act Effct Green (s)	20.0	76.0		31.0	87.0	87.0	9.0	50.0	86.0		36.0	
Actuated g/C Ratio	0.12	0.44		0.18	0.51	0.51	0.05	0.29	0.50		0.21	
v/c Ratio	1.44	1.62		1.59	1.60	1.09	0.99	0.33	0.98		1.51	
Control Delay	241.1	306.0		313.4	293.3	68.5	108.0	38.4	29.5		281.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Total Delay	241.1	306.0		313.4	293.3	68.5	108.0	38.4	29.5		281.8	
LOS	F	F		F	F	E	F	D	C		F	
Approach Delay		298.7			263.8			37.9			281.8	
Approach LOS		F			F			D			F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Leadmine Rd

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 50th (ft)	~447	~2123		~825	~2402	~1084	103	127	793			~895
Queue Length 95th (ft)	m#438	m#2062		m#569	m#1652	m412	m93	m107	m426			#1035
Internal Link Dist (ft)		1544			92			353				113
Turn Bay Length (ft)	825						90					
Base Capacity (vph)	395	2786		619	2572	801	92	1019	784			719
Starvation Cap Reductn	0	0		0	0	0	0	0	0			0
Spillback Cap Reductn	0	0		0	0	0	0	0	0			0
Storage Cap Reductn	0	0		0	0	0	0	0	0			0
Reduced v/c Ratio	1.44	1.62		1.59	1.60	1.09	0.99	0.33	0.98			1.51

Intersection Summary

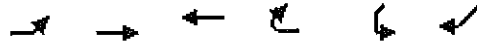
Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 148 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.62
 Intersection Signal Delay: 258.4
 Intersection LOS: F
 Intersection Capacity Utilization 148.3%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Leadmine Rd

ø1	ø2	ø3	ø4
36 s	81 s	14 s	41 s
ø5	ø6	ø7	ø8
25 s	92 s	55 s	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Volume (vph)	0	5276	3060	0	0	2901
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.86	0.81	1.00	1.00	0.76
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	6280	7620	0	0	3628
Flt Permitted						
Satd. Flow (perm)	0	6280	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		306	259		639	
Travel Time (s)		4.6	3.9		17.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5276	3060	0	0	2901
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5276	3060	0	0	2901
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	60.0	0.0	0.0	112.0
Total Split (%)	0.0%	0.0%	34.9%	0.0%	0.0%	65.1%
Maximum Green (s)			53.0			105.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		172.0	55.0			107.0
Actuated g/C Ratio		1.00	0.32			0.62
v/c Ratio		0.84	1.26			1.29
Control Delay		9.8	162.4			161.9
Queue Delay		0.0	0.0			0.0
Total Delay		9.8	162.4			161.9
LOS		A	F			F
Approach Delay		9.8	162.4			
Approach LOS		A	F			
Queue Length 50th (ft)		1377	~1056			~1814
Queue Length 95th (ft)		m0	m#902			#1890
Internal Link Dist (ft)		226	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Lead Mine Flyover AM (2035)
 6/21/2010

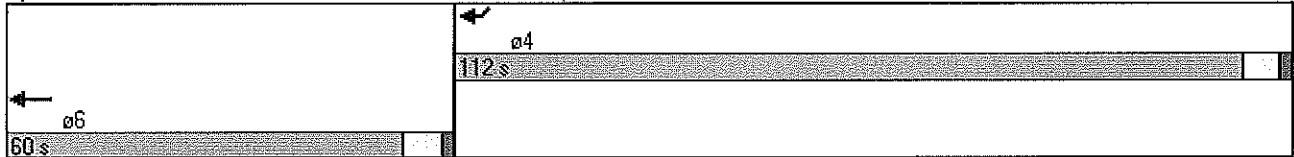


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		6280	2437			2257
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.84	1.26			1.29

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 128 (74%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.29
 Intersection Signal Delay: 90.6
 Intersection Capacity Utilization 144.5%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp



Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

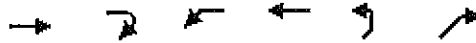
Lead Mine Flyover AM (2035)
6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	3222	0	0	1976	1281	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Flt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	3222	0	0	1976	1281	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	3222	0	0	1976	1281	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	119.0	0.0	0.0	119.0	53.0	0.0
Total Split (%)	69.2%	0.0%	0.0%	69.2%	30.8%	0.0%
Maximum Green (s)	112.0			112.0	46.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	114.0			114.0	48.0	
Actuated g/C Ratio	0.66			0.66	0.28	
v/c Ratio	1.40			0.57	1.34	
Control Delay	205.5			16.4	207.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	205.5			16.4	207.7	
LOS	F			B	F	
Approach Delay	205.5			16.4	207.7	
Approach LOS	F			B	F	
Queue Length 50th (ft)	~2551			418	~967	
Queue Length 95th (ft)	#2632			455	#1104	
Internal Link Dist (ft)	301			418	376	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	2299			3488	953	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.40			0.57	1.34	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 0 (0%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.40
 Intersection Signal Delay: 148.3
 Intersection Capacity Utilization 249.5%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
119 s	53 s

Lanes, Volumes, Timings

Lead Mine Flyover AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↗	↖	↔		↖	↗	↖	↖	↗	↖
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			0%				-6%
Storage Length (ft)	0		0	0		0	0		0	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	0		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor										1.00		
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1625	0	1770	3539	1583	1823	5233	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1599	1631	1625	0	1770	3539	1583	1821	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			117			703	
Travel Time (s)		6.0			24.6			1.8			10.7	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	14.0	45.0	45.0	0.0	14.0	95.0	45.0	18.0	99.0	0.0
Total Split (%)	8.1%	8.1%	8.1%	26.2%	26.2%	0.0%	8.1%	55.2%	26.2%	10.5%	57.6%	0.0%
Maximum Green (s)	7.0	7.0	7.0	38.0	38.0		7.0	88.0	38.0	11.0	92.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	Min	None	None	Min	
Act Effct Green (s)		9.0	17.1	40.1	40.1		9.0	87.6	130.8	18.5	94.2	
Actuated g/C Ratio		0.05	0.10	0.24	0.24		0.05	0.53	0.79	0.11	0.57	
v/c Ratio		0.17	0.39	0.96	0.95		0.70	0.76	0.23	0.34	0.98	
Control Delay		81.8	75.8	98.7	95.3		112.2	36.6	4.3	75.5	48.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		81.8	75.8	98.7	95.3		112.2	36.6	4.3	75.5	48.3	
LOS		F	E	F	F		F	D	A	E	D	

Lanes, Volumes, Timings

Lead Mine Flyover AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		77.1			97.0			34.3				49.0
Approach LOS		E			F			C				D
Queue Length 50th (ft)		19	66	453	441		76	722	58	73	~1266	
Queue Length 95th (ft)		48	120	#693	#675		#163	758	58	135	#1329	
Internal Link Dist (ft)		140			1181			37				623
Turn Bay Length (ft)										250		
Base Capacity (vph)		98	165	393	391		96	1998	1244	212	2961	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.17	0.39	0.96	0.95		0.70	0.71	0.23	0.33	0.98	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 166.4
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 51.1
 Intersection LOS: D
 Intersection Capacity Utilization 95.4%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø2	ø1	ø4	ø3
95 s	18 s	45 s	14 s
ø5	ø6		
14 s	99 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Frt		0.878				0.850		0.994			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1627	0	0	1837	2787	1805	5156	0	3416	3500	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	69	145	1046	46	82	2732	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	69	145	1092	0	82	2838	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	15.0	15.0	0.0	15.5	15.5	15.0	17.0	126.5	0.0	15.0	124.5	0.0
Total Split (%)	8.7%	8.7%	0.0%	9.0%	9.0%	8.7%	9.9%	73.5%	0.0%	8.7%	72.4%	0.0%
Maximum Green (s)	8.0	8.0		8.5	8.5	8.0	10.0	119.5		8.0	117.5	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	13.3	13.3		9.7	17.4	12.3	122.3			9.5	119.5	
Actuated g/C Ratio	0.08	0.08		0.06	0.10	0.07	0.71			0.06	0.69	
v/c Ratio	0.79	0.88		0.33	0.24	1.12	0.30			0.43	1.17	
Control Delay	111.2	128.2		86.5	56.8	178.1	13.2			68.2	103.9	
Queue Delay	0.0	132.1		0.0	0.0	0.0	0.7			0.0	54.9	
Total Delay	111.2	260.3		86.5	56.8	178.1	13.9			68.2	158.8	
LOS	F	F		F	E	F	B			E	F	
Approach Delay		187.1			66.6		33.1				156.3	
Approach LOS		F			E		C				F	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	123	~139			38	35	~183	338		48	~2030	
Queue Length 95th (ft)	#270	#289			79	61	#341	83		m32	m409	
Internal Link Dist (ft)		104			168			329			187	
Turn Bay Length (ft)										200		
Base Capacity (vph)	136	126			112	290	129	3666		199	2432	
Starvation Cap Reductn	0	0			0	0	0	2087		0	202	
Spillback Cap Reductn	0	40			0	0	0	0		0	232	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.79	1.29			0.30	0.24	1.12	0.69		0.41	1.29	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.17
 Intersection Signal Delay: 121.7
 Intersection LOS: F
 Intersection Capacity Utilization: 112.0%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

φ1	φ2	φ4	φ3
15 s	126.5 s	15.5 s	15 s
φ5	φ6		
17 s	124.5 s		

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↖	↗	↗	↖	↗↖↗		↖	↗↖↗	
Volume (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frnt						0.850		0.967				
Fit Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	1863	0	1770	1863	1583	1770	4903	0	1770	3539	0
Fit Permitted				0.757			0.950			0.950		
Satd. Flow (perm)	0	1863	0	1410	1863	1583	1770	4903	0	1770	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1553			404			409	
Travel Time (s)		2.9			23.5			6.1			6.2	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	126	4	202	5	1035	288	544	2285	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	126	4	202	5	1323	0	544	2288	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	25.0	25.0	0.0	25.0	25.0	80.0	14.0	67.0	0.0	80.0	133.0	0.0
Total Split (%)	14.5%	14.5%	0.0%	14.5%	14.5%	46.5%	8.1%	39.0%	0.0%	46.5%	77.3%	0.0%
Maximum Green (s)	18.0	18.0		18.0	18.0	73.0	7.0	60.0		73.0	126.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)				21.4	21.4	82.3	9.0	79.7		56.0	137.8	
Actuated g/C Ratio				0.12	0.12	0.48	0.05	0.46		0.33	0.80	
v/c Ratio				0.72	0.02	0.27	0.05	0.58		0.94	0.81	
Control Delay				84.1	55.2	20.2	79.0	37.2		46.7	7.0	
Queue Delay				0.0	0.0	0.0	0.0	0.0		10.0	44.2	
Total Delay				84.1	55.2	20.2	79.0	37.2		56.8	51.2	
LOS				F	E	C	E	D		E	D	
Approach Delay					44.9			37.4			52.3	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					D			D				D
Queue Length 50th (ft)				116	3	92	6	379		~668		392
Queue Length 95th (ft)				#250	m16	121	22	538		m309		m57
Internal Link Dist (ft)		109				1473			324			329
Turn Bay Length (ft)							40					
Base Capacity (vph)				183	242	775	93	2271		772		2836
Starvation Cap Reductn				0	0	0	0	0		199		744
Spillback Cap Reductn				0	0	0	0	0		0		0
Storage Cap Reductn				0	0	0	0	0		0		0
Reduced v/c Ratio				0.69	0.02	0.26	0.05	0.58		0.95		1.09

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 168 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 47.3
 Intersection LOS: D
 Intersection Capacity Utilization 88.6%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø2	ø1	ø4
67 s	80 s	25 s
ø5	ø6	ø8
14 s	133 s	25 s

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	348	139	45	32	111	276	213	568	55	397	1041	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	0		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor										0.99		
Frt			0.850		0.911			0.987			0.964	
Flt Protected	0.950				0.996		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1690	0	1770	1839	0	1770	1796	0
Flt Permitted	0.950				0.963		0.950			0.950		
Satd. Flow (perm)	1770	1863	1583	0	1634	0	1770	1839	0	1754	1796	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			133			907			285	
Travel Time (s)		18.1			3.6			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	348	139	45	32	111	276	213	568	55	397	1041	326
Shared Lane Traffic (%)												
Lane Group Flow (vph)	348	139	45	0	419	0	213	623	0	397	1367	0
Turn Type	Prot		pt+ov	Perm			Prot			Prot		
Protected Phases	7	4	4 5		8		5	2		1	6	
Permitted Phases				8								
Detector Phase	7	4	4 5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	7.0		7.0	7.0		4.0	12.0		4.0	7.0	
Minimum Split (s)	11.0	20.0		20.0	20.0		11.0	20.0		11.0	20.0	
Total Split (s)	26.0	63.0	82.0	37.0	37.0	0.0	19.0	67.0	0.0	42.0	90.0	0.0
Total Split (%)	15.1%	36.6%	47.7%	21.5%	21.5%	0.0%	11.0%	39.0%	0.0%	24.4%	52.3%	0.0%
Maximum Green (s)	19.0	56.0		30.0	30.0		12.0	60.0		35.0	83.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	21.0	58.0	77.0		32.0		14.0	62.0		37.0	85.0	
Actuated g/C Ratio	0.12	0.34	0.45		0.19		0.08	0.36		0.22	0.49	
v/c Ratio	1.61	0.22	0.06		1.38		1.48	0.94		1.04	1.54	
Control Delay	341.5	49.0	34.4		238.3		298.0	75.8		57.3	275.0	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	35.2	
Total Delay	341.5	49.0	34.4		238.3		298.0	75.8		57.3	310.2	
LOS	F	D	C		F		F	E		E	F	
Approach Delay		239.1			238.3			132.4			253.2	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Lead Mine Flyover AM (2035)
 6/21/2010

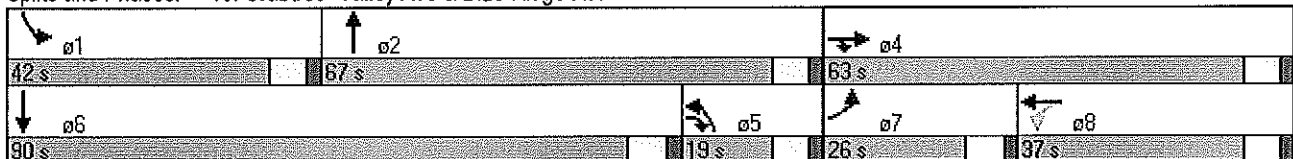


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F				F				F		
Queue Length 50th (ft)	~571	130	37		~623		~329	681		~492	~2197	
Queue Length 95th (ft)	#784	188	57		#850		#511	#930		m214	m#1078	
Internal Link Dist (ft)		1112				53				827		
Turn Bay Length (ft)	500						150					
Base Capacity (vph)	216	628	709		304		144	663		381	888	
Starvation Cap Reductn	0	0	0		0		0	0		0	43	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.61	0.22	0.06		1.38		1.48	0.94		1.04	1.62	

Intersection Summary

Area Type: Other
 Cycle Length: 172
 Actuated Cycle Length: 172
 Offset: 2 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 220.9
 Intersection LOS: F
 Intersection Capacity Utilization 146.9%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Lead Mine Flyover AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	387	387	54	492	104	89	69	118	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.974			0.905			0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3274	0	1770	3447	0	1770	1686	0	1770	1656	0
Flt Permitted	0.422			0.341			0.700			0.525		
Satd. Flow (perm)	786	3274	0	635	3447	0	1304	1686	0	978	1656	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		571			1192			291			153	
Travel Time (s)		8.7			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	387	387	54	492	104	89	69	118	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	774	0	54	596	0	89	187	0	27	88	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	53.0	53.0	0.0	53.0	53.0	0.0	33.0	33.0	0.0	33.0	33.0	0.0
Total Split (%)	61.6%	61.6%	0.0%	61.6%	61.6%	0.0%	38.4%	38.4%	0.0%	38.4%	38.4%	0.0%
Maximum Green (s)	46.0	46.0		46.0	46.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	59.2	59.2		59.2	59.2		16.8	16.8		16.8	16.8	
Actuated g/C Ratio	0.69	0.69		0.69	0.69		0.20	0.20		0.20	0.20	
v/c Ratio	0.13	0.34		0.12	0.25		0.35	0.57		0.14	0.27	
Control Delay	8.2	10.3		3.3	3.3		32.4	37.4		28.2	30.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.2	10.3		3.3	3.3		32.4	37.4		28.2	30.0	
LOS	A	B		A	A		C	D		C	C	
Approach Delay		10.2			3.3			35.8			29.6	
Approach LOS		B			A			D			C	
Queue Length 50th (ft)	26	245		9	55		42	92		12	41	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Lead Mine Flyover AM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m41	240		m7	m44		78	146		32	75	
Internal Link Dist (ft)		491			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	541	2253		437	2372		425	549		318	539	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.13	0.34		0.12	0.25		0.21	0.34		0.08	0.16	

Intersection Summary

Area Type: Other
 Cycle Length: 86
 Actuated Cycle Length: 86
 Offset: 64 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 12.8
 Intersection LOS: B
 Intersection Capacity Utilization 66.5%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø4
53 s	33 s
ø6	ø8
53 s	33 s

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd

Lead Mine Flyover AM (2035)
 6/21/2010



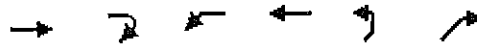
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	↘↘
Volume (veh/h)	0	63	0	1192	1701	343
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	63	0	1192	1701	343
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				661	433	
pX, platoon unblocked	0.77	0.77	0.77			
vC, conflicting volume	2297	1701	1701			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2530	1760	1760			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	17	57	272			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	63	596	596	1770	137	137
Volume Left	0	0	0	0	0	0
Volume Right	63	0	0	69	137	137
cSH	57	1700	1700	1700	1700	1700
Volume to Capacity	1.11	0.35	0.35	1.04	0.08	0.08
Queue Length 95th (ft)	131	0	0	0	0	0
Control Delay (s)	270.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	270.8	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization		104.2%		ICU Level of Service		G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

Lead Mine Flyover AM (2035)
 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↵	↑↑	↵	
Volume (veh/h)	732	100	342	303	29	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	732	100	342	303	29	112
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				571		
pX, platoon unblocked						
vC, conflicting volume			732		1618	416
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			732		1618	416
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			61		49	81
cM capacity (veh/h)			868		57	585

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	488	344	342	152	152	141
Volume Left	0	0	342	0	0	29
Volume Right	0	100	0	0	0	112
cSH	1700	1700	868	1700	1700	202
Volume to Capacity	0.29	0.20	0.39	0.09	0.09	0.70
Queue Length 95th (ft)	0	0	47	0	0	110
Control Delay (s)	0.0	0.0	11.8	0.0	0.0	56.1
Lane LOS			B			F
Approach Delay (s)	0.0		6.3			56.1
Approach LOS						F

Intersection Summary						
Average Delay			7.4			
Intersection Capacity Utilization			60.9%		ICU Level of Service	B
Analysis Period (min)			15			

Network Totals

Number of Intersections	36
Control Delay / Veh (s/v)	61
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	62
Total Delay (hr)	5211
Stops / Veh	0.17
Stops (#)	49736
Average Speed (mph)	6
Total Travel Time (hr)	6002
Distance Traveled (mi)	38559
Fuel Consumed (gal)	5723
Fuel Economy (mpg)	6.7
CO Emissions (kg)	400.05
NOx Emissions (kg)	77.84
VOC Emissions (kg)	92.72
Unserved Vehicles (#)	12088
Vehicles in dilemma zone (#)	1391
Performance Index	5349.6

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Lead Mine Flyover PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑		↖↖	↑↑↑	↖	↖↖	↑↑	↖	↖↖	↑↑	↖↖
Volume (vph)	322	3512	407	492	3693	1743	1018	1878	388	1239	1266	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.984				0.850			0.850		0.983	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6305	0	3433	5085	1583	3433	3539	1583	3467	3514	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6305	0	3433	5085	1583	3433	3539	1583	3467	3514	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1166			1075			606			1605	
Travel Time (s)		17.7			16.3			9.2			24.3	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	3512	407	492	3693	1743	1018	1878	388	1239	1266	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	3919	0	492	3693	1743	1018	1878	388	1239	1432	0
Tum Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3		14.4	17.4	14.3	14.4	17.4	
Total Split (s)	22.0	65.0	0.0	20.0	63.0	0.0	29.0	46.0	20.0	33.0	50.0	0.0
Total Split (%)	13.4%	39.6%	0.0%	12.2%	38.4%	0.0%	17.7%	28.0%	12.2%	20.1%	30.5%	0.0%
Maximum Green (s)	15.0	58.0		13.0	56.0		22.0	39.0	13.0	26.0	43.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	17.0	60.0		15.0	58.0	164.0	24.0	41.0	56.0	28.0	45.0	
Actuated g/C Ratio	0.10	0.37		0.09	0.35	1.00	0.15	0.25	0.34	0.17	0.27	
v/c Ratio	1.76	1.70		1.57	2.05	1.10	2.03	2.12	0.72	2.09	1.49	
Control Delay	401.7	348.9		310.4	503.2	75.3	494.4	532.4	27.8	528.1	264.2	
Queue Delay	0.0	0.0		9.1	0.0	0.0	0.0	0.0	0.0	0.0	4.9	
Total Delay	401.7	348.9		319.4	503.2	75.3	494.4	532.4	27.8	528.1	269.1	
LOS	F	F		F	F	E	F	F	C	F	F	

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Lead Mine Flyover PM (2035)

6/21/2010

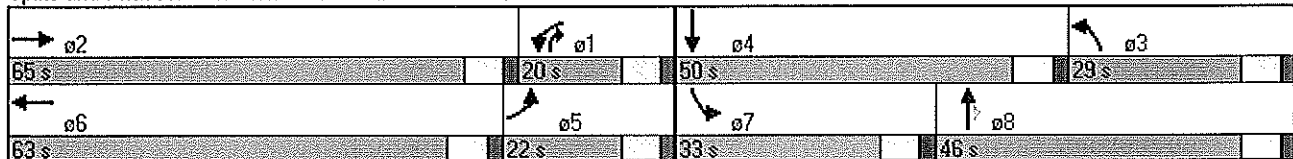


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		352.9			362.1			461.0			389.2	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~512	~1787		~393	~2329	~1429	~883	~1689	186	~1080	~1111	
Queue Length 95th (ft)	#716	#1814		m#220	m#1370	m593	m#977	#1817	m206	#1218	#1251	
Internal Link Dist (ft)		1086			995			526			1525	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	183	2307		314	1798	1583	502	885	541	592	964	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		4	0	0	0	0	0	0	7	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.76	1.70		1.59	2.05	1.10	2.03	2.12	0.72	2.09	1.50	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 8 (5%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.12
 Intersection Signal Delay: 384.3
 Intersection LOS: F
 Intersection Capacity Utilization 193.1%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Lead Mine Flyover PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	4831	272	412	5622	112	246	9	1334	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Fr		0.992			0.997				0.850		0.877	
Flt Protected	0.950			0.950				0.954		0.950		
Satd. Flow (prot)	1752	6293	0	1770	6389	0	0	1786	1591	1778	1642	0
Flt Permitted	0.950			0.950				0.681		0.392		
Satd. Flow (perm)	1752	6293	0	1770	6389	0	0	1275	1591	734	1642	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1075			1624			201			281	
Travel Time (s)		16.3			24.6			5.5			5.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	4831	272	412	5622	112	246	9	1334	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	5103	0	412	5734	0	0	255	1334	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	79.0	0.0	37.0	100.6	0.0	48.0	48.0	37.0	48.0	48.0	0.0
Total Split (%)	9.4%	48.2%	0.0%	22.6%	61.3%	0.0%	29.3%	29.3%	22.6%	29.3%	29.3%	0.0%
Maximum Green (s)	8.4	72.0		30.0	93.6		41.0	41.0	30.0	41.0	41.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	9.9	74.0		32.0	98.9			43.0	80.0	43.0	43.0	
Actuated g/C Ratio	0.06	0.45		0.20	0.60			0.26	0.49	0.26	0.26	
v/c Ratio	0.34	1.80		1.19	1.49			0.76	1.72	1.51	0.17	
Control Delay	61.8	383.3		124.0	236.4			71.8	357.8	292.5	48.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	61.8	383.3		124.0	236.4			71.8	357.8	292.5	48.0	
LOS	E	F		F	F			E	F	F	D	
Approach Delay		381.1			228.8			311.9			243.7	
Approach LOS		F			F			F			F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	35	~2381		~545	~2564			255	~2103	~429	60	
Queue Length 95th (ft)	m21	m#1028		m180	m41			#384	#2370	#626	106	
Internal Link Dist (ft)		995			1544			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	111	2840		345	3852			334	776	192	431	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.32	1.80		1.19	1.49			0.76	1.72	1.51	0.17	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 78 (48%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.80
 Intersection Signal Delay: 298.3
 Intersection Capacity Utilization 185.7%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

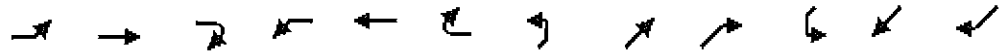
~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø2	ø1	ø4
79 s	37 s	48 s
ø5	ø6	
15.4 s	100.6 s	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Leadmine Rd

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	896	5401	157	1641	5860	1875	117	498	1166	0	586	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%			0%	
Storage Length (ft)	825		0	0		0	90		0	0		0
Storage Lanes	2		0	2		1	1		1	0		0
Taper Length (ft)	200		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Fr		0.996				0.850			0.850		0.966	
Fit Protected	0.950			0.950			0.950					
Satd. Flow (prot)	3399	6318	0	3433	5085	1583	1752	3504	1567	0	3419	0
Fit Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	3399	6318	0	3433	5085	1583	1752	3504	1567	0	3419	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			10	
Link Distance (ft)		1624			172			433			193	
Travel Time (s)		24.6			2.6			8.4			13.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	896	5401	157	1641	5860	1875	117	498	1166	0	586	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	896	5558	0	1641	5860	1875	117	498	1166	0	755	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov			
Protected Phases	5	2		1	6		3	8	1		4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	6	3	8	1		4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	6.0	6.0	6.0		4.0	
Minimum Split (s)	13.5	17.5		13.5	17.5	17.5	13.5	13.5	13.5		20.0	
Total Split (s)	28.0	77.0	0.0	44.0	93.0	93.0	14.0	43.0	44.0	0.0	29.0	0.0
Total Split (%)	17.1%	47.0%	0.0%	26.8%	56.7%	56.7%	8.5%	26.2%	26.8%	0.0%	17.7%	0.0%
Maximum Green (s)	21.0	70.0		37.0	86.0	86.0	7.0	36.0	37.0		22.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0		5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lead		Lead		Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes		Yes		Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0		3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None	None		None	
Act Effct Green (s)	23.0	72.0		39.0	88.0	88.0	9.0	38.0	82.0		24.0	
Actuated g/C Ratio	0.14	0.44		0.24	0.54	0.54	0.05	0.23	0.50		0.15	
v/c Ratio	1.88	2.00		2.01	2.15	2.21	1.22	0.61	1.49		1.51	
Control Delay	426.1	474.0		487.4	537.1	564.4	163.0	43.8	249.2		283.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Total Delay	426.1	474.0		487.4	537.1	564.4	163.0	43.8	249.2		283.8	
LOS	F	F		F	F	F	F	D	F		F	
Approach Delay		467.4			533.9			186.1			283.8	
Approach LOS		F			F			F			F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Leadmine Rd

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 50th (ft)	~766	~2741		~1414	~3694	~3254	~153	242	~1736			~590
Queue Length 95th (ft)	m#313	m#1154		m#518	m#1407	m#1257	m90	m161	m#963			#725
Internal Link Dist (ft)		1544			92			353				113
Turn Bay Length (ft)	825						90					
Base Capacity (vph)	477	2774		816	2729	849	96	812	784			500
Starvation Cap Reductn	0	0		0	0	0	0	0	0			0
Spillback Cap Reductn	0	0		0	0	0	0	0	0			0
Storage Cap Reductn	0	0		0	0	0	0	0	0			0
Reduced v/c Ratio	1.88	2.00		2.01	2.15	2.21	1.22	0.61	1.49			1.51

Intersection Summary

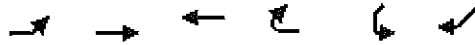
Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 100 (61%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.21
 Intersection Signal Delay: 466.5
 Intersection LOS: F
 Intersection Capacity Utilization 183.5%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Leadmine Rd

ø1	ø2	ø3	ø4
44 s	77 s	14 s	29 s
ø6	ø5	ø8	
93 s	28 s	43 s	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

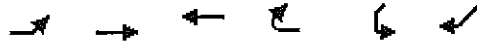
Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑↑	↑↑↑↑			↑↑↑
Volume (vph)	0	5050	5063	0	0	4313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-2%		-1%	
Lane Util. Factor	1.00	0.86	0.81	1.00	1.00	0.76
Frt						0.850
Fit Protected						
Satd. Flow (prot)	0	6280	7620	0	0	3628
Fit Permitted						
Satd. Flow (perm)	0	6280	7620	0	0	3628
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		25	
Link Distance (ft)		306	259		639	
Travel Time (s)		4.6	3.9		17.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5050	5063	0	0	4313
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	5050	5063	0	0	4313
Turn Type						custom
Protected Phases		Free	6			4
Permitted Phases						
Detector Phase			6			4
Switch Phase						
Minimum Initial (s)			7.0			7.0
Minimum Split (s)			14.0			14.0
Total Split (s)	0.0	0.0	68.0	0.0	0.0	96.0
Total Split (%)	0.0%	0.0%	41.5%	0.0%	0.0%	58.5%
Maximum Green (s)			61.0			89.0
Yellow Time (s)			5.0			5.0
All-Red Time (s)			2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)			3.0			3.0
Recall Mode			C-Min			None
Act Effct Green (s)		164.0	63.0			91.0
Actuated g/C Ratio		1.00	0.38			0.55
v/c Ratio		0.80	1.73			2.14
Control Delay		9.7	357.0			538.7
Queue Delay		0.0	0.0			0.0
Total Delay		9.7	357.0			538.7
LOS		A	F			F
Approach Delay		9.7	357.0			
Approach LOS		A	F			
Queue Length 50th (ft)		781	~1981			~3223
Queue Length 95th (ft)		m0	m#1326			#3246
Internal Link Dist (ft)		226	179		559	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Turn Bay Length (ft)						
Base Capacity (vph)		6280	2927			2013
Starvation Cap Reductn		0	0			0
Spillback Cap Reductn		0	0			0
Storage Cap Reductn		0	0			0
Reduced v/c Ratio		0.80	1.73			2.14

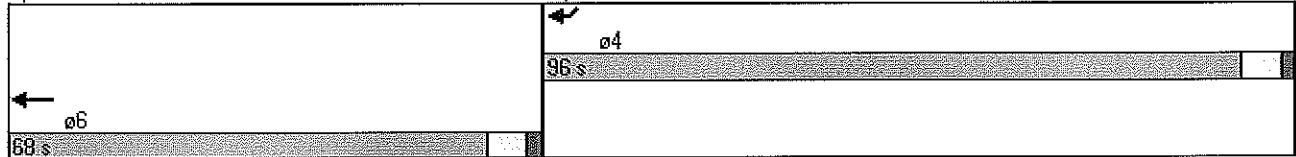
Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 62 (38%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.14
 Intersection Signal Delay: 289.8
 Intersection Capacity Utilization 167.6%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service H

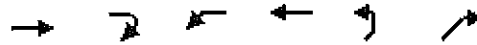
- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp



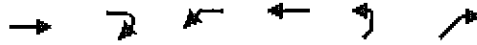
Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Lead Mine Flyover PM (2035)
6/21/2010



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑↑	↑↑	
Volume (vph)	2258	0	0	3142	2192	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	4%			-7%	1%	
Lane Util. Factor	0.95	1.00	1.00	0.91	0.97	1.00
Frt						
Flt Protected					0.950	
Satd. Flow (prot)	3468	0	0	5263	3416	0
Flt Permitted					0.950	
Satd. Flow (perm)	3468	0	0	5263	3416	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	45			45	25	
Link Distance (ft)	381			498	456	
Travel Time (s)	5.8			7.5	12.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2258	0	0	3142	2192	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2258	0	0	3142	2192	0
Turn Type						
Protected Phases	6			6	8	
Permitted Phases						
Detector Phase	6			6	8	
Switch Phase						
Minimum Initial (s)	7.0			7.0	7.0	
Minimum Split (s)	14.0			14.0	14.0	
Total Split (s)	83.0	0.0	0.0	83.0	81.0	0.0
Total Split (%)	50.6%	0.0%	0.0%	50.6%	49.4%	0.0%
Maximum Green (s)	76.0			76.0	74.0	
Yellow Time (s)	5.0			5.0	5.0	
All-Red Time (s)	2.0			2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	2.0	5.0	5.0	2.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	2.0	
Recall Mode	C-Min			C-Min	None	
Act Effct Green (s)	78.0			78.0	76.0	
Actuated g/C Ratio	0.48			0.48	0.46	
v/c Ratio	1.37			1.26	1.38	
Control Delay	203.9			155.3	212.1	
Queue Delay	0.0			0.0	0.0	
Total Delay	203.9			155.3	212.1	
LOS	F			F	F	
Approach Delay	203.9			155.3	212.1	
Approach LOS	F			F	F	
Queue Length 50th (ft)	~1699			~1539	~1604	
Queue Length 95th (ft)	#1824			#1600	#1726	
Internal Link Dist (ft)	301			418	376	

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp



Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Turn Bay Length (ft)						
Base Capacity (vph)	1649			2503	1583	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	1.37			1.26	1.38	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 32 (20%), Referenced to phase 6:EBWB, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.38
 Intersection Signal Delay: 186.2
 Intersection Capacity Utilization 331.9%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

06	08
83 s	81 s

Lanes, Volumes, Timings

Lead Mine Flyover PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕	↗	↖	↕	↖
Volume (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			0%				-6%
Storage Length (ft)	0		0	0		0	0		0	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	0		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor										1.00		
Frt			0.850		0.957				0.850		0.999	
Flt Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1587	0	1770	3539	1583	1823	5233	0
Flt Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1599	1631	1587	0	1770	3539	1583	1822	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			117			703	
Travel Time (s)		6.0			24.6			1.8			10.7	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2495	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2495	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	23.0	28.0	28.0	0.0	23.0	108.0	28.0	14.0	99.0	0.0
Total Split (%)	8.5%	8.5%	14.0%	17.1%	17.1%	0.0%	14.0%	65.9%	17.1%	8.5%	60.4%	0.0%
Maximum Green (s)	7.0	7.0	16.0	21.0	21.0		16.0	101.0	21.0	7.0	92.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	Min	None	None	Min	
Act Effct Green (s)		9.0	25.2	23.0	23.0		14.2	103.1	127.2	9.0	97.9	
Actuated g/C Ratio		0.06	0.16	0.14	0.14		0.09	0.64	0.79	0.06	0.61	
v/c Ratio		0.41	0.24	1.04	1.04		0.65	1.10	0.54	0.65	0.57	
Control Delay		87.4	60.1	134.1	136.3		90.3	82.1	5.4	103.1	20.8	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		87.4	60.1	134.1	136.3		90.3	82.1	5.4	103.1	20.8	
LOS		F	E	F	F		F	F	A	F	C	

Lanes, Volumes, Timings

Lead Mine Flyover PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		71.0			135.2			66.5				23.7
Approach LOS		E			F			E				C
Queue Length 50th (ft)		43	57	~298	~293		107	~1618	106	71		431
Queue Length 95th (ft)		88	102	#494	#488		171	#1732	142	#147		499
Internal Link Dist (ft)		140			1181			37				623
Turn Bay Length (ft)										250		
Base Capacity (vph)		101	288	233	227		198	2264	1249	102		3179
Starvation Cap Reductn		0	0	0	0		0	0	0	0		0
Spillback Cap Reductn		0	0	0	0		0	0	0	0		0
Storage Cap Reductn		0	0	0	0		0	0	0	0		0
Reduced v/c Ratio		0.41	0.21	1.04	1.04		0.51	1.10	0.54	0.65		0.57

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 161.2
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 58.3
 Intersection LOS: E
 Intersection Capacity Utilization 107.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø2	ø1	ø4	ø3
108 s	14 s	28 s	14 s
ø5	ø6		
23 s	99 s		

Lanes, Volumes, Timings
7: Office Center Entrance & Creedmoor Rd.

Lead Mine Flyover PM (2035)
6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	561	93	2585	150	409	1998	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Fr		0.892				0.850		0.992			0.994	
Fit Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1653	0	0	1788	2787	1805	5146	0	3416	3500	0
Fit Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1653	0	0	1788	2787	1805	5146	0	3416	3500	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			248			409			267	
Travel Time (s)		5.0			8.5			8.0			5.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	561	93	2585	150	409	1998	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	561	93	2735	0	409	2085	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		15.5	15.5	15.0	15.0	18.0		15.0	18.0	
Total Split (s)	19.0	19.0	0.0	20.4	20.4	26.0	15.0	98.6	0.0	26.0	109.6	0.0
Total Split (%)	11.6%	11.6%	0.0%	12.4%	12.4%	15.9%	9.1%	60.1%	0.0%	15.9%	66.8%	0.0%
Maximum Green (s)	12.0	12.0		13.4	13.4	19.0	8.0	91.6		19.0	102.6	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)	14.0	14.0		15.4	15.4	21.0	10.0	93.6		21.0	104.6	
Actuated g/C Ratio	0.09	0.09		0.09	0.09	0.25	0.06	0.57		0.13	0.64	
v/c Ratio	0.92	0.71		0.90	0.90	0.80	0.85	0.93		0.94	0.93	
Control Delay	127.0	98.8		120.1	120.1	67.0	82.6	24.9		90.4	15.5	
Queue Delay	0.0	60.0		0.0	0.0	0.0	0.0	59.0		0.0	9.1	
Total Delay	127.0	158.8		120.1	120.1	67.0	82.6	83.8		90.4	24.6	
LOS	F	F		F	F	E	F	F		F	C	
Approach Delay		140.3			78.3			83.8			35.4	
Approach LOS		F			E			F			D	

Lanes, Volumes, Timings
 7: Office Center Entrance & Creedmoor Rd.

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	150	106			165	323	98	569		233	758	
Queue Length 95th (ft)	#291	#197			#307	405	m99	m511		m166	m113	
Internal Link Dist (ft)		104			168			329				187
Turn Bay Length (ft)										200		
Base Capacity (vph)	150	141			168	704	110	2937		437	2232	
Starvation Cap Reductn	0	0			0	0	0	521		0	159	
Spillback Cap Reductn	0	47			0	0	0	0		0	63	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.92	1.06			0.90	0.80	0.85	1.13		0.94	1.01	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 76 (46%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 66.1
 Intersection LOS: E
 Intersection Capacity Utilization 93.1%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1	ø2	ø3	ø4
26 s	98.6 s	19 s	20.4 s
ø6	ø5		
109.6 s	15 s		

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Lead Mine Flyover PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↑	↗	↖	↑↑↑		↖	↑↑	
Volume (vph)	36	0	0	172	17	517	14	2275	537	494	1700	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	40		0	0		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.95	0.95
Ped Bike Factor								1.00				
Frt						0.850		0.971				
Flt Protected		0.950		0.950			0.950			0.950		
Satd. Flow (prot)	0	1770	0	1770	1863	1583	1770	4925	0	1770	3539	0
Flt Permitted		0.746		0.756			0.950			0.950		
Satd. Flow (perm)	0	1390	0	1408	1863	1583	1770	4925	0	1770	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		189			1553			404			409	
Travel Time (s)		2.9			23.5			6.1			6.2	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	0	0	172	17	517	14	2275	537	494	1700	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	0	172	17	517	14	2812	0	494	1702	0
Turn Type	Perm			Perm		pm+ov	Prot			Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8						
Detector Phase	4	4		8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	12.0		7.0	12.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	22.0	22.0	0.0	22.0	22.0	47.0	14.0	95.0	0.0	47.0	128.0	0.0
Total Split (%)	13.4%	13.4%	0.0%	13.4%	13.4%	28.7%	8.5%	57.9%	0.0%	28.7%	78.0%	0.0%
Maximum Green (s)	15.0	15.0		15.0	15.0	40.0	7.0	88.0		40.0	121.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag						Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		17.0		17.0	17.0	64.0	9.0	90.0		42.0	134.2	
Actuated g/C Ratio		0.10		0.10	0.10	0.39	0.05	0.55		0.26	0.82	
v/c Ratio		0.25		1.18	0.09	0.84	0.14	1.04		1.09	0.59	
Control Delay		72.6		193.1	73.5	52.4	77.4	65.1		115.4	1.4	
Queue Delay		0.0		0.0	0.0	69.9	0.0	2.9		120.9	1.2	
Total Delay		72.6		193.1	73.5	122.4	77.4	68.0		236.3	2.5	
LOS		E		F	E	F	E	E		F	A	
Approach Delay		72.6			138.4			68.0			55.1	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		E			F			E			E	
Queue Length 50th (ft)		36		~221	18	468	15	~1189		~592	66	
Queue Length 95th (ft)		77		m#385	m38	#669	41	#1260		m#677	83	
Internal Link Dist (ft)		109			1473			324			329	
Turn Bay Length (ft)							40					
Base Capacity (vph)		144		146	193	618	97	2703		453	2896	
Starvation Cap Reductn		0		0	0	0	0	0		93	883	
Spillback Cap Reductn		0		0	0	167	0	19		0	0	
Storage Cap Reductn		0		0	0	0	0	0		0	0	
Reduced v/c Ratio		0.25		1.18	0.09	1.15	0.14	1.05		1.37	0.85	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 94 (57%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 71.8
 Intersection LOS: E
 Intersection Capacity Utilization 106.3%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø1 47 s	ø2 95 s	ø4 22 s
ø6 128 s	ø5 14 s	ø8 22 s

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Lead Mine Flyover PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↔	↗	↖	↑	↗	↖	↑	↗
Volume (vph)	261	195	217	27	166	303	435	1217	20	319	913	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		0	0		0	150		0	0		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98							0.99		
Frt			0.850		0.918			0.998			0.969	
Flt Protected	0.950				0.997		0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	0	1705	0	1770	1859	0	1770	1805	0
Flt Permitted	0.950				0.971		0.950			0.950		
Satd. Flow (perm)	1770	1863	1548	0	1660	0	1770	1859	0	1757	1805	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			133			907			285	
Travel Time (s)		18.1			3.6			17.7			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	261	195	217	27	166	303	435	1217	20	319	913	238
Shared Lane Traffic (%)												
Lane Group Flow (vph)	261	195	217	0	496	0	435	1237	0	319	1151	0
Turn Type	Prot		pm+ov	Perm			Prot			Prot		
Protected Phases	7	4	5		8		5	2		1	6	
Permitted Phases			4	8								
Detector Phase	7	4	5	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	7.0	4.0	7.0	7.0		4.0	12.0		4.0	7.0	
Minimum Split (s)	11.0	20.0	11.0	20.0	20.0		11.0	20.0		11.0	20.0	
Total Split (s)	20.0	60.0	30.0	40.0	40.0	0.0	30.0	80.0	0.0	24.0	74.0	0.0
Total Split (%)	12.2%	36.6%	18.3%	24.4%	24.4%	0.0%	18.3%	48.8%	0.0%	14.6%	45.1%	0.0%
Maximum Green (s)	13.0	53.0	23.0	33.0	33.0		23.0	73.0		17.0	67.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead		Lag	Lag	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	15.0	55.0	80.0		35.0		25.0	75.0		19.0	69.0	
Actuated g/C Ratio	0.09	0.34	0.49		0.21		0.15	0.46		0.12	0.42	
v/c Ratio	1.61	0.31	0.29		1.40		1.61	1.46		1.56	1.52	
Control Delay	339.4	43.1	23.3		241.9		332.5	245.3		291.4	260.6	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	339.4	43.1	23.3		241.9		332.5	245.3		291.4	260.6	
LOS	F	D	C		F		F	F		F	F	
Approach Delay		151.6			241.9			268.0			267.2	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Lead Mine Flyover PM (2035)
 6/21/2010

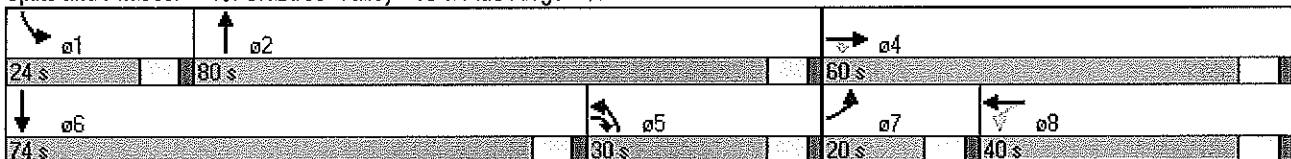


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F				F				F		
Queue Length 50th (ft)	~404	183	121		~709		~667	~1805		~470	~1749	
Queue Length 95th (ft)	#594	257	188		#942		#892	#2072		m#216	m812	
Internal Link Dist (ft)		1112				53				827		
Turn Bay Length (ft)	500						150					
Base Capacity (vph)	162	625	760		354		270	850		205	759	
Starvation Cap Reductn	0	0	0		0		0	0		0	0	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	1.61	0.31	0.29		1.40		1.61	1.46		1.56	1.52	

Intersection Summary

Area Type: Other
 Cycle Length: 164
 Actuated Cycle Length: 164
 Offset: 104 (63%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 246.6
 Intersection LOS: F
 Intersection Capacity Utilization 146.6%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Lead Mine Flyover PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕↔		↔	↕↔		↔	↕		↔	↕	
Volume (vph)	192	535	356	144	475	220	135	293	33	105	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	500		0	100		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940			0.953			0.985			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3327	0	1770	3373	0	1770	1835	0	1770	1693	0
Flt Permitted	0.350			0.264			0.275			0.410		
Satd. Flow (perm)	652	3327	0	492	3373	0	512	1835	0	764	1693	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		571			1192			291			153	
Travel Time (s)		8.7			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	535	356	144	475	220	135	293	33	105	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	891	0	144	695	0	135	326	0	105	429	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	12.0	12.0		12.0	12.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	47.0	47.0	0.0	47.0	47.0	0.0	35.0	35.0	0.0	35.0	35.0	0.0
Total Split (%)	57.3%	57.3%	0.0%	57.3%	57.3%	0.0%	42.7%	42.7%	0.0%	42.7%	42.7%	0.0%
Maximum Green (s)	40.0	40.0		40.0	40.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)	45.4	45.4		45.4	45.4		26.6	26.6		26.6	26.6	
Actuated g/C Ratio	0.55	0.55		0.55	0.55		0.32	0.32		0.32	0.32	
v/c Ratio	0.53	0.48		0.53	0.37		0.81	0.55		0.42	0.78	
Control Delay	13.6	10.9		13.2	8.7		61.0	25.8		26.4	35.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.6	10.9		13.2	8.7		61.0	25.8		26.4	35.3	
LOS	B	B		B	A		E	C		C	D	
Approach Delay		11.4			9.5			36.1			33.6	
Approach LOS		B			A			D			C	
Queue Length 50th (ft)	69	163		34	77		61	131		40	190	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Lead Mine Flyover PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m57	m125		m17	m41		#154	203		84	290	
Internal Link Dist (ft)		491			1112			211			73	
Turn Bay Length (ft)	250			500			100					
Base Capacity (vph)	362	1845		273	1871		188	673		281	621	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.53	0.48		0.53	0.37		0.72	0.48		0.37	0.69	

Intersection Summary

Area Type: Other
 Cycle Length: 82
 Actuated Cycle Length: 82
 Offset: 78 (95%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 18.8
 Intersection Capacity Utilization 85.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service E

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø4
47 s	35 s
ø6	ø8
47 s	35 s

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd

Lead Mine Flyover PM (2035)
 6/21/2010



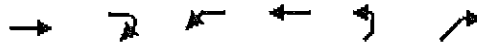
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↓	↘↘
Volume (veh/h)	0	241	0	1781	1230	1154
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	241	0	1781	1230	1154
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				661	433	
pX, platoon unblocked	0.85	0.85	0.85			
vC, conflicting volume	2120	1230	1230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2231	1182	1182			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	31	155	498			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	241	890	890	1461	462	462
Volume Left	0	0	0	0	0	0
Volume Right	241	0	0	231	462	462
cSH	155	1700	1700	1700	1700	1700
Volume to Capacity	1.56	0.52	0.52	0.86	0.27	0.27
Queue Length 95th (ft)	408	0	0	0	0	0
Control Delay (s)	332.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	332.6	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay			18.2			
Intersection Capacity Utilization			100.3%	ICU Level of Service		G
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 11: Crabtree Valley Ave & Edwards Mill Rd

Lead Mine Flyover PM (2035)
 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑		↵	↑↑	↵	
Volume (veh/h)	891	140	369	501	205	192
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	891	140	369	501	205	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				571		
pX, platoon unblocked						
vC, conflicting volume			891		1950	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			891		1950	516
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			51		0	62
cM capacity (veh/h)			757		29	504

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NE 1
Volume Total	594	437	369	250	250	397
Volume Left	0	0	369	0	0	205
Volume Right	0	140	0	0	0	192
cSH	1700	1700	757	1700	1700	53
Volume to Capacity	0.35	0.26	0.49	0.15	0.15	7.48
Queue Length 95th (ft)	0	0	68	0	0	Err
Control Delay (s)	0.0	0.0	14.2	0.0	0.0	Err
Lane LOS			B			F
Approach Delay (s)	0.0		6.0			Err
Approach LOS						F

Intersection Summary						
Average Delay			1729.7			
Intersection Capacity Utilization			82.7%	ICU Level of Service		E
Analysis Period (min)			15			

Network Totals

Number of Intersections	36
Control Delay / Veh (s/v)	116
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	116
Total Delay (hr)	10837
Stops / Veh	0.19
Stops (#)	63770
Average Speed (mph)	4
Total Travel Time (hr)	11727
Distance Traveled (mi)	42269
Fuel Consumed (gal)	10121
Fuel Economy (mpg)	4.2
CO Emissions (kg)	707.43
NOx Emissions (kg)	137.64
VOC Emissions (kg)	163.95
Unserved Vehicles (#)	28340
Vehicles in dilemma zone (#)	1060
Performance Index	11014.5

**2035 Crabtree Valley Ave (CVA)
Extensions**

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑	↔	↔	↑↑↑	↔	↔	↑↑	↔
Volume (vph)	120	2111	3	370	2264	814	19	708	129	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	100		0	450		0
Storage Lanes	1		0	1		2	1		1	2		0
Taper Length (ft)	100		100	100		100	200		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	0.88	1.00	0.91	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt						0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6408	0	3433	5085	2787	1770	5085	1583	3467	3521	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6408	0	3433	5085	2787	1770	5085	1583	3466	3521	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1611	
Travel Time (s)		32.4			16.3			11.8			24.4	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	2111	3	370	2264	814	19	708	129	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	2114	0	370	2264	814	19	708	129	1813	2004	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0	7.0	7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3	14.4	14.4	17.4	14.3	14.4	17.4	
Total Split (s)	14.3	45.0	0.0	17.0	47.7	50.0	14.4	20.0	17.0	50.0	55.6	0.0
Total Split (%)	10.8%	34.1%	0.0%	12.9%	36.1%	37.9%	10.9%	15.2%	12.9%	37.9%	42.1%	0.0%
Maximum Green (s)	7.3	38.0		10.0	40.7	43.0	7.4	13.0	10.0	43.0	48.6	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	3.0		2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	None
Act Effct Green (s)	9.3	40.0		12.0	42.7	87.7	9.2	15.0	32.0	45.0	59.2	
Actuated g/C Ratio	0.07	0.30		0.09	0.32	0.66	0.07	0.11	0.24	0.34	0.45	
v/c Ratio	0.96	1.09		1.19	1.38	0.44	0.15	1.22	0.34	1.53	1.27	
Control Delay	131.1	92.4		150.8	205.1	6.2	65.5	153.4	29.9	276.6	158.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	131.1	92.4		150.8	205.1	6.2	65.5	153.4	29.9	276.6	158.1	
LOS	F	F		F	F	A	E	F	C	F	F	

Lanes, Volumes, Timings
 1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		94.4			152.3			132.8				214.4
Approach LOS		F			F			F				F
Queue Length 50th (ft)	104	~590		~202	~967	159	18	~270	95	~1120	~1064	
Queue Length 95th (ft)	#232	#665		#308	#1062	177	m34	#361	162	#1256	#1381	
Internal Link Dist (ft)		2057			996			528				1531
Turn Bay Length (ft)	230			400		260	100			450		
Base Capacity (vph)	125	1942		312	1645	1852	126	578	384	1182	1580	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	1.09		1.19	1.38	0.44	0.15	1.22	0.34	1.53	1.27	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 18 (14%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.53
 Intersection Signal Delay: 161.1
 Intersection LOS: F
 Intersection Capacity Utilization 132.5%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

ø2	ø1	ø4	ø3
45 s	17 s	55.6 s	14.4 s
ø5	ø6	ø8	ø7
14.3 s	47.7 s	20 s	50 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔		↔	↔↔↔			↔	↔	↔	↔	
Volume (vph)	14	3996	43	93	3361	128	47	4	131	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.998			0.994				0.850		0.882	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1752	6331	0	1770	6369	0	0	1790	1591	1778	1651	0
Flt Permitted	0.950			0.950				0.706		0.724		
Satd. Flow (perm)	1752	6331	0	1770	6369	0	0	1322	1591	1355	1651	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1076			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	3996	43	93	3361	128	47	4	131	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4039	0	93	3489	0	0	51	131	156	51	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	92.7	0.0	15.3	92.6	0.0	24.0	24.0	15.3	24.0	24.0	0.0
Total Split (%)	11.7%	70.2%	0.0%	11.6%	70.2%	0.0%	18.2%	18.2%	11.6%	18.2%	18.2%	0.0%
Maximum Green (s)	8.4	85.7		8.3	85.6		17.0	17.0	8.3	17.0	17.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	9.3	88.1		10.3	97.5		18.6	33.9	18.6	18.6	18.6	
Actuated g/C Ratio	0.07	0.67		0.08	0.74		0.14	0.26	0.14	0.14	0.14	
v/c Ratio	0.11	0.96		0.67	0.74		0.27	0.32	0.82	0.22	0.22	
Control Delay	38.1	26.2		45.2	8.1		54.8	42.2	86.0	52.7	52.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	38.1	26.2		45.2	8.1		54.8	42.2	86.0	52.7	52.7	
LOS	D	C		D	A		D	D	F	D	D	
Approach Delay		26.3			9.1		45.7				77.8	
Approach LOS		C			A		D				E	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	11	666		85	190			39	91	131	39	
Queue Length 95th (ft)	m9	m532		m53	m31			81	151	#248	80	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	138	4225		138	4705			190	408	195	238	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.10	0.96		0.67	0.74			0.27	0.32	0.80	0.21	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 68 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 20.4
 Intersection LOS: C
 Intersection Capacity Utilization 92.3%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

→ ρ2	↙ ρ1	↕ ρ4
92.7 s	15.3 s	24 s
↙ ρ5	← ρ6	
15.4 s	92.6 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	569	3599	115	293	3163	776	207	426	318	2578	876	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.995				0.850			0.850		0.971	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6312	0	3433	5085	1583	1752	3504	1567	5040	3471	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6312	0	3433	5085	1583	1752	3504	1567	5037	3471	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			1170			459			524	
Travel Time (s)		24.5			17.7			8.9			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	569	3599	115	293	3163	776	207	426	318	2578	876	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	569	3714	0	293	3163	776	207	426	318	2578	1089	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	19.0		14.0	19.0	14.0	14.0	14.0	14.0	14.0	14.0	
Total Split (s)	20.0	60.0	0.0	14.0	54.0	42.0	16.0	16.0	14.0	42.0	42.0	0.0
Total Split (%)	15.2%	45.5%	0.0%	10.6%	40.9%	31.8%	12.1%	12.1%	10.6%	31.8%	31.8%	0.0%
Maximum Green (s)	13.0	53.0		7.0	47.0	35.0	9.0	9.0	7.0	35.0	35.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	15.0	55.0		9.0	49.0	86.0	11.0	11.0	25.0	37.0	37.0	
Actuated g/C Ratio	0.11	0.42		0.07	0.37	0.65	0.08	0.08	0.19	0.28	0.28	
v/c Ratio	1.47	1.41		1.25	1.68	0.75	1.42	1.46	1.07	1.82	1.12	
Control Delay	255.6	214.9		170.0	334.2	9.2	263.3	264.6	118.2	398.2	94.4	
Queue Delay	0.0	0.0		0.0	0.0	1.4	0.0	0.0	0.0	3.5	12.1	
Total Delay	255.6	214.9		170.0	334.2	10.6	263.3	264.6	118.2	401.7	106.5	
LOS	F	F		F	F	B	F	F	F	F	F	

Lanes, Volumes, Timings
 3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		220.3			263.5			215.3				314.1
Approach LOS		F			F			F				F
Queue Length 50th (ft)	~343	~1235		~162	~1461	134	~233	~256	~299	~1181	~558	
Queue Length 95th (ft)	m#373	#1288		m#168	m#1453	m168	m#349	m#330	m#433	m#1178	m#558	
Internal Link Dist (ft)		1540			1090			379				444
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	386	2630		234	1888	1031	146	292	297	1413	973	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	6	24	
Spillback Cap Reductn	0	0		0	0	109	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.47	1.41		1.25	1.68	0.84	1.42	1.46	1.07	1.83	1.15	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 78 (59%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.82
 Intersection Signal Delay: 260.0
 Intersection LOS: F
 Intersection Capacity Utilization 154.8%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø1 14 s	ø2 60 s	ø4 42 s	ø3 16 s
ø6 54 s	ø5 20 s	ø7 42 s	ø8 16 s

Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↗	↖					↗↗↗			↗↗↗
Volume (vph)	0	5382	1113	197	2022	0	0	0	1238	0	0	2210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.86	1.00	1.00	1.00	0.76	1.00	1.00	0.76
Frt			0.850						0.850			0.850
Flt Protected				0.950								
Satd. Flow (prot)	0	4984	1552	1787	6472	0	0	0	3610	0	0	3628
Flt Permitted				0.950								
Satd. Flow (perm)	0	4984	1552	1787	6472	0	0	0	3610	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		1170			490			271				640
Travel Time (s)		17.7			7.4			4.1				17.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	5382	1113	197	2022	0	0	0	1238	0	0	2210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5382	1113	197	2022	0	0	0	1238	0	0	2210
Turn Type			Free	Prot					custom			custom
Protected Phases		2		1	6							
Permitted Phases			Free						1			5
Detector Phase		2		1	6				1			5
Switch Phase												
Minimum Initial (s)		12.0		7.0	12.0				7.0			7.0
Minimum Split (s)		20.0		14.0	19.0				14.0			14.0
Total Split (s)	0.0	97.0	0.0	35.0	50.0	0.0	0.0	0.0	35.0	0.0	0.0	82.0
Total Split (%)	0.0%	73.5%	0.0%	26.5%	37.9%	0.0%	0.0%	0.0%	26.5%	0.0%	0.0%	62.1%
Maximum Green (s)		90.0		28.0	43.0				28.0			75.0
Yellow Time (s)		5.0		5.0	5.0				5.0			5.0
All-Red Time (s)		2.0		2.0	2.0				2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag		Lead		Lag	Lead				Lag			Lag
Lead-Lag Optimize?		Yes		Yes	Yes				Yes			Yes
Vehicle Extension (s)		3.0		3.0	3.0				3.0			3.0
Recall Mode		C-Min		None	C-Min				None			None
Act Effct Green (s)		92.0	132.0	30.0	45.0				30.0			77.0
Actuated g/C Ratio		0.70	1.00	0.23	0.34				0.23			0.58
v/c Ratio		1.55	0.72	0.49	0.92				1.51			1.04
Control Delay		272.2	1.8	52.5	38.8				271.5			60.0
Queue Delay		0.0	0.0	0.0	0.0				0.0			0.0
Total Delay		272.2	1.8	52.5	38.8				271.5			60.0
LOS		F	A	D	D				F			E
Approach Delay		225.8			40.0							
Approach LOS		F			D							
Queue Length 50th (ft)		~2434	6	154	375				~645			~898
Queue Length 95th (ft)		m#1193	m0	m212	m388				#760			#1010
Internal Link Dist (ft)		1090			410				191		560	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Turn Bay Length (ft)												
Base Capacity (vph)		3474	1552	406	2206				820			2116
Starvation Cap Reductn		0	0	0	0				0			0
Spillback Cap Reductn		0	0	0	0				0			0
Storage Cap Reductn		0	0	0	0				0			0
Reduced v/c Ratio		1.55	0.72	0.49	0.92				1.51			1.04

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 128 (97%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.55
 Intersection Signal Delay: 166.4
 Intersection LOS: F
 Intersection Capacity Utilization 141.2%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

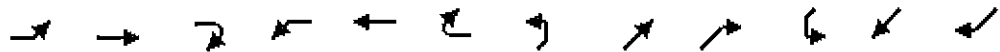
Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

→ ø2	↘ ø1
87 s	35 s
← ø6	↙ ø5
50 s	82 s

Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑	↑	↓	↑↑↑	↑	↓	↑↑	↑			
Volume (vph)	0	3222	1096	50	1826	587	393	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	150		400	250		250	0		100
Storage Lanes	0		1	1		1	1		1	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.994				
Satd. Flow (prot)	0	3468	1552	1832	5263	1639	1602	3353	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	3468	1552	1832	5263	1639	1602	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	50	1826	587	393	576	374	0	0	0
Shared Lane Traffic (%)							20%					
Lane Group Flow (vph)	0	3222	1096	50	1826	587	314	655	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		19.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	93.0	25.0	14.0	107.0	107.0	25.0	25.0	14.0	0.0	0.0	0.0
Total Split (%)	0.0%	70.5%	18.9%	10.6%	81.1%	81.1%	18.9%	18.9%	10.6%	0.0%	0.0%	0.0%
Maximum Green (s)		86.0	18.0	7.0	100.0	100.0	18.0	18.0	7.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Act Effct Green (s)		88.0	113.0	9.0	102.0	102.0	20.0	20.0	34.0			
Actuated g/C Ratio		0.67	0.86	0.07	0.77	0.77	0.15	0.15	0.26			
v/c Ratio		1.39	0.82	0.40	0.45	0.46	1.29	1.29	0.92			
Control Delay		197.8	3.4	68.9	5.6	6.7	202.6	188.5	76.7			
Queue Delay		15.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		212.8	5.5	68.9	5.6	6.7	202.6	188.5	76.7			
LOS		F	A	E	A	A	F	F	E			
Approach Delay		160.1			7.2			160.7				
Approach LOS		F			A			F				

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 50th (ft)		~1939	185	42	171	153	~376	~391	314			
Queue Length 95th (ft)		m575	m80	86	193	212	#581	#521	#504			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				150		400	250		250			
Base Capacity (vph)		2312	1329	125	4067	1267	243	508	406			
Starvation Cap Reductn		54	119	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.43	0.91	0.40	0.45	0.46	1.29	1.29	0.92			

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 6 (5%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.39
 Intersection Signal Delay: 113.9
 Intersection LOS: F
 Intersection Capacity Utilization 120.6%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

a2	a1	a3
93 s	14 s	25 s
a6		a8
107 s		25 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extensions AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕	↗	↖	↕	↗
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1625	0	1717	3433	1536	1823	5233	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1577	1626	1620	0	1717	3433	1503	1821	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	14.0	32.0	32.0	0.0	14.0	72.0	32.0	14.0	72.0	0.0
Total Split (%)	10.6%	10.6%	10.6%	24.2%	24.2%	0.0%	10.6%	54.5%	24.2%	10.6%	54.5%	0.0%
Maximum Green (s)	7.0	7.0	7.0	25.0	25.0		7.0	65.0	25.0	7.0	65.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	12.6	27.0	27.0		9.0	77.9	104.9	9.3	75.4	
Actuated g/C Ratio		0.07	0.10	0.20	0.20		0.07	0.59	0.79	0.07	0.57	
v/c Ratio		0.14	0.42	1.13	1.11		0.57	0.70	0.23	0.54	0.97	
Control Delay		60.6	48.6	136.9	131.6		54.8	15.8	3.0	75.3	39.2	
Queue Delay		0.0	1.9	23.6	23.0		0.0	16.9	0.0	0.0	4.4	
Total Delay		60.6	50.5	160.5	154.6		54.8	32.7	3.0	75.3	43.6	
LOS		E	D	F	F		D	C	A	E	D	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		52.6			157.6			28.8				44.4
Approach LOS		D			F			C				D
Queue Length 50th (ft)		14	54	~395	~381		55	372	12	58		751
Queue Length 95th (ft)		39	64	#607	#591		m54	m381	m93	#112		#1113
Internal Link Dist (ft)		140			1181			444				609
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		124	152	334	332		117	2027	1201	128		2989
Starvation Cap Reductn		0	0	0	0		0	628	0	0		0
Spillback Cap Reductn		0	27	16	16		0	0	0	0		79
Storage Cap Reductn		0	0	0	0		0	0	0	0		0
Reduced v/c Ratio		0.14	0.51	1.19	1.17		0.57	1.02	0.23	0.54		1.00

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.13
 Intersection Signal Delay: 54.7
 Intersection LOS: D
 Intersection Capacity Utilization 95.7%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

φ1	φ2	φ4	φ3
14 s	72 s	32 s	14 s
φ6	φ5		
72 s	14 s		

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	119	752	330	751	625	170	425	557	375	536	1704	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	250		250	550		300	0		0
Storage Lanes	1		1	1		1	2		1	2		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor									0.99			
Frt			0.850			0.850			0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	3433	3539	1583	3433	3539	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	3433	3539	1562	3433	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		650			1563			1667			394	
Travel Time (s)		9.8			23.7			25.3			6.0	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	119	752	330	751	625	170	425	557	375	536	1704	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	119	752	330	751	625	170	425	557	375	536	1707	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases			4			8			2			
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0	
Total Split (s)	20.0	29.0	18.0	28.0	37.0	34.0	18.0	41.0	28.0	34.0	57.0	0.0
Total Split (%)	15.2%	22.0%	13.6%	21.2%	28.0%	25.8%	13.6%	31.1%	21.2%	25.8%	43.2%	0.0%
Maximum Green (s)	13.0	22.0	11.0	21.0	30.0	27.0	11.0	34.0	21.0	27.0	50.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)	17.4	24.0	37.0	23.0	29.6	56.2	13.0	38.4	61.4	26.6	52.0	
Actuated g/C Ratio	0.13	0.18	0.28	0.17	0.22	0.43	0.10	0.29	0.47	0.20	0.39	
v/c Ratio	0.51	1.17	0.74	1.26	0.79	0.25	1.26	0.54	0.51	0.78	1.22	
Control Delay	63.0	139.1	40.1	155.8	31.1	11.2	185.0	42.2	25.2	34.3	124.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.0	139.1	40.1	155.8	31.1	11.2	185.0	42.2	25.2	34.3	124.0	
LOS	E	F	D	F	C	B	F	D	C	C	F	
Approach Delay		104.3			89.5			82.2			102.6	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	98	~402	162	~404	221	69	~234	214	207	198	~953	
Queue Length 95th (ft)	166	#531	235	#531	282	m96	#341	278	303	m129	m#676	
Internal Link Dist (ft)		570			1483			1587			314	
Turn Bay Length (ft)	200		200	250		250	550		300			
Base Capacity (vph)	233	643	444	598	858	703	338	1030	731	754	1394	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	1.17	0.74	1.26	0.73	0.24	1.26	0.54	0.51	0.71	1.22	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.26
 Intersection Signal Delay: 95.4
 Intersection LOS: F
 Intersection Capacity Utilization 118.2%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø1	ø2	ø3	ø4
34 s	41 s	28 s	29 s
ø6	ø5	ø8	ø7
57 s	18 s	37 s	20 s

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	215	983	95	339	1166	224	170	307	289	290	652	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		250	0		0	200		100	0		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00
Ped Bike Factor			0.98							0.98		
Frnt			0.850			0.850		0.927			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3281	0	3433	1792	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1547	1770	3539	1583	1770	3281	0	3381	1792	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			129			638			285	
Travel Time (s)		18.1			3.5			12.4			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	215	983	95	339	1166	224	170	307	289	290	652	219
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	983	95	339	1166	224	170	596	0	290	871	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6						
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	18.0	39.0	15.0	24.0	45.0	22.0	15.0	47.0	0.0	22.0	54.0	0.0
Total Split (%)	13.6%	29.5%	11.4%	18.2%	34.1%	16.7%	11.4%	35.6%	0.0%	16.7%	40.9%	0.0%
Maximum Green (s)	11.0	32.0	8.0	17.0	38.0	15.0	8.0	40.0		15.0	47.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Act Effct Green (s)	13.0	34.0	44.0	19.0	40.0	56.3	10.0	42.7		16.3	49.0	
Actuated g/C Ratio	0.10	0.26	0.33	0.14	0.30	0.43	0.08	0.32		0.12	0.37	
w/c Ratio	1.24	1.08	0.18	1.33	1.09	0.33	1.27	0.56		0.68	1.31	
Control Delay	171.4	74.9	9.5	215.8	97.8	16.0	214.6	39.6		36.1	164.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	171.4	74.9	9.5	215.8	97.8	16.0	214.6	39.6		36.1	164.3	
LOS	F	E	A	F	F	B	F	D		D	F	
Approach Delay		86.2			110.3			78.4			132.3	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			F			E			F	
Queue Length 50th (ft)	~220	~474	8	~376	~589	83	~183	223		102	~944	
Queue Length 95th (ft)	#384	#612	m31	#568	#727	127	#333	285		m89	m#762	
Internal Link Dist (ft)		1112			49			558			205	
Turn Bay Length (ft)	500			250			200					
Base Capacity (vph)	174	912	518	255	1072	684	134	1060		442	665	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	1.24	1.08	0.18	1.33	1.09	0.33	1.27	0.56		0.66	1.31	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 8 (6%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 104.2
 Intersection LOS: F
 Intersection Capacity Utilization 119.7%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

ø1	ø2	ø4	ø3
24 s	39 s	54 s	15 s
ø6	ø5	ø7	ø8
45 s	18 s	22 s	47 s

Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↗	↔	↕	↗	↔	↕	↗	↔	↕	↗
Volume (vph)	139	1148	387	54	1352	148	115	112	118	27	23	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	500		250	100		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.923			0.884	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1719	0	1770	1647	0
Flt Permitted	0.950			0.950			0.543			0.375		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1011	1719	0	699	1647	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		569			1192			291			153	
Travel Time (s)		8.6			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	139	1148	387	54	1352	148	115	112	118	27	23	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	139	1148	387	54	1352	148	115	230	0	27	102	0
Turn Type	Prot		pm+ov	Prot		pm+ov	pm+pt			pm+pt		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	20.0	73.0	17.0	14.0	67.0	14.0	17.0	31.0	0.0	14.0	28.0	0.0
Total Split (%)	15.2%	55.3%	12.9%	10.6%	50.8%	10.6%	12.9%	23.5%	0.0%	10.6%	21.2%	0.0%
Maximum Green (s)	13.0	66.0	10.0	7.0	60.0	7.0	10.0	24.0		7.0	21.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Act Effct Green (s)	14.9	66.2	79.5	16.4	64.9	74.0	35.2	23.1		29.0	19.9	
Actuated g/C Ratio	0.11	0.50	0.60	0.12	0.49	0.56	0.27	0.18		0.22	0.15	
v/c Ratio	0.70	0.65	0.41	0.25	0.78	0.17	0.34	0.76		0.12	0.41	
Control Delay	61.1	17.1	5.9	40.8	9.1	2.7	38.5	68.4		34.6	55.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	61.1	17.1	5.9	40.8	9.1	2.7	38.5	68.4		34.6	55.2	
LOS	E	B	A	D	A	A	D	E		C	E	
Approach Delay		18.2			9.6			58.5			50.9	
Approach LOS		B			A			E			D	
Queue Length 50th (ft)	120	398	61	50	92	12	74	187		17	79	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Extensions AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m146	m366	m103	m44	m81	m11	124	277		40	136	
Internal Link Dist (ft)		489			1112			211			73	
Turn Bay Length (ft)			250	500		250	100					
Base Capacity (vph)	208	1946	958	220	1743	887	346	339		227	287	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.67	0.59	0.40	0.25	0.78	0.17	0.33	0.68		0.12	0.36	

Intersection Summary

Area Type: Other
 Cycle Length: 132
 Actuated Cycle Length: 132
 Offset: 116 (88%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 19.5
 Intersection LOS: B
 Intersection Capacity Utilization 80.0%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
73 s	14 s	17 s	28 s
ø6	ø5	ø7	ø8
67 s	20 s	14 s	31 s

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions AM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↑↑↑			↑↑↑	
Volume (veh/h)	0	0	90	0	0	69	0	788	58	0	2152	106
Sign Control		Stop			Stop			Free			Free	
Grade		1%			0%			-4%			1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	90	0	0	69	0	788	58	0	2152	106
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)								394			890	
pX, platoon unblocked	0.68	0.68	0.63	0.68	0.68	0.91	0.63			0.91		
vC, conflicting volume	2468	3051	770	1624	3075	292	2258			846		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	589	1445	0	0	1481	0	966			469		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	87	100	100	93	100			100		
cM capacity (veh/h)	248	89	688	606	85	983	450			987		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	90	69	315	315	216	861	861	536
Volume Left	0	0	0	0	0	0	0	0
Volume Right	90	69	0	0	58	0	0	106
cSH	688	983	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.13	0.07	0.19	0.19	0.13	0.51	0.51	0.32
Queue Length 95th (ft)	11	6	0	0	0	0	0	0
Control Delay (s)	11.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A						
Approach Delay (s)	11.0	8.9	0.0			0.0		
Approach LOS	B	A						

Intersection Summary		
Average Delay		0.5
Intersection Capacity Utilization	56.2%	ICU Level of Service B
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions AM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/21/2010

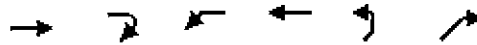


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	↘↘
Volume (veh/h)	0	105	0	951	1056	228
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	105	0	951	1056	228
Pedestrians	1700					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	80					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				635	459	
pX, platoon unblocked	0.71	0.71	0.71			
vC, conflicting volume	3232	2756	2756			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3946	3274	3274			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	0	1	12			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	105	476	476	1056	114	114
Volume Left	0	0	0	0	0	0
Volume Right	105	0	0	0	114	114
cSH	1	1700	1700	1700	1700	1700
Volume to Capacity	118.94	0.28	0.28	0.62	0.07	0.07
Queue Length 95th (ft)	Err	0	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	Err	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay		448.7				
Intersection Capacity Utilization		68.7%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions AM (2035)
 11: Crabtree Valley Ave & Edwards Mill Rd 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↗
Volume (veh/h)	1563	100	0	1546	0	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1563	100	0	1546	0	112
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	569					
pX, platoon unblocked	0.67					
vC, conflicting volume	1563			2386	832	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1563			2083	832	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	64	
cM capacity (veh/h)	419			31	313	

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	1042	621	773	773	112
Volume Left	0	0	0	0	0
Volume Right	0	100	0	0	112
cSH	1700	1700	1700	1700	313
Volume to Capacity	0.61	0.37	0.45	0.45	0.36
Queue Length 95th (ft)	0	0	0	0	39
Control Delay (s)	0.0	0.0	0.0	0.0	22.8
Lane LOS	C				
Approach Delay (s)	0.0		0.0		22.8
Approach LOS	C				

Intersection Summary					
Average Delay	0.8				
Intersection Capacity Utilization	60.0%		ICU Level of Service	B	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions AM (2035)
 13: Crabtree Valley Ave & Summit Park Ln 6/21/2010



Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑			↑↑↑↑		↗
Volume (veh/h)	1101	461	0	1729	0	84
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1101	461	0	1729	0	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)	129					
pX, platoon unblocked			0.74		0.74	0.74
vC, conflicting volume			1562		1764	781
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1069		1340	20
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	89
cM capacity (veh/h)			482		107	784

Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NW 3	NW 4	NE 1
Volume Total	734	828	432	432	432	432	84
Volume Left	0	0	0	0	0	0	0
Volume Right	0	461	0	0	0	0	84
cSH	1700	1700	1700	1700	1700	1700	784
Volume to Capacity	0.43	0.49	0.25	0.25	0.25	0.25	0.11
Queue Length 95th (ft)	0	0	0	0	0	0	9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.1
Lane LOS							B
Approach Delay (s)	0.0		0.0				10.1
Approach LOS							B

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		57.0%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions AM (2035)
 14: Blue Ridge Rd. & Crabtree View Pl 6/21/2010



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑			↑↑		↗
Volume (veh/h)	616	130	0	1161	0	335
Sign Control	Free			Free	Stop	
Grade	-2%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	616	130	0	1161	0	335
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (ft)	285		809			
pX, platoon unblocked					0.77	
vC, conflicting volume			746		1262 373	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			746		754 373	
tC, single (s)			4.1		6.8 6.9	
tC, 2 stage (s)						
tF (s)			2.2		3.5 3.3	
p0 queue free %			100		100 46	
cM capacity (veh/h)			858		267 624	

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SW 1
Volume Total	411	335	580	580	335
Volume Left	0	0	0	0	0
Volume Right	0	130	0	0	335
cSH	1700	1700	1700	1700	624
Volume to Capacity	0.24	0.20	0.34	0.34	0.54
Queue Length 95th (ft)	0	0	0	0	80
Control Delay (s)	0.0	0.0	0.0	0.0	17.2
Lane LOS	C				
Approach Delay (s)	0.0		0.0		17.2
Approach LOS	C				

Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			48.6%		ICU Level of Service	A
Analysis Period (min)			15			

Network Totals

Number of Intersections	30
Control Delay / Veh (s/v)	48
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	48
Total Delay (hr)	3068
Stops / Veh	0.30
Stops (#)	69155
Average Speed (mph)	10
Total Travel Time (hr)	3891
Distance Traveled (mi)	40321
Fuel Consumed (gal)	4456
Fuel Economy (mpg)	9.0
CO Emissions (kg)	311.47
NOx Emissions (kg)	60.60
VOC Emissions (kg)	72.19
Unserved Vehicles (#)	10956
Vehicles in dilemma zone (#)	1303
Performance Index	3260.3

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	322	2618	3	229	2867	1428	199	2193	239	1447	1058	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	100		0	450		0
Storage Lanes	1		0	1		2	1		1	2		0
Taper Length (ft)	100		100	100		100	200		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	0.88	1.00	0.91	1.00	0.97	0.95	0.95
Ped Bike Factor										1.00		
Frt						0.850			0.850		0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6408	0	3433	5085	2787	1770	5085	1583	3467	3503	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6408	0	3433	5085	2787	1770	5085	1583	3467	3503	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1611	
Travel Time (s)		32.4			16.3			11.8			24.4	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	2618	3	229	2867	1428	199	2193	239	1447	1058	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	2621	0	229	2867	1428	199	2193	239	1447	1224	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0	7.0	7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.3	22.3		14.3	22.3	14.4	14.4	17.4	14.3	14.4	17.4	
Total Split (s)	26.0	78.0	0.0	16.0	68.0	49.0	26.7	51.0	16.0	49.0	73.3	0.0
Total Split (%)	13.4%	40.2%	0.0%	8.2%	35.1%	25.3%	13.8%	26.3%	8.2%	25.3%	37.8%	0.0%
Maximum Green (s)	19.0	71.0		9.0	61.0	42.0	19.7	44.0	9.0	42.0	66.3	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	21.0	73.0		11.0	63.0	107.0	21.7	46.0	62.0	44.0	68.3	
Actuated g/C Ratio	0.11	0.38		0.06	0.32	0.55	0.11	0.24	0.32	0.23	0.35	
v/c Ratio	1.68	1.09		1.17	1.74	0.93	1.01	1.82	0.47	1.84	0.99	
Control Delay	371.6	102.4		156.8	368.3	29.6	145.5	409.2	60.8	420.4	85.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	371.6	102.4		156.8	368.3	29.6	145.5	409.2	60.8	420.4	85.3	
LOS	F	F		F	F	C	F	F	E	F	F	

Lanes, Volumes, Timings
1: Glenwood Ave #1 & Creedmoor Rd

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		131.8			250.7			357.6				266.8
Approach LOS		F			F			F				F
Queue Length 50th (ft)	~597	~1086		~177	~1970	570	~251	~1551	281	~1434	823	
Queue Length 95th (ft)	#814	#1136		m#155	m#1719	m505	m#283	m#1378	m288	#1567	#984	
Internal Link Dist (ft)		2057			996			528				1531
Turn Bay Length (ft)	230			400		260	100			450		
Base Capacity (vph)	192	2411		195	1651	1537	198	1206	506	786	1233	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.68	1.09		1.17	1.74	0.93	1.01	1.82	0.47	1.84	0.99	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 90 (46%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.84
 Intersection Signal Delay: 248.7
 Intersection LOS: F
 Intersection Capacity Utilization 173.6%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

→ ρ2	↖ ρ1	↓ ρ4	↗ ρ3
78 s	16 s	73.3 s	26.7 s
↖ ρ5	← ρ6	↑ ρ8	↗ ρ7
26 s	68 s	51 s	49 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↑	↗	↔	↖	
Volume (vph)	36	3697	571	503	4219	112	245	9	873	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.996				0.850		0.877	
Fit Protected	0.950			0.950				0.954		0.950		
Satd. Flow (prot)	1752	6217	0	1770	6382	0	0	1786	1591	1778	1642	0
Fit Permitted	0.950			0.950				0.670		0.396		
Satd. Flow (perm)	1752	6217	0	1770	6382	0	0	1254	1591	741	1642	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1076			1620			201				281
Travel Time (s)		16.3			24.5			5.5				5.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	3697	571	503	4219	112	245	9	873	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	4268	0	503	4331	0	0	254	873	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	22.1		15.3	22.0		23.7	23.7	15.3	23.7	23.7	
Total Split (s)	15.4	94.0	0.0	42.0	120.6	0.0	58.0	58.0	42.0	58.0	58.0	0.0
Total Split (%)	7.9%	48.5%	0.0%	21.6%	62.2%	0.0%	29.9%	29.9%	21.6%	29.9%	29.9%	0.0%
Maximum Green (s)	8.4	87.0		35.0	113.6		51.0	51.0	35.0	51.0	51.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Act Effct Green (s)	10.0	89.0		37.0	118.8		53.0	95.0	53.0	53.0	53.0	
Actuated g/C Ratio	0.05	0.46		0.19	0.61		0.27	0.49	0.27	0.27	0.27	
v/c Ratio	0.40	1.50		1.49	1.11		0.74	1.12	1.43	0.16	0.16	
Control Delay	100.3	246.6		249.4	73.2		78.8	115.5	266.8	54.8	54.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	100.3	246.6		249.4	73.2		78.8	115.5	266.8	54.8	54.8	
LOS	F	F		F	E		E	F	F	D	D	
Approach Delay		245.4			91.5			107.2			224.5	
Approach LOS		F			F			F			F	

Lanes, Volumes, Timings
 2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	43	~2171		~887	~1869			299	~1276	~496	71	
Queue Length 95th (ft)	m37	m#1504		m311	m31			420	#1543	#704	120	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	94	2852		338	3908			343	779	202	449	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.38	1.50		1.49	1.11			0.74	1.12	1.43	0.16	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 78 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.50
 Intersection Signal Delay: 160.0
 Intersection LOS: F
 Intersection Capacity Utilization 145.7%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø2	ø1	ø4
94 s	42 s	58 s
ø5	ø6	
15.4 s	120.6 s	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	872	3872	115	867	4510	1437	155	959	481	1527	586	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor										1.00		
Frt		0.996				0.850			0.850		0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6318	0	3433	5085	1583	1752	3504	1567	5040	3453	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6318	0	3433	5085	1583	1752	3504	1567	5038	3453	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			1170			459			524	
Travel Time (s)		24.5			17.7			8.9			10.2	
Confl. Peds. (#/hr)										1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	872	3872	115	867	4510	1437	155	959	481	1527	586	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	872	3987	0	867	4510	1437	155	959	481	1527	755	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	19.0		14.0	19.0	14.0	14.0	14.0	14.0	14.0	14.0	
Total Split (s)	31.0	94.0	0.0	31.0	94.0	36.0	22.0	33.0	31.0	36.0	47.0	0.0
Total Split (%)	16.0%	48.5%	0.0%	16.0%	48.5%	18.6%	11.3%	17.0%	16.0%	18.6%	24.2%	0.0%
Maximum Green (s)	24.0	87.0		24.0	87.0	29.0	15.0	26.0	24.0	29.0	40.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	26.0	89.0		26.0	89.0	125.0	17.0	28.0	59.0	31.0	42.0	
Actuated g/C Ratio	0.13	0.46		0.13	0.46	0.64	0.09	0.14	0.30	0.16	0.22	
v/c Ratio	1.91	1.38		1.88	1.93	1.41	1.01	1.90	1.01	1.90	1.01	
Control Delay	445.2	196.0		438.1	448.5	213.2	134.1	441.6	86.7	442.5	92.6	
Queue Delay	0.0	10.6		0.0	0.0	169.0	0.0	0.0	0.0	143.7	29.1	
Total Delay	445.2	206.7		438.1	448.5	382.3	134.1	441.6	86.7	586.3	121.7	
LOS	F	F		F	F	F	F	F	F	F	F	

Lanes, Volumes, Timings
3: Glenwood Ave #1 & Lead Mine Rd

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		249.5			433.2			304.7			432.6	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~889	~1934		~874	~3260	~2464	~209	~986	~628	~1062	~532	
Queue Length 95th (ft)	m#540	m813		m#438	m#1646	m1015	m#264	m#961	m#669	m#1147	m#654	
Internal Link Dist (ft)		1540			1090			379			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	456	2898		460	2333	1020	154	506	477	805	748	
Starvation Cap Reductn	0	0		0	0	113	0	0	0	0	57	
Spillback Cap Reductn	0	49		0	0	215	0	0	0	116	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.91	1.40		1.88	1.93	1.79	1.01	1.90	1.01	2.22	1.09	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 78 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.93
 Intersection Signal Delay: 362.5
 Intersection LOS: F
 Intersection Capacity Utilization 184.2%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ø2	↖ ø1	↓ ø4	↗ ø3
94 s	31 s	47 s	22 s
← ø6	↗ ø5	↑ ø8	↖ ø7
94 s	31 s	33 s	36 s

Lanes, Volumes, Timings
4: Glenwood Ave #1 & I-440 WB Ramp

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↓↓↓				↓↓↓			↓↓↓
Volume (vph)	0	4811	1068	271	3023	0	0	0	1056	0	0	3791
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.86	1.00	1.00	1.00	0.76	1.00	1.00	0.76
Fr't			0.850						0.850			0.850
Fit Protected				0.950								
Satd. Flow (prot)	0	4984	1552	1787	6472	0	0	0	3610	0	0	3628
Fit Permitted				0.950								
Satd. Flow (perm)	0	4984	1552	1787	6472	0	0	0	3610	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		1170			490			271				640
Travel Time (s)		17.7			7.4			4.1				17.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4811	1068	271	3023	0	0	0	1056	0	0	3791
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4811	1068	271	3023	0	0	0	1056	0	0	3791
Turn Type			Free	Prot					custom			custom
Protected Phases		2		1	6							
Permitted Phases			Free						1			5
Detector Phase		2		1	6				1			5
Switch Phase												
Minimum Initial (s)		12.0		7.0	12.0				7.0			7.0
Minimum Split (s)		20.0		14.0	19.0				14.0			14.0
Total Split (s)	0.0	152.0	0.0	42.0	65.0	0.0	0.0	0.0	42.0	0.0	0.0	129.0
Total Split (%)	0.0%	78.4%	0.0%	21.6%	33.5%	0.0%	0.0%	0.0%	21.6%	0.0%	0.0%	66.5%
Maximum Green (s)		145.0		35.0	58.0				35.0			122.0
Yellow Time (s)		5.0		5.0	5.0				5.0			5.0
All-Red Time (s)		2.0		2.0	2.0				2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag		Lead		Lag	Lead				Lag			Lag
Lead-Lag Optimize?		Yes		Yes	Yes				Yes			Yes
Vehicle Extension (s)		3.0		3.0	3.0				3.0			3.0
Recall Mode		C-Min		None	C-Min				None			None
Act Effct Green (s)		147.0	194.0	37.0	60.0				37.0			124.0
Actuated g/C Ratio		0.76	1.00	0.19	0.31				0.19			0.64
w/c Ratio		1.27	0.69	0.79	1.51				1.53			1.63
Control Delay		140.0	3.1	102.7	268.4				294.0			315.0
Queue Delay		29.6	0.0	0.0	0.0				0.0			5.8
Total Delay		169.6	3.1	102.7	268.4				294.0			320.7
LOS		F	A	F	F				F			F
Approach Delay		139.4			254.8							
Approach LOS		F			F							
Queue Length 50th (ft)		~2821	36	313	~1562				~824			~3046
Queue Length 95th (ft)		m101	m0	m#464	#1586				#940			#3061
Internal Link Dist (ft)		1090			410				191		560	

Lanes, Volumes, Timings
 4: Glenwood Ave #1 & I-440 WB Ramp

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Turn Bay Length (ft)												
Base Capacity (vph)		3777	1552	341	2002				689			2319
Starvation Cap Reductn		8	0	0	0				0			0
Spillback Cap Reductn		186	0	0	0				0			18
Storage Cap Reductn		0	0	0	0				0			0
Reduced v/c Ratio		1.34	0.69	0.79	1.51				1.53			1.65

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 38 (20%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.63
 Intersection Signal Delay: 227.2
 Intersection Capacity Utilization 140.6%
 Intersection LOS: F
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

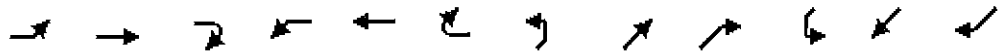
Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

→ ø2	↘ ø1
152 s	42 s
← ø6	↙ ø5
65 s	129 s

Lanes, Volumes, Timings
5: Glenwood Ave #1 & I-440 EB Ramp

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑	↑	↓	↑↑↑	↑	↓	↑↑	↑			
Volume (vph)	0	2258	1144	50	2992	524	302	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	150		400	250		250	0		100
Storage Lanes	0		1	1		1	1		1	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	1.00	0.91	0.91	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			
Fit Protected				0.950			0.950	0.997				
Satd. Flow (prot)	0	3468	1552	1832	5263	1639	1602	3363	1575	0	0	0
Fit Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	3468	1552	1832	5263	1639	1602	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2258	1144	50	2992	524	302	566	379	0	0	0
Shared Lane Traffic (%)							10%					
Lane Group Flow (vph)	0	2258	1144	50	2992	524	272	596	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		19.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	134.0	46.0	14.0	148.0	148.0	46.0	46.0	14.0	0.0	0.0	0.0
Total Split (%)	0.0%	69.1%	23.7%	7.2%	76.3%	76.3%	23.7%	23.7%	7.2%	0.0%	0.0%	0.0%
Maximum Green (s)		127.0	39.0	7.0	141.0	141.0	39.0	39.0	7.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lag		Lead					Lead			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Act Effct Green (s)		129.0	175.0	9.0	143.0	143.0	41.0	41.0	55.0			
Actuated g/C Ratio		0.66	0.90	0.05	0.74	0.74	0.21	0.21	0.28			
v/c Ratio		0.98	0.82	0.59	0.77	0.43	0.80	0.84	0.85			
Control Delay		32.4	2.9	117.3	17.3	11.2	90.8	84.9	83.6			
Queue Delay		72.1	10.2	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		104.5	13.1	117.3	17.3	11.2	90.8	84.9	83.6			
LOS		F	B	F	B	B	F	F	F			
Approach Delay		73.8			17.8			85.8				
Approach LOS		E			B			F				

Lanes, Volumes, Timings
 5: Glenwood Ave #1 & I-440 EB Ramp

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 50th (ft)		1338	242	64	794	241	367	406	461			
Queue Length 95th (ft)		m650	m119	#125	826	309	#524	489	#638			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				150		400	250		250			
Base Capacity (vph)		2306	1400	85	3879	1208	339	711	447			
Starvation Cap Reductn		377	242	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.17	0.99	0.59	0.77	0.43	0.80	0.84	0.85			

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 14 (7%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 51.3
 Intersection LOS: D
 Intersection Capacity Utilization 94.2%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

ø1	ø2	ø3
14 s	134 s	46 s
ø4	ø5	ø6
148 s	46 s	46 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extensions PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕	↗	↖	↕	↗
Volume (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.99	1.00	1.00				0.98	1.00		
Frt			0.850		0.957				0.850		0.999	
Flt Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1587	0	1717	3433	1536	1823	5233	0
Flt Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1577	1624	1582	0	1717	3433	1503	1822	5233	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			1	2					2	1		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2494	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	14.0	14.0		14.0	19.0	14.0	14.0	19.0	
Total Split (s)	14.0	14.0	24.0	32.0	32.0	0.0	24.0	134.0	32.0	14.0	124.0	0.0
Total Split (%)	7.2%	7.2%	12.4%	16.5%	16.5%	0.0%	12.4%	69.1%	16.5%	7.2%	63.9%	0.0%
Maximum Green (s)	7.0	7.0	17.0	25.0	25.0		17.0	127.0	25.0	7.0	117.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Act Effct Green (s)		9.0	23.1	29.8	29.8		15.9	129.0	158.8	9.0	122.1	
Actuated g/C Ratio		0.05	0.12	0.15	0.15		0.08	0.66	0.82	0.05	0.63	
v/c Ratio		0.49	0.32	0.96	0.97		0.72	1.09	0.55	0.78	0.55	
Control Delay		109.9	56.5	126.6	128.7		104.6	65.2	2.9	138.6	21.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	239.7	3.4	0.0	0.0	
Total Delay		109.9	56.5	126.6	128.7		104.6	304.9	6.3	138.6	21.5	
LOS		F	E	F	F		F	F	A	F	C	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		77.9			127.6			237.2				25.6
Approach LOS		E			F			F				C
Queue Length 50th (ft)		52	55	~356	~351		130	~1893	124	85		473
Queue Length 95th (ft)		100	95	#565	#556		m78	m318	m64	#184		527
Internal Link Dist (ft)		140			1181			444				609
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		84	215	251	244		168	2283	1235	85		3293
Starvation Cap Reductn		0	0	0	0		0	752	451	0		0
Spillback Cap Reductn		0	0	0	0		0	0	0	0		0
Storage Cap Reductn		0	0	0	0		0	0	0	0		0
Reduced v/c Ratio		0.49	0.28	0.96	0.97		0.60	1.63	0.86	0.78		0.55

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 168 (87%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 155.7
 Intersection LOS: F
 Intersection Capacity Utilization 107.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

p2	p1	p3	p4
134 s	14 s	14 s	32 s
p5	p6		
24 s	124 s		

Lanes, Volumes, Timings
9: Crabtree Valley Ave & Creedmoor Rd.

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	174	1037	261	850	997	475	773	1571	686	471	1130	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	250		250	550		300	0		0
Storage Lanes	1		1	1		1	2		1	2		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor									0.99			
Fr _t			0.850			0.850			0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	3433	3539	1583	3433	3539	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	3433	3539	1563	3433	3539	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		650			1563			1667			394	
Travel Time (s)		9.8			23.7			25.3			6.0	
Confl. Peds. (#/hr)									2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	174	1037	261	850	997	475	773	1571	686	471	1130	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	174	1037	261	850	997	475	773	1571	686	471	1132	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases			4			8			2			
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0	
Total Split (s)	27.0	50.0	39.0	42.0	65.0	26.0	39.0	76.0	42.0	26.0	63.0	0.0
Total Split (%)	13.9%	25.8%	20.1%	21.6%	33.5%	13.4%	20.1%	39.2%	21.6%	13.4%	32.5%	0.0%
Maximum Green (s)	20.0	43.0	32.0	35.0	58.0	19.0	32.0	69.0	35.0	19.0	56.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)	23.0	45.0	79.0	37.0	59.0	80.0	34.0	71.0	108.0	21.0	58.0	
Actuated g/C Ratio	0.12	0.23	0.41	0.19	0.30	0.41	0.18	0.37	0.56	0.11	0.30	
v/c Ratio	0.83	1.26	0.40	1.30	0.93	0.73	1.28	1.21	0.78	1.27	1.07	
Control Delay	112.5	184.7	23.2	177.5	51.1	26.3	199.0	153.7	38.4	193.2	71.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	112.5	184.7	23.2	177.5	51.1	26.3	199.0	153.7	38.4	193.2	71.2	
LOS	F	F	C	F	D	C	F	F	D	F	E	
Approach Delay		147.5			92.3			139.2			107.1	

Lanes, Volumes, Timings
 9: Crabtree Valley Ave & Creedmoor Rd.

Crabtree Valley Ave Extensions PM (2035)
 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	F			F			F			F		
Queue Length 50th (ft)	223	~870	135	~719	682	483	~642	~1282	631	~381	~822	
Queue Length 95th (ft)	#369	#1012	185	m#557	m566	m394	#778	#1416	811	m#402	m#831	
Internal Link Dist (ft)	570			1483			1587			314		
Turn Bay Length (ft)	200		200	250		250	550		300			
Base Capacity (vph)	210	821	645	655	1095	653	602	1295	874	372	1058	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	1.26	0.40	1.30	0.91	0.73	1.28	1.21	0.78	1.27	1.07	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 22 (11%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.30
 Intersection Signal Delay: 121.6
 Intersection LOS: F
 Intersection Capacity Utilization 126.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd.

ø1	ø2	ø3	ø4
26 s	76 s	42 s	50 s
ø6	ø5	ø8	ø7
63 s	89 s	65 s	27 s

Lanes, Volumes, Timings
10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	104	1413	248	365	1631	566	388	768	385	642	517	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		250	0		0	200		100	0		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	0.97	1.00	1.00
Ped Bike Factor			0.98							0.99		
Frts			0.850			0.850		0.950			0.967	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3362	0	3433	1801	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1548	1770	3539	1583	1770	3362	0	3411	1801	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			129			638			285	
Travel Time (s)		18.1			3.5			12.4			5.6	
Confl. Peds. (#/hr)			2							9		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	104	1413	248	365	1631	566	388	768	385	642	517	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	104	1413	248	365	1631	566	388	1153	0	642	660	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6						
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	14.0	65.0	36.0	35.0	86.0	32.0	36.0	62.0	0.0	32.0	58.0	0.0
Total Split (%)	7.2%	33.5%	18.6%	18.0%	44.3%	16.5%	18.6%	32.0%	0.0%	16.5%	29.9%	0.0%
Maximum Green (s)	7.0	58.0	29.0	28.0	79.0	25.0	29.0	55.0		25.0	51.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Act Effct Green (s)	9.0	60.0	91.0	30.0	81.0	108.0	31.0	57.0		27.0	53.0	
Actuated g/C Ratio	0.05	0.31	0.47	0.15	0.42	0.56	0.16	0.29		0.14	0.27	
v/c Ratio	1.27	1.29	0.34	1.33	1.10	0.64	1.37	1.17		1.34	1.34	
Control Delay	191.6	159.4	10.1	229.5	108.4	23.5	243.0	143.8		223.0	220.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	191.6	159.4	10.1	229.5	108.4	23.5	243.0	143.8		223.0	220.5	
LOS	F	F	B	F	F	C	F	F		F	F	
Approach Delay		140.3			106.9			168.8			221.7	

Lanes, Volumes, Timings
 10: Crabtree Valley Ave & Blue Ridge Rd.

Crabtree Valley Ave Extensions PM (2035)

6/21/2010

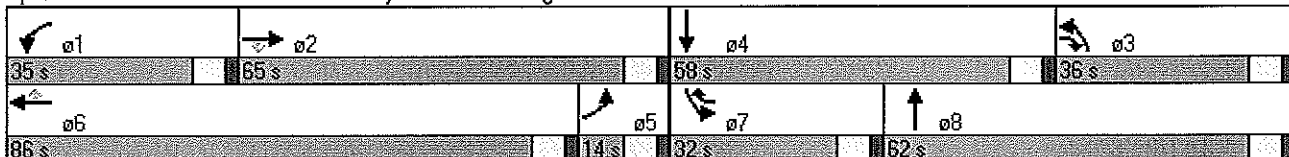


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS	F			F			F			F		
Queue Length 50th (ft)	~168	~1210	127	~602	~1239	373	~651	~915		~553	~1104	
Queue Length 95th (ft)	m#183	m#1254	m130	#827	#1370	482	#881	#1057		m#512	m#1015	
Internal Link Dist (ft)	1112			49			558			205		
Turn Bay Length (ft)	500		250				200					
Base Capacity (vph)	82	1095	732	274	1478	881	283	988		478	492	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	1.27	1.29	0.34	1.33	1.10	0.64	1.37	1.17		1.34	1.34	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 36 (19%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.37
 Intersection Signal Delay: 149.3
 Intersection LOS: F
 Intersection Capacity Utilization 133.3%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings
12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	263	1627	356	144	1754	264	179	380	33	105	169	389
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		250	500		250	100		0	0		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.988			0.895	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1840	0	1770	1667	0
Flt Permitted	0.950			0.950			0.070			0.204		
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	130	1840	0	380	1667	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		569			1192			291			153	
Travel Time (s)		8.6			18.1			5.7			4.2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	263	1627	356	144	1754	264	179	380	33	105	169	389
Shared Lane Traffic (%)												
Lane Group Flow (vph)	263	1627	356	144	1754	264	179	413	0	105	558	0
Turn Type	Prot		pm+ov	Prot		pm+ov	pm+pt			pm+pt		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6	8			4		
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	29.0	97.0	17.0	21.0	89.0	14.0	17.0	62.0	0.0	14.0	59.0	0.0
Total Split (%)	14.9%	50.0%	8.8%	10.8%	45.9%	7.2%	8.8%	32.0%	0.0%	7.2%	30.4%	0.0%
Maximum Green (s)	22.0	90.0	10.0	14.0	82.0	7.0	10.0	55.0		7.0	52.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Act Effct Green (s)	24.0	92.0	104.0	16.0	84.0	98.0	69.0	57.0		63.0	54.0	
Actuated g/C Ratio	0.12	0.47	0.54	0.08	0.43	0.51	0.36	0.29		0.32	0.28	
v/c Ratio	1.20	0.97	0.42	0.99	1.14	0.33	1.21	0.76		0.56	1.20	
Control Delay	161.5	37.9	8.3	70.2	85.6	8.7	183.7	73.0		55.0	166.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	161.5	37.9	8.3	70.2	85.6	8.7	183.7	73.0		55.0	166.6	
LOS	F	D	A	E	F	A	F	E		D	F	
Approach Delay		47.7			75.2			106.5			148.9	
Approach LOS		D			E			F			F	
Queue Length 50th (ft)	~398	1094	108	181	~1354	87	~227	485		91	~861	

Lanes, Volumes, Timings
 12: Crabtree Valley Ave & Mall Entrance

Crabtree Valley Ave Extensions PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	m#381	m944	m129	m152	m769	m75	#408	626		143	#1111	
Internal Link Dist (ft)		489			1112			211				73
Turn Bay Length (ft)			250	500		250	100					
Base Capacity (vph)	219	1678	849	146	1532	800	148	541		188	464	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	1.20	0.97	0.42	0.99	1.14	0.33	1.21	0.76		0.56	1.20	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 16 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 76.2
 Intersection LOS: E
 Intersection Capacity Utilization 122.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
97 s	21 s	17 s	59 s
ø5	ø6	ø7	ø8
29 s	89 s	14 s	62 s

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions PM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/21/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↑↑↑			↑↑↑	
Volume (veh/h)	0	0	72	0	0	561	0	2070	150	0	1531	87
Sign Control		Stop			Stop			Free			Free	
Grade		1%			0%			-4%			1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	72	0	0	561	0	2070	150	0	1531	87
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)								394			890	
pX, platoon unblocked	0.76	0.76	0.81	0.76	0.76	0.66	0.81			0.66		
vC, conflicting volume	2264	3794	554	2727	3763	765	1618			2220		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0	1837	0	429	1795	0	922			1050		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	22	100			100		
cM capacity (veh/h)	168	57	873	354	60	717	593			435		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	72	561	828	828	564	612	612	393
Volume Left	0	0	0	0	0	0	0	0
Volume Right	72	561	0	0	150	0	0	87
cSH	873	717	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.08	0.78	0.49	0.49	0.33	0.36	0.36	0.23
Queue Length 95th (ft)	7	193	0	0	0	0	0	0
Control Delay (s)	9.5	25.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A	D						
Approach Delay (s)	9.5	25.6	0.0			0.0		
Approach LOS	A	D						

Intersection Summary		
Average Delay		3.4
Intersection Capacity Utilization	84.7%	ICU Level of Service E
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions PM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/21/2010

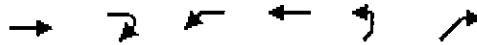


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	↖↖
Volume (veh/h)	0	703	0	1595	600	968
Sign Control	Stop			Free		Free
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	703	0	1595	600	968
Pedestrians	1700					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	80					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				635	459	
pX, platoon unblocked	0.83	0.84	0.84			
vC, conflicting volume	3098	2300	2300			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2547	2449	2449			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	4	4	32			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	703	798	798	600	484	484
Volume Left	0	0	0	0	0	0
Volume Right	703	0	0	0	484	484
cSH	4	1700	1700	1700	1700	1700
Volume to Capacity	171.62	0.47	0.47	0.35	0.28	0.28
Queue Length 95th (ft)	Err	0	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	Err	0.0	0.0			
Approach LOS	F					

Intersection Summary						
Average Delay	1818.2					
Intersection Capacity Utilization	81.8%		ICU Level of Service		D	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions PM (2035)
 11: Crabtree Valley Ave & Edwards Mill Rd 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	2054	140	0	2322	0	192
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2054	140	0	2322	0	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				569		
pX, platoon unblocked					0.57	
vC, conflicting volume			2054		3285	1097
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2054		3499	1097
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	8
cM capacity (veh/h)			269		3	208

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	1369	825	1161	1161	192
Volume Left	0	0	0	0	0
Volume Right	0	140	0	0	192
cSH	1700	1700	1700	1700	208
Volume to Capacity	0.81	0.49	0.68	0.68	0.92
Queue Length 95th (ft)	0	0	0	0	189
Control Delay (s)	0.0	0.0	0.0	0.0	91.5
Lane LOS					F
Approach Delay (s)	0.0		0.0		91.5
Approach LOS					F

Intersection Summary	
Average Delay	3.7
Intersection Capacity Utilization	79.8%
ICU Level of Service	D
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions PM (2035)
 13: Crabtree Valley Ave & Summit Park Ln 6/21/2010



Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑↑			↑↑↑		↑
Volume (veh/h)	2054	386	0	2562	0	191
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2054	386	0	2562	0	191
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	129					
pX, platoon unblocked			0.69		0.69	0.69
vC, conflicting volume			2440		2888	1220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2191		2837	428
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	52
cM capacity (veh/h)			165		10	398

Direction, Lane #	SE 1	SE 2	NW 1	NW 2	NW 3	NW 4	NE 1
Volume Total	1369	1071	640	640	640	640	191
Volume Left	0	0	0	0	0	0	0
Volume Right	0	386	0	0	0	0	191
cSH	1700	1700	1700	1700	1700	1700	398
Volume to Capacity	0.81	0.63	0.38	0.38	0.38	0.38	0.48
Queue Length 95th (ft)	0	0	0	0	0	0	63
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	22.1
Lane LOS							C
Approach Delay (s)	0.0		0.0				22.1
Approach LOS							C

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		87.6%	ICU Level of Service E
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis Crabtree Valley Ave Extensions PM (2035)
 14: Blue Ridge Rd. & Crabtree View PI 6/21/2010



Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑			↑↑		↗
Volume (veh/h)	1290	148	0	1303	0	305
Sign Control	Free			Free	Stop	
Grade	-2%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1290	148	0	1303	0	305
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	285			809		
pX, platoon unblocked			0.72		0.72	0.72
vC, conflicting volume			1438		2016	719
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			832		1633	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	61
cM capacity (veh/h)			574		66	781

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SW 1
Volume Total	860	578	652	652	305
Volume Left	0	0	0	0	0
Volume Right	0	148	0	0	305
cSH	1700	1700	1700	1700	781
Volume to Capacity	0.51	0.34	0.38	0.38	0.39
Queue Length 95th (ft)	0	0	0	0	47
Control Delay (s)	0.0	0.0	0.0	0.0	12.5
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.5
Approach LOS					B

Intersection Summary					
Average Delay			1.3		
Intersection Capacity Utilization			65.9%	ICU Level of Service	C
Analysis Period (min)			15		

Network Totals

Number of Intersections	30
Control Delay / Veh (s/v)	93
Queue Delay / Veh (s/v)	6
Total Delay / Veh (s/v)	99
Total Delay (hr)	6896
Stops / Veh	0.32
Stops (#)	79794
Average Speed (mph)	6
Total Travel Time (hr)	7821
Distance Traveled (mi)	44016
Fuel Consumed (gal)	7488
Fuel Economy (mpg)	5.9
CO Emissions (kg)	523.44
NOx Emissions (kg)	101.84
VOC Emissions (kg)	121.31
Unserved Vehicles (#)	17830
Vehicles in dilemma zone (#)	1031
Performance Index	7118.0

**2035 CVA Extension to I-440
(with an At-Grade CVA / Blue
Ridge Rd Intersection)**

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑↑		↔	↑↑↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	120	2785	423	306	2827	865	348	658	129	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor		0.99				0.98			0.95		1.00	
Frt		0.980				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6247	0	3433	5085	1583	3433	3539	1583	3467	3504	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6247	0	3433	5085	1559	3433	3539	1507	3467	3504	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	2785	423	306	2827	865	348	658	129	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	3208	0	306	2827	865	348	658	129	1813	2004	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	15.0	75.0	0.0	17.0	77.0	0.0	19.0	33.0	17.0	65.0	79.0	0.0
Total Split (%)	7.9%	39.5%	0.0%	8.9%	40.5%	0.0%	10.0%	17.4%	8.9%	34.2%	41.6%	0.0%
Maximum Green (s)	8.0	68.0		10.0	70.0		12.0	26.0	10.0	58.0	72.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	10.0	70.0		12.0	72.0	190.0	14.0	28.0	40.0	60.0	74.0	
Actuated g/C Ratio	0.05	0.37		0.06	0.38	1.00	0.07	0.15	0.21	0.32	0.39	
v/c Ratio	1.29	1.39		1.41	1.47	0.55	1.38	1.26	0.40	1.66	1.47	
Control Delay	252.9	222.9		248.8	243.0	0.8	243.1	180.8	54.4	337.2	254.7	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		85.5	0.0	0.0	0.0	0.0	0.0	0.0	2.9	
Total Delay	252.9	222.9		334.3	243.0	0.8	243.1	180.8	54.4	337.2	257.6	
LOS	F	F		F	F	A	F	F	D	F	F	
Approach Delay		224.0			197.6			185.5			295.4	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~190	~1545		~267	~1792	0	~288	~545	46	~1685	~1797	
Queue Length 95th (ft)	#340	#1579		m#340	#1816	0	#396	#667	166	#1809	#1918	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	93	2302		217	1927	1559	253	522	322	1095	1365	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		26	0	0	0	0	0	0	6	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.29	1.39		1.60	1.47	0.55	1.38	1.26	0.40	1.66	1.47	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 68 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.66
 Intersection Signal Delay: 234.0
 Intersection Capacity Utilization 147.8%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

→ ø2	↖ ø1	↗ ø3	↓ ø4
75 s	17 s	19 s	79 s
← ø6	↖ ø5	↗ ø8	↘ ø7
77 s	15 s	33 s	65 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔	↗	↔	↗	
Volume (vph)	14	4670	43	66	3911	128	47	4	117	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%				-1%			-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00				0.95		0.96	
Frt		0.999			0.995				0.850		0.882	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1752	6332	0	1770	6356	0	0	1790	1591	1778	1589	0
Flt Permitted	0.950			0.950				0.712		0.724		
Satd. Flow (perm)	1752	6332	0	1770	6356	0	0	1333	1514	1355	1589	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1076			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	4670	43	66	3911	128	47	4	117	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4713	0	66	4039	0	0	51	117	156	51	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	41.0		15.3	38.0		41.0	41.0	15.3	41.0	41.0	
Total Split (s)	15.4	133.7	0.0	15.3	133.6	0.0	41.0	41.0	15.3	41.0	41.0	0.0
Total Split (%)	8.1%	70.4%	0.0%	8.1%	70.3%	0.0%	21.6%	21.6%	8.1%	21.6%	21.6%	0.0%
Maximum Green (s)	8.4	126.7		8.3	126.6		34.0	34.0	8.3	34.0	34.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		7.0			7.0		11.5	11.5		11.5	11.5	
Pedestrian Calls (#/hr)		12			12		24	24		24	24	
Act Effct Green (s)	9.8	134.8		12.4	142.9			27.8	40.2	27.8	27.8	
Actuated g/C Ratio	0.05	0.71		0.07	0.75			0.15	0.21	0.15	0.15	
v/c Ratio	0.15	1.05		0.57	0.84			0.26	0.36	0.78	0.22	
Control Delay	57.4	35.6		60.5	56.4			73.1	61.7	103.5	71.5	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	22.3		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	57.4	57.9		60.5	56.4			73.1	61.7	103.5	71.5	
LOS	E	E		E	E			E	E	F	E	
Approach Delay		57.9			56.5			65.2			95.6	
Approach LOS		E			E			E			F	
Queue Length 50th (ft)	16	~1867		72	1508			57	119	191	57	
Queue Length 95th (ft)	m11	m98		m41	m818			102	181	271	100	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	96	4491		116	4782			253	326	257	301	
Starvation Cap Reductn	0	211		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.15	1.10		0.57	0.84			0.20	0.36	0.61	0.17	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 25 (13%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 58.3
 Intersection LOS: E
 Intersection Capacity Utilization 104.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

φ1	φ2	φ4
15.3 s	133.7 s	41 s
φ6	φ5	
133.6 s	15.4 s	

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	555	4204	184	294	3802	776	91	440	218	1804	1650	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00				0.96					0.99	
Frt		0.994				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6296	0	3433	5085	1583	1752	3504	1567	5040	3480	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6296	0	3433	5085	1525	1752	3504	1567	5040	3480	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			354			460			524	
Travel Time (s)		24.5			5.4			9.0			10.2	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	555	4204	184	294	3802	776	91	440	218	1804	1650	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	4388	0	294	3802	776	91	440	218	1804	1863	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	23.0	89.0	0.0	17.0	83.0	39.0	15.0	45.0	17.0	39.0	69.0	0.0
Total Split (%)	12.1%	46.8%	0.0%	8.9%	43.7%	20.5%	7.9%	23.7%	8.9%	20.5%	36.3%	0.0%
Maximum Green (s)	16.0	82.0		10.0	76.0	32.0	8.0	38.0	10.0	32.0	62.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		12			12						24	
Act Effct Green (s)	18.0	84.0		12.0	78.0	121.7	10.0	30.3	47.3	43.7	64.0	
Actuated g/C Ratio	0.09	0.44		0.06	0.41	0.64	0.05	0.16	0.25	0.23	0.34	
v/c Ratio	1.72	1.58		1.35	1.82	0.78	0.99	0.79	0.56	1.56	1.59	
Control Delay	374.4	293.3		217.5	396.0	12.6	149.3	42.6	31.4	288.3	299.9	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		5.5	0.0	0.3	0.0	0.0	0.0	0.0	84.6	
Total Delay	374.4	293.3		223.1	396.0	12.9	149.3	42.6	31.4	288.3	384.4	
LOS	F	F		F	F	B	F	D	C	F	F	
Approach Delay		302.4			324.6			52.3			337.2	
Approach LOS		F			F			D			F	
Queue Length 50th (ft)	~535	~2291		~248	~2608	340	120	130	121	~1125	~1734	
Queue Length 95th (ft)	m#510	m#2142		m#245	m#2572	m375	m#205	181	m151	m#1265	m#1838	
Internal Link Dist (ft)		1540			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	322	2783		217	2088	990	92	738	390	1160	1172	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	124	
Spillback Cap Reductn	0	0		2	0	27	0	0	0	0	4	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.72	1.58		1.37	1.82	0.81	0.99	0.60	0.56	1.56	1.78	

Intersection Summary

Area Type: Other

Cycle Length: 190

Actuated Cycle Length: 190

Offset: 122 (64%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.82

Intersection Signal Delay: 305.8

Intersection LOS: F

Intersection Capacity Utilization 164.4%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

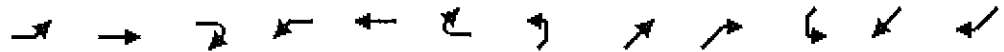
→ ø2	↖ ø1	↓ ø4	↗ ø3
89 s	17 s	89 s	15 s
← ø6	↘ ø5	↑ ø8	↙ ø7
83 s	23 s	45 s	39 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

4: Glenwood Ave #1 & I-440 WB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑		↓↓↓↓				↑			↑↑↑
Volume (vph)	0	4970	1349	0	2662	0	0	0	1238	0	0	2210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Ped Bike Factor			0.97						0.98			
Frt			0.850						0.865			0.850
Fit Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Fit Permitted												
Satd. Flow (perm)	0	4984	1512	0	7620	0	0	0	1586	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		819			490			314				640
Travel Time (s)		12.4			7.4			4.8				17.5
Confl. Peds. (#/hr)			12						12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4970	1349	0	2662	0	0	0	1238	0	0	2210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4970	1349	0	2662	0	0	0	1238	0	0	2210
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	71.0	0.0	0.0	0.0	0.0	0.0	0.0	119.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	37.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	62.6%
Maximum Green (s)					64.0							112.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lead							Lag
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		190.0	190.0		66.0				190.0			114.0
Actuated g/C Ratio		1.00	1.00		0.35				1.00			0.60
w/c Ratio		1.00	0.89		1.01				0.78			1.02
Control Delay		24.1	15.7		58.5				3.9			60.3
Queue Delay		56.4	0.0		0.0				1.8			0.0
Total Delay		80.5	15.7		58.5				5.7			60.3
LOS		F	B		E				A			E
Approach Delay		66.7			58.5							
Approach LOS		E			E							
Queue Length 50th (ft)		1844	1284		~749				0			~1271



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 95th (ft)		m0	m0		m#793				m0			#1364
Internal Link Dist (ft)		739			410			234			560	
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1512		2647				1586			2177
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		614	0		0				195			0
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		1.14	0.89		1.01				0.89			1.02

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 116 (61%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 57.7
 Intersection LOS: E
 Intersection Capacity Utilization 99.4%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp



Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

5: Glenwood Ave #1 & I-440 EB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↗	↖	↑↑↑	↗	↖↖	↗↑	↗			
Volume (vph)	0	3222	1096	100	1826	587	1033	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93			0.98						
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.986				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3143	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1448	1832	5263	1611	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12			12						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	100	1826	587	1033	576	374	0	0	0
Shared Lane Traffic (%)							23%					
Lane Group Flow (vph)	0	3222	1096	100	1826	587	795	814	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	121.0	53.0	16.0	137.0	137.0	53.0	53.0	16.0	0.0	0.0	0.0
Total Split (%)	0.0%	63.7%	27.9%	8.4%	72.1%	72.1%	27.9%	27.9%	8.4%	0.0%	0.0%	0.0%
Maximum Green (s)		114.0	46.0	9.0	130.0	130.0	46.0	46.0	9.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		116.0	164.0	11.0	132.0	132.0	48.0	48.0	64.0			
Actuated g/C Ratio		0.61	0.86	0.06	0.69	0.69	0.25	0.25	0.34			
v/c Ratio		1.06	0.86	0.94	0.50	0.52	1.04	1.03	0.70			
Control Delay		64.4	8.1	158.1	14.1	16.0	109.8	106.1	63.3			

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

5: Glenwood Ave #1 & I-440 EB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		43.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		107.4	8.6	158.1	14.1	16.0	109.8	106.1	63.3			
LOS		F	A	F	B	B	F	F	E			
Approach Delay		82.3			20.3			99.5				
Approach LOS		F			C			F				
Queue Length 50th (ft)		~1612	373	127	369	334	~619	~626	409			
Queue Length 95th (ft)		m#1627	m409	#264	399	429	#772	#779	544			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		3043	1276	106	3656	1119	765	794	531			
Starvation Cap Reductn		260	26	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.16	0.88	0.94	0.50	0.52	1.04	1.03	0.70			

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 135 (71%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 68.5
 Intersection Capacity Utilization 103.6%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

ø2	ø1	ø3
121 s	16 s	53 s
ø6		ø8
137 s		53 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↗	↖	↔		↖	↕	↗	↖	↕	↖
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.95		1.00				0.94		1.00	
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1620	0	1717	3433	1536	1823	5229	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1520	1631	1620	0	1717	3433	1442	1823	5229	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	14.0	50.0	50.0	0.0	14.0	107.0	50.0	19.0	112.0	0.0
Total Split (%)	7.4%	7.4%	7.4%	26.3%	26.3%	0.0%	7.4%	56.3%	26.3%	10.0%	58.9%	0.0%
Maximum Green (s)	7.0	7.0	7.0	43.0	43.0		7.0	100.0	43.0	12.0	105.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)		9.0	15.0	47.1	47.1		9.6	97.6	144.7	21.9	109.8	
Actuated g/C Ratio		0.05	0.08	0.25	0.25		0.05	0.51	0.76	0.12	0.58	
v/c Ratio		0.20	0.51	0.94	0.92		0.77	0.81	0.25	0.33	0.96	
Control Delay		92.7	69.1	99.5	97.2		107.6	22.7	4.0	86.2	48.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	1.6	47.1	42.4		0.0	16.7	0.2	0.0	21.2	
Total Delay		92.7	70.7	146.6	139.6		107.6	39.4	4.2	86.2	69.2	
LOS		F	E	F	F		F	D	A	F	E	
Approach Delay		75.3			143.1			36.4			69.6	
Approach LOS		E			F			D			E	
Queue Length 50th (ft)		21	51	500	487		86	370	53	85	1286	
Queue Length 95th (ft)		52	90	#740	#721		m99	m366	m56	145	#1367	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		86	125	404	402		87	1843	1121	210	3023	
Starvation Cap Reductn		0	0	0	0		0	445	348	0	0	
Spillback Cap Reductn		0	12	62	62		0	0	0	0	244	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.20	0.57	1.11	1.09		0.77	1.02	0.36	0.33	1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 1 (1%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 69.0
 Intersection LOS: E
 Intersection Capacity Utilization 98.5%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø2	ø1	ø3	ø4
107 s	19 s	14 s	50 s
ø5	ø6		
14 s	112 s		

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Volume (vph)	107	21	90	10	24	69	145	959	46	82	2427	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.97				0.96		1.00			1.00	
Frt		0.878				0.850		0.993			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1575	0	0	1837	2787	1805	5140	0	3416	3486	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1575	0	0	1837	2675	1805	5140	0	3416	3486	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	69	145	959	46	82	2427	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	69	145	1005	0	82	2533	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0	14.0	14.0	38.0		14.0	38.0	
Total Split (s)	38.0	38.0	0.0	38.0	38.0	14.0	17.0	100.0	0.0	14.0	97.0	0.0
Total Split (%)	20.0%	20.0%	0.0%	20.0%	20.0%	7.4%	8.9%	52.6%	0.0%	7.4%	51.1%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0	7.0	10.0	93.0		7.0	90.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	12	12		12	12			12			12	
Act Effct Green (s)	21.2	21.2			16.3	76.0	28.6	73.8		61.5	106.7	
Actuated g/C Ratio	0.11	0.11			0.09	0.40	0.15	0.39		0.32	0.56	
v/c Ratio	0.55	0.63			0.22	0.06	0.53	0.50		0.07	1.29	
Control Delay	89.2	95.7			80.6	32.3	98.2	28.4		24.0	154.5	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	21.8	
Total Delay	89.2	95.7			80.6	32.3	98.2	28.4		24.0	176.3	
LOS	F	F			F	C	F	C		C	F	
Approach Delay		92.5			48.2			37.2			171.5	
Approach LOS		F			D			D			F	
Queue Length 50th (ft)	129	136			42	29	115	157		20	~2042	
Queue Length 95th (ft)	195	203			78	48	252	182		m19	m#1245	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)	306	274			319	1106	272	2570		1106	1958	
Starvation Cap Reductn	0	0			0	0	0	0		0	71	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.35	0.41			0.11	0.06	0.53	0.39		0.07	1.34	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 178 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.29
 Intersection Signal Delay: 126.4
 Intersection Capacity Utilization 106.1%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø4	ø3
100 s	14 s	38 s	38 s
ø5	ø6		
17 s	97 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↘	↙	↑↑	↘	↙↘	↑↑
Volume (vph)	650	192	958	375	544	1983
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1520	3539	1520	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	192	958	375	544	1983
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	192	958	375	544	1983
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	53.0	47.0	90.0	53.0	47.0	137.0
Total Split (%)	27.9%	24.7%	47.4%	27.9%	24.7%	72.1%
Maximum Green (s)	46.0	40.0	83.0	46.0	40.0	130.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	43.3	86.9	88.1	131.5	43.5	136.7
Actuated g/C Ratio	0.23	0.46	0.46	0.69	0.23	0.72
v/c Ratio	0.83	0.27	0.58	0.35	0.69	0.78
Control Delay	61.6	11.1	41.9	12.4	44.0	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	1.8



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	61.6	11.1	41.9	12.4	44.0	21.5
LOS	E	B	D	B	D	C
Approach Delay	50.1		33.6			26.4
Approach LOS	D		C			C
Queue Length 50th (ft)	430	60	447	151	299	472
Queue Length 95th (ft)	495	63	614	262	m148	m37
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	867	729	1750	1091	865	2546
Starvation Cap Reductn	0	0	0	0	0	377
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.26	0.55	0.34	0.63	0.91

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 151 (79%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 32.7
 Intersection LOS: C
 Intersection Capacity Utilization 82.2%
 ICU Level of Service E
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

ø2	ø1	ø3
90 s	47 s	53 s
ø6		
137 s		

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	176	259	184	469	526	94	324	572	272	830	969	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		250	0		0	350		600	0		0
Storage Lanes	1		1	2		0	2		1	2		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	0.97	0.95	1.00	0.97	1.00	1.00
Ped Bike Factor			0.96		0.99				0.96		0.99	
Frt			0.850		0.977				0.850		0.972	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3435	0	3433	3539	1583	3433	1797	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1514	3433	3435	0	3433	3539	1520	3433	1797	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			348			896			285	
Travel Time (s)		18.1			9.5			17.5			5.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	176	259	184	469	526	94	324	572	272	830	969	220
Shared Lane Traffic (%)												
Lane Group Flow (vph)	176	259	184	469	620	0	324	572	272	830	1189	0
Turn Type	Prot		pm+ov	Prot			Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2						8			
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	41.0	41.0	14.0	14.0	41.0		14.0	41.0	14.0	14.0	41.0	
Total Split (s)	41.0	43.0	18.0	40.0	42.0	0.0	18.0	45.0	40.0	62.0	89.0	0.0
Total Split (%)	21.6%	22.6%	9.5%	21.1%	22.1%	0.0%	9.5%	23.7%	21.1%	32.6%	46.8%	0.0%
Maximum Green (s)	34.0	36.0	11.0	33.0	35.0		11.0	38.0	33.0	55.0	82.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		14.0			14.0			17.0			17.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	26.1	21.2	35.0	51.0	46.1		13.8	37.0	88.1	60.7	84.0	
Actuated g/C Ratio	0.14	0.11	0.18	0.27	0.24		0.07	0.19	0.46	0.32	0.44	
v/c Ratio	0.72	0.66	0.65	0.51	0.74		1.30	0.83	0.38	0.76	1.50	
Control Delay	92.5	84.4	54.4	61.6	73.1		215.7	75.6	24.6	16.4	241.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.8	

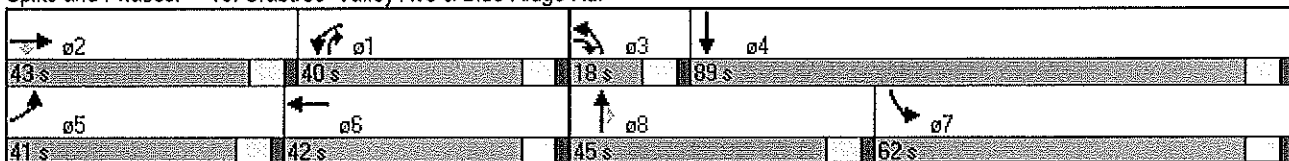


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	92.5	84.4	54.4	61.6	73.1		215.7	75.6	24.6	16.4	242.0	
LOS	F	F	D	E	E		F	E	C	B	F	
Approach Delay		77.8			68.1			102.6			149.3	
Approach LOS		E			E			F			F	
Queue Length 50th (ft)	222	171	141	257	379		~277	375	166	301	~2017	
Queue Length 95th (ft)	309	223	246	329	#495		#380	445	214	m156	m#270	
Internal Link Dist (ft)		1112			268			816			205	
Turn Bay Length (ft)	500		250				350		600			
Base Capacity (vph)	335	708	283	922	833		249	745	722	1097	794	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	1	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.53	0.37	0.65	0.51	0.74		1.30	0.77	0.38	0.76	1.50	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 169 (89%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.50
 Intersection Signal Delay: 111.0 Intersection LOS: F
 Intersection Capacity Utilization 121.4% ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.97	
Frt		0.999				0.850		0.908			0.904	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3533	0	1770	3539	1583	1770	1662	0	1770	1628	0
Flt Permitted	0.950			0.950			0.748			0.749		
Satd. Flow (perm)	1770	3533	0	1770	3539	1425	1393	1662	0	1395	1628	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	896	0	24	823	103	10	13	0	34	14	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	24.0	123.0	0.0	21.0	120.0	120.0	46.0	46.0	0.0	46.0	46.0	0.0
Total Split (%)	12.6%	64.7%	0.0%	11.1%	63.2%	63.2%	24.2%	24.2%	0.0%	24.2%	24.2%	0.0%
Maximum Green (s)	17.0	116.0		14.0	113.0	113.0	39.0	39.0		39.0	39.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	10.9	157.6		12.6	156.8	156.8	13.6	13.6		13.9	13.9	
Actuated g/C Ratio	0.06	0.83		0.07	0.83	0.83	0.07	0.07		0.07	0.07	
v/c Ratio	0.29	0.31		0.20	0.28	0.09	0.10	0.11		0.33	0.12	
Control Delay	94.1	5.0		92.4	2.9	2.6	81.6	81.6		90.7	81.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	94.1	5.0		92.4	2.9	2.6	81.6	81.6		90.7	81.9	
LOS	F	A		F	A	A	F	F		F	F	
Approach Delay		7.8			5.1			81.6			88.1	
Approach LOS		A			A			F			F	
Queue Length 50th (ft)	38	61		32	86	18	12	16		42	17	
Queue Length 95th (ft)	m68	168		70	66	17	35	41		82	43	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	177	2930		149	2921	1176	301	359		301	351	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.31		0.16	0.28	0.09	0.03	0.04		0.11	0.04	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 113 (59%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.33
 Intersection Signal Delay: 9.3
 Intersection Capacity Utilization 43.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

φ2	φ1	φ4
123 s	21 s	46 s
φ5	φ6	φ8
24 s	120 s	46 s



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	69	475	387	54	797	218	88	69	118	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		250	100		0	0		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.90			0.90		0.97			0.96	
Frt			0.850			0.850		0.905			0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1631	0	3433	1593	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1425	1770	3539	1425	1770	1631	0	3433	1593	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			1192			291			153	
Travel Time (s)		14.3			18.1			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	475	387	54	797	218	88	69	118	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	475	387	54	797	218	88	187	0	27	88	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6						
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0		14.0	41.0	
Total Split (s)	25.0	85.0	40.0	20.0	80.0	21.0	40.0	64.0	0.0	21.0	45.0	0.0
Total Split (%)	13.2%	44.7%	21.1%	10.5%	42.1%	11.1%	21.1%	33.7%	0.0%	11.1%	23.7%	0.0%
Maximum Green (s)	18.0	78.0	33.0	13.0	73.0	14.0	33.0	57.0		14.0	38.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	14.8	113.4	141.7	13.2	109.1	120.7	28.3	34.5		11.6	17.9	
Actuated g/C Ratio	0.08	0.60	0.75	0.07	0.57	0.64	0.15	0.18		0.06	0.09	
v/c Ratio	0.50	0.22	0.36	0.44	0.39	0.24	0.33	0.63		0.13	0.59	
Control Delay	74.2	9.4	4.0	94.9	9.5	3.1	76.3	81.6		84.9	97.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	74.2	9.4	4.0	94.9	9.5	3.1	76.3	81.6		84.9	97.5	
LOS	E	A	A	F	A	A	E	F		F	F	
Approach Delay		11.9			12.5			79.9			94.5	
Approach LOS		B			B			E			F	
Queue Length 50th (ft)	85	72	33	56	112	14	100	219		17	108	
Queue Length 95th (ft)	143	142	60	m56	m254	m82	164	308		36	171	
Internal Link Dist (ft)		866			1112			211			73	
Turn Bay Length (ft)	400		250	500		250	100					
Base Capacity (vph)	186	2113	1138	145	2032	951	326	506		289	335	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.37	0.22	0.34	0.37	0.39	0.23	0.27	0.37		0.09	0.26	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 90 (47%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 24.0
 Intersection Capacity Utilization 52.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

φ1	φ2	φ4	φ3
20 s	85 s	45 s	40 s
φ6	φ5	φ7	φ8
80 s	25 s	21 s	64 s

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

6/21/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	32	387	781	55	536	1086
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1489	3539	1489	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			896
Travel Time (s)	8.2		14.2			13.6
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	387	781	55	536	1086
Shared Lane Traffic (%)						
Lane Group Flow (vph)	32	387	781	55	536	1086
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4		2		
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	41.0	20.0	41.0	41.0	20.0	41.0
Total Split (s)	41.0	65.0	84.0	41.0	65.0	149.0
Total Split (%)	21.6%	34.2%	44.2%	21.6%	34.2%	78.4%
Maximum Green (s)	34.0	58.0	77.0	34.0	58.0	142.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	12.0	62.4	112.6	124.6	50.4	168.0
Actuated g/C Ratio	0.06	0.33	0.59	0.66	0.27	0.88
v/c Ratio	0.29	0.75	0.37	0.06	0.59	0.35
Control Delay	89.8	61.3	22.1	11.5	54.6	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Crabtree Valley Ave Extension to I-440 (At Grade) AM (2035)

6/21/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	89.8	61.3	22.1	11.5	54.6	2.2
LOS	F	E	C	B	D	A
Approach Delay	63.5		21.4			19.5
Approach LOS	E		C			B
Queue Length 50th (ft)	39	423	253	21	280	50
Queue Length 95th (ft)	80	479	371	47	m243	m96
Internal Link Dlst (ft)	459		647			816
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	335	558	2097	1034	1089	3129
Starvation Cap Reductn	0	0	0	0	0	1411
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.69	0.37	0.05	0.49	0.63

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 55 (29%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 26.5
 Intersection Capacity Utilization 55.5%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

ø2	ø1	ø4
84 s	65 s	41 s
ø6		
149 s		

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd

6/21/2010

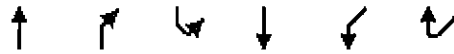


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	↗↗
Volume (veh/h)	0	119	0	749	1900	228
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	119	0	749	1900	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				635	460	
pX, platoon unblocked	0.72	0.65	0.65			
vC, conflicting volume	2274	1900	1900			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1823	2119	2119			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	49	27	164			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	119	374	374	1900	114	114
Volume Left	0	0	0	0	0	0
Volume Right	119	0	0	0	114	114
cSH	27	1700	1700	1700	1700	1700
Volume to Capacity	4.43	0.22	0.22	1.12	0.07	0.07
Queue Length 95th (ft)	Err	0	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	Err	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay	397.2					
Intersection Capacity Utilization	114.0%			ICU Level of Service	H	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 14: Blue Ridge Rd. & Crabtree View Pl
 6/21/2010



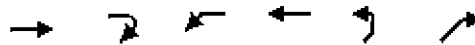
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	749	93	0	2019	0	0
Sign Control	Free			Free	Stop	
Grade	-2%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	749	93	0	2019	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	285			810		
pX, platoon unblocked			0.85		0.75	0.85
vC, conflicting volume			842		1805	421
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			449		480	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			937		386	917

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SW 1
Volume Total	499	343	1010	1010	0
Volume Left	0	0	0	0	0
Volume Right	0	93	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.29	0.20	0.59	0.59	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary					
Average Delay			0.0		
Intersection Capacity Utilization			59.1%	ICU Level of Service	B
Analysis Period (min)			15		

HCM Unsignalized Intersection Capacity Analysis
 16: Crabtree Valley Ave & Edwards Mill Rd

6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	856	63	0	842	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	856	63	0	842	0	70
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.94	
vC, conflicting volume				925	1314	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				925	1216	472
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				100	100	87
cM capacity (veh/h)				730	163	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	571	348	421	421	70
Volume Left	0	0	0	0	0
Volume Right	0	63	0	0	70
cSH	1700	1700	1700	1700	533
Volume to Capacity	0.34	0.20	0.25	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.8
Approach LOS					B

Intersection Summary					
Average Delay			0.5		
Intersection Capacity Utilization			38.9%		ICU Level of Service A
Analysis Period (min)	15				

Network Totals

Number of Intersections	37
Control Delay / Veh (s/v)	42
Queue Delay / Veh (s/v)	3
Total Delay / Veh (s/v)	45
Total Delay (hr)	3430
Stops / Veh	0.20
Stops (#)	54892
Average Speed (mph)	9
Total Travel Time (hr)	4260
Distance Traveled (mi)	40355
Fuel Consumed (gal)	4535
Fuel Economy (mpg)	8.9
CO Emissions (kg)	316.96
NOx Emissions (kg)	61.67
VOC Emissions (kg)	73.46
Unserved Vehicles (#)	10018
Vehicles in dilemma zone (#)	1095
Performance Index	3582.1



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑↑	↘	↖↖	↑↑↑↑	↗	↖↖	↑↑	↗	↖↖	↑↑	↘
Volume (vph)	322	3512	407	293	3692	1743	1018	1878	240	1239	1266	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor		1.00				0.98			0.95		0.99	
Frt		0.984				0.850			0.850		0.983	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6279	0	3433	5085	1583	3433	3539	1583	3467	3494	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6279	0	3433	5085	1559	3433	3539	1507	3467	3494	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	3512	407	293	3692	1743	1018	1878	240	1239	1266	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	3919	0	293	3692	1743	1018	1878	240	1239	1432	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	23.0	82.0	0.0	16.0	75.0	0.0	31.0	56.0	16.0	36.0	61.0	0.0
Total Split (%)	12.1%	43.2%	0.0%	8.4%	39.5%	0.0%	16.3%	29.5%	8.4%	18.9%	32.1%	0.0%
Maximum Green (s)	16.0	75.0		9.0	68.0		24.0	49.0	9.0	29.0	54.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	18.0	77.0		11.0	70.0	190.0	26.0	51.0	62.0	31.0	56.0	
Actuated g/C Ratio	0.09	0.41		0.06	0.37	1.00	0.14	0.27	0.33	0.16	0.29	
v/c Ratio	1.92	1.54		1.47	1.97	1.12	2.17	1.98	0.48	2.19	1.39	
Control Delay	472.2	282.4		258.1	461.3	85.7	562.0	481.1	79.1	572.3	228.4	

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	472.2	282.4		258.1	461.3	85.7	562.0	481.1	79.1	572.3	228.4	
LOS	F	F		F	F	F	F	F	E	F	F	
Approach Delay		296.8			336.6			476.6			388.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~615	~1988		~256	~2603	~1322	~1062	~1932	289	~1273	~1247	
Queue Length 95th (ft)	#830	#1996		m#152	m#1612	m401	m#1005	m#1823	m296	#1410	#1384	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	168	2545		199	1873	1559	470	950	496	566	1030	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.92	1.54		1.47	1.97	1.12	2.17	1.98	0.48	2.19	1.39	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 62 (33%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.19
 Intersection Signal Delay: 362.5
 Intersection LOS: F
 Intersection Capacity Utilization 193.1%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

→ ø2	↖ ø1	↗ ø3	↓ ø4
82 s	16 s	31 s	61 s
↖ ø5	← ø6	↑ ø8	↘ ø7
23 s	75 s	56 s	36 s

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑↑		↖	↑↑↑↑			↑	↗	↖	↗	
Volume (vph)	36	4683	272	412	5427	112	242	9	698	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%			-1%	
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00				0.95		0.94	
Frt		0.992			0.997				0.850		0.877	
Flt Protected	0.950			0.950				0.954		0.950		
Satd. Flow (prot)	1752	6259	0	1770	6376	0	0	1786	1591	1778	1540	0
Flt Permitted	0.950			0.950				0.671		0.402		
Satd. Flow (perm)	1752	6259	0	1770	6376	0	0	1256	1514	753	1540	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1076			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Confl. Peds. (#/hr)			12			12			12			21
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	4683	272	412	5427	112	242	9	698	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	4955	0	412	5539	0	0	251	698	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	41.0		15.3	38.0		41.0	41.0	15.3	41.0	41.0	
Total Split (s)	15.4	101.0	0.0	32.0	117.6	0.0	57.0	57.0	32.0	57.0	57.0	0.0
Total Split (%)	8.1%	53.2%	0.0%	16.8%	61.9%	0.0%	30.0%	30.0%	16.8%	30.0%	30.0%	0.0%
Maximum Green (s)	8.4	94.0		25.0	110.6		50.0	50.0	25.0	50.0	50.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		7.0			7.0		11.5	11.5		11.5	11.5	
Pedestrian Calls (#/hr)		12			12		24	24		24	24	
Act Effct Green (s)	10.0	96.0		27.0	115.8			52.0	79.0	52.0	52.0	
Actuated g/C Ratio	0.05	0.51		0.14	0.61			0.27	0.42	0.27	0.27	
v/c Ratio	0.39	1.57		1.63	1.43			0.73	1.09	1.40	0.17	
Control Delay	111.8	275.0		316.5	243.4			76.5	111.0	255.0	54.0	

Lanes, Volumes, Timings
2: Glenwood Ave #1 & Marriott Dr

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	5.2		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	111.8	280.2		316.5	243.4			76.5	111.0	255.0	54.0	
LOS	F	F		F	F			E	F	F	D	
Approach Delay		279.0			248.4			101.9			214.9	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	48	~2518		~732	~2800			288	~976	~481	69	
Queue Length 95th (ft)	m30	m531		m192	m911			407	#938	#690	119	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	96	3162		252	3886			344	640	206	421	
Starvation Cap Reductn	0	23		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.38	1.58		1.63	1.43			0.73	1.09	1.40	0.17	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 32 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.63
 Intersection Signal Delay: 248.5
 Intersection Capacity Utilization 145.4%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1 32 s	ø2 101 s	ø4 57 s
ø5 15.4 s	ø6 117.6 s	

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑		↔↔	↑↑↑	↔	↔	↑↑	↔	↔↔↔	↑↑	
Volume (vph)	676	4837	157	684	5661	1656	121	937	258	985	1128	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00				0.96					0.99	
Frt		0.995				0.850			0.850		0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6305	0	3433	5085	1583	1752	3504	1567	5040	3465	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6305	0	3433	5085	1525	1752	3504	1567	5040	3465	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			354			460			524	
Travel Time (s)		24.5			5.4			9.0			10.2	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	676	4837	157	684	5661	1656	121	937	258	985	1128	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	676	4994	0	684	5661	1656	121	937	258	985	1297	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	25.0	93.0	0.0	25.0	93.0	28.0	17.0	44.0	25.0	28.0	55.0	0.0
Total Split (%)	13.2%	48.9%	0.0%	13.2%	48.9%	14.7%	8.9%	23.2%	13.2%	14.7%	28.9%	0.0%
Maximum Green (s)	18.0	86.0		18.0	86.0	21.0	10.0	37.0	18.0	21.0	48.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		12			12						24	
Act Effct Green (s)	20.0	88.0		20.0	88.0	111.0	12.0	39.0	59.0	23.0	50.0	
Actuated g/C Ratio	0.11	0.46		0.11	0.46	0.58	0.06	0.21	0.31	0.12	0.26	
v/c Ratio	1.89	1.71		1.89	2.40	1.84	1.09	1.30	0.53	1.61	1.42	
Control Delay	440.0	345.8		444.6	656.7	410.1	168.3	170.1	12.2	326.7	236.2	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	293.8	0.0	0.0	0.0	0.0	27.0	
Total Delay	440.0	345.8		444.6	656.7	703.9	168.3	170.1	12.2	326.7	263.1	
LOS	F	F		F	F	F	F	F	B	F	F	
Approach Delay		357.0			648.4			138.9			290.6	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~660	~2691		~677	~4289	~3150	~172	~782	83	~614	~1152	
Queue Length 95th (ft)	m#367	m#1458		m#318	m#2177	m#1211	m#180	m#776	m88	m#703	m#1286	
Internal Link Dist (ft)		1540			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	358	2920		361	2355	898	111	719	487	610	912	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	37	
Spillback Cap Reductn	0	0		0	0	366	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.89	1.71		1.89	2.40	3.11	1.09	1.30	0.53	1.61	1.48	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 108 (57%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.40
 Intersection Signal Delay: 466.6
 Intersection LOS: F
 Intersection Capacity Utilization 190.0%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ø2 93 s	↖ ø1 25 s	↗ ø3 17 s	↓ ø4 55 s
↖ ø5 25 s	← ø6 93 s	↘ ø7 28 s	↑ ø8 44 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

4: Glenwood Ave #1 & I-440 WB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑		↑↑↑↑				↑			↑↑↑
Volume (vph)	0	4539	1651	0	4393	0	0	0	1056	0	0	3608
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Fr _t			0.850						0.865			0.850
Fit Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Fit Permitted												
Satd. Flow (perm)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		819			490			314				640
Travel Time (s)		12.4			7.4			4.8				17.5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4539	1651	0	4393	0	0	0	1056	0	0	3608
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4539	1651	0	4393	0	0	0	1056	0	0	3608
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	74.0	0.0	0.0	0.0	0.0	0.0	0.0	116.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	38.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	61.1%
Maximum Green (s)					67.0							109.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lead							Lag
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		190.0	190.0		69.0				190.0			111.0
Actuated g/C Ratio		1.00	1.00		0.36				1.00			0.58
v/c Ratio		0.91	1.06		1.59				0.66			1.70
Control Delay		24.6	61.5		300.8				2.1			346.1
Queue Delay		0.4	0.0		11.3				0.1			0.0
Total Delay		25.0	61.5		312.1				2.1			346.1
LOS		C	E		F				A			F
Approach Delay		34.7			312.1							
Approach LOS		C			F							
Queue Length 50th (ft)		1066	~1373		~1927				0			~2888
Queue Length 95th (ft)		m0	m130		#1920				m0			#2917
Internal Link Dist (ft)		739			410			234			560	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1552		2767				1611			2120
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		112	0		43				36			0
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		0.93	1.06		1.61				0.67			1.70

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 11 (6%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.70
 Intersection Signal Delay: 186.1
 Intersection LOS: F
 Intersection Capacity Utilization 143.4%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Ramp

 74 s	 116 s
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Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

5: Glenwood Ave #1 & I-440 EB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↗	↖	↑↑↑	↗	↖↖	↖↑	↗			
Volume (vph)	0	2258	1145	100	2992	524	1672	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93			0.98						
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.976				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3111	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1448	1832	5263	1609	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12			12						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2258	1145	100	2992	524	1672	566	379	0	0	0
Shared Lane Traffic (%)							33%					
Lane Group Flow (vph)	0	2258	1145	100	2992	524	1120	1118	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	95.0	76.0	19.0	114.0	114.0	76.0	76.0	19.0	0.0	0.0	0.0
Total Split (%)	0.0%	50.0%	40.0%	10.0%	60.0%	60.0%	40.0%	40.0%	10.0%	0.0%	0.0%	0.0%
Maximum Green (s)		88.0	69.0	12.0	107.0	107.0	69.0	69.0	12.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		90.0	161.0	14.0	109.0	109.0	71.0	71.0	90.0			
Actuated g/C Ratio		0.47	0.85	0.07	0.57	0.57	0.37	0.37	0.47			
v/c Ratio		0.96	0.90	0.74	0.99	0.57	0.99	0.96	0.51			
Control Delay		51.3	13.3	115.7	53.9	28.6	82.3	76.1	37.7			

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

5: Glenwood Ave #1 & I-440 EB Ramp

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		54.3	13.3	115.7	53.9	28.6	82.3	76.1	37.7			
LOS		D	B	F	D	C	F	E	D			
Approach Delay		40.5			51.9			73.2				
Approach LOS		D			D			E				
Queue Length 50th (ft)		970	459	125	1323	405	811	796	326			
Queue Length 95th (ft)		1051	749	#226	#1409	524	#988	#961	432			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2361	1266	135	3019	923	1132	1163	746			
Starvation Cap Reductn		66	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		0.98	0.90	0.74	0.99	0.57	0.99	0.96	0.51			

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 148 (78%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 53.7
 Intersection LOS: D
 Intersection Capacity Utilization 98.3%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & I-440 EB Ramp

ø2	ø1	ø3
95 s	19 s	76 s
ø6		ø8
114 s		76 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↗	↖	↔		↖	↕	↗	↖	↕	↗
Volume (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.96		0.99				0.94		1.00	
Frt			0.850		0.957				0.850		0.999	
Flt Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1570	0	1717	3433	1536	1823	5230	0
Flt Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1542	1631	1570	0	1717	3433	1442	1823	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2494	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	24.0	34.0	34.0	0.0	24.0	128.0	34.0	14.0	118.0	0.0
Total Split (%)	7.4%	7.4%	12.6%	17.9%	17.9%	0.0%	12.6%	67.4%	17.9%	7.4%	62.1%	0.0%
Maximum Green (s)	7.0	7.0	17.0	27.0	27.0		17.0	121.0	27.0	7.0	111.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)		9.0	23.0	30.1	30.1		15.8	124.7	154.8	9.0	117.9	
Actuated g/C Ratio		0.05	0.12	0.16	0.16		0.08	0.66	0.81	0.05	0.62	
v/c Ratio		0.48	0.32	0.94	0.95		0.71	1.11	0.57	0.77	0.56	
Control Delay		107.2	53.5	118.9	123.1		85.8	74.9	2.4	134.9	22.4	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0	0.0	0.0		0.0	204.3	2.3	0.0	0.1	
Total Delay		107.2	53.5	118.9	123.1		85.8	279.2	4.7	134.9	22.4	
LOS		F	D	F	F		F	F	A	F	C	
Approach Delay		75.1			121.0			216.6			26.4	
Approach LOS		E			F			F			C	
Queue Length 50th (ft)		51	53	322	315		126	~1851	84	83	486	
Queue Length 95th (ft)		99	91	#526	#523		m73	m416	m41	#178	544	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		85	218	258	249		172	2254	1190	86	3246	
Starvation Cap Reductn		0	0	0	0		0	659	368	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	203	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.48	0.28	0.94	0.95		0.59	1.56	0.82	0.77	0.60	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 188 (99%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.11
 Intersection Signal Delay: 143.6
 Intersection LOS: F
 Intersection Capacity Utilization 108.3%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
14 s	128 s	14 s	34 s
ø5	ø6		
24 s	118 s		

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	561	110	2437	150	409	1799	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.97				0.96		1.00			1.00	
Frt		0.892				0.850		0.991			0.993	
Flt Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1606	0	0	1788	2787	1805	5127	0	3416	3481	0
Flt Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1606	0	0	1788	2675	1805	5127	0	3416	3481	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	561	110	2437	150	409	1799	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	561	110	2587	0	409	1886	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0	14.0	14.0	38.0		14.0	38.0	
Total Split (s)	38.0	38.0	0.0	38.0	38.0	24.0	15.0	90.0	0.0	24.0	99.0	0.0
Total Split (%)	20.0%	20.0%	0.0%	20.0%	20.0%	12.6%	7.9%	47.4%	0.0%	12.6%	52.1%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0	17.0	8.0	83.0		17.0	92.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	12	12		12	12			12			12	
Act Effct Green (s)	22.4	22.4			23.4	59.0	10.0	88.6		35.6	114.2	
Actuated g/C Ratio	0.12	0.12			0.12	0.31	0.05	0.47		0.19	0.60	
v/c Ratio	0.67	0.53			0.69	0.66	1.16	1.08		0.64	0.90	
Control Delay	95.0	88.0			95.4	42.2	143.1	71.6		82.7	20.4	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	51.7		0.0	4.9	
Total Delay	95.0	88.0			95.4	42.2	143.1	123.3		82.7	25.3	
LOS	F	F			F	D	F	F		F	C	
Approach Delay		92.1			53.6			124.2			35.5	
Approach LOS		F			D			F			D	
Queue Length 50th (ft)	168	120			185	253	~161	~1320		250	569	
Queue Length 95th (ft)	243	184			262	302	m#153	m#1290		m212	m383	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)	306	279			311	852	95	2392		640	2093	
Starvation Cap Reductn	0	0			0	0	0	235		0	163	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.45	0.36			0.49	0.66	1.16	1.20		0.64	0.98	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 172 (91%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 80.2
 Intersection Capacity Utilization 95.6%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service F

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1	ø2	ø4	ø3
24 s	90 s	38 s	38 s
ø6	ø5		
89 s	15 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↙	↑↑	↘	↘↘	↑↑
Volume (vph)	489	468	2229	685	494	1504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1520	3539	1520	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	489	468	2229	685	494	1504
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	468	2229	685	494	1504
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	31.0	118.0	41.0	31.0	149.0
Total Split (%)	21.6%	16.3%	62.1%	21.6%	16.3%	78.4%
Maximum Green (s)	34.0	24.0	111.0	34.0	24.0	142.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	33.9	59.9	115.1	149.0	26.0	146.1
Actuated g/C Ratio	0.18	0.32	0.61	0.78	0.14	0.77
v/c Ratio	0.80	0.96	1.04	0.57	1.05	0.55
Control Delay	78.0	84.8	66.9	8.3	113.7	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.8



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	78.0	84.8	66.9	8.3	113.7	3.5
LOS	E	F	E	A	F	A
Approach Delay	81.3		53.1			30.8
Approach LOS	F		D			C
Queue Length 50th (ft)	308	561	~1600	252	~346	100
Queue Length 95th (ft)	381	#805	#1710	325	m#427	68
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	650	488	2144	1217	470	2721
Starvation Cap Reductn	0	0	0	0	0	828
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.96	1.04	0.56	1.05	0.79

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 144 (76%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 50.1
 Intersection LOS: D
 Intersection Capacity Utilization 104.2%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ρ2	↙ ρ1	↘ ρ3
118 s	31 s	41 s
↓ ρ6		
149 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑	↗	↖↗	↑↑		↖↗	↑↑	↗	↖↗	↗	
Volume (vph)	257	558	412	493	663	219	601	950	570	776	740	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		250	0		0	350		600	0		0
Storage Lanes	1		1	2		0	2		1	2		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	0.97	0.95	1.00	0.97	1.00	1.00
Ped Bike Factor			0.96		0.99				0.96		0.99	
Frt			0.850		0.963				0.850		0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3371	0	3433	3539	1583	3433	1806	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1514	3433	3371	0	3433	3539	1520	3433	1806	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			35			35	
Link Distance (ft)		1192			348			896			285	
Travel Time (s)		18.1			9.5			17.5			5.6	
Confl. Peds. (##/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	257	558	412	493	663	219	601	950	570	776	740	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	257	558	412	493	882	0	601	950	570	776	883	0
Turn Type	Prot		pm+ov	Prot			Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2						8			
Detector Phase	5	2	3	1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	41.0	41.0	14.0	14.0	41.0		14.0	41.0	14.0	14.0	41.0	
Total Split (s)	41.0	49.0	28.0	40.0	48.0	0.0	28.0	55.0	40.0	46.0	73.0	0.0
Total Split (%)	21.6%	25.8%	14.7%	21.1%	25.3%	0.0%	14.7%	28.9%	21.1%	24.2%	38.4%	0.0%
Maximum Green (s)	34.0	42.0	21.0	33.0	41.0		21.0	48.0	33.0	39.0	66.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		14.0			14.0			17.0			17.0	
Pedestrian Calls (##/hr)		12			12			12			12	
Act Effct Green (s)	32.7	45.6	68.6	33.4	46.3		23.0	50.0	83.4	41.0	68.0	
Actuated g/C Ratio	0.17	0.24	0.36	0.18	0.24		0.12	0.26	0.44	0.22	0.36	
v/c Ratio	0.84	0.66	0.74	0.82	1.07		1.44	1.02	0.84	1.05	1.37	
Control Delay	105.4	46.6	26.6	87.1	117.7		258.1	83.2	30.3	70.1	195.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	105.4	46.6	26.6	87.1	117.7		258.1	83.2	30.3	70.1	195.4	
LOS	F	D	C	F	F		F	F	C	E	F	
Approach Delay		52.2			106.7			118.5				136.8
Approach LOS		D			F			F				F
Queue Length 50th (ft)	284	212	298	307	~667		~520	~649	355	~538	~1450	
Queue Length 95th (ft)	387	362	301	377	#822		m#633	m#778	m434	m337	m#922	
Internal Link Dist (ft)		1112			268			816				205
Turn Bay Length (ft)	500		250				350		600			
Base Capacity (vph)	335	850	555	632	821		416	931	692	741	646	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.77	0.66	0.74	0.78	1.07		1.44	1.02	0.82	1.05	1.37	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 147 (77%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.44
 Intersection Signal Delay: 108.0 Intersection LOS: F
 Intersection Capacity Utilization 121.5% ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

ø1	ø2	ø3	ø4
40 s	49 s	28 s	73 s
ø5	ø6	ø8	ø7
41 s	48 s	55 s	46 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕	↖	↖	↗		↖	↗	
Volume (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.95	
Frt		0.998				0.850		0.888			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3528	0	1770	3539	1583	1770	1622	0	1770	1516	0
Flt Permitted	0.950			0.950			0.452			0.744		
Satd. Flow (perm)	1770	3528	0	1770	3539	1425	842	1622	0	1386	1516	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1113	0	30	818	221	16	20	0	115	128	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	31.0	117.0	0.0	19.0	105.0	105.0	54.0	54.0	0.0	54.0	54.0	0.0
Total Split (%)	16.3%	61.6%	0.0%	10.0%	55.3%	55.3%	28.4%	28.4%	0.0%	28.4%	28.4%	0.0%
Maximum Green (s)	24.0	110.0		12.0	98.0	98.0	47.0	47.0		47.0	47.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	18.0	143.4		10.6	133.6	133.6	23.5	23.5		23.5	23.5	
Actuated g/C Ratio	0.09	0.75		0.06	0.70	0.70	0.12	0.12		0.12	0.12	
v/c Ratio	0.50	0.42		0.30	0.33	0.22	0.15	0.10		0.67	0.68	
Control Delay	70.8	5.5		101.0	4.8	3.8	74.8	71.9		97.8	97.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	70.8	5.5		101.0	4.8	3.8	74.8	71.9		97.8	97.1	
LOS	E	A		F	A	A	E	E		F	F	
Approach Delay		10.0			7.3			73.2			97.4	
Approach LOS		B			A			E			F	
Queue Length 50th (ft)	102	132		30	13	5	18	23		140	156	
Queue Length 95th (ft)	m139	m173		m48	276	112	46	51		210	228	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	242	2663		130	2488	1002	217	418		357	391	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.35	0.42		0.23	0.33	0.22	0.07	0.05		0.32	0.33	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 126 (66%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 18.1
 Intersection LOS: B
 Intersection Capacity Utilization 60.1%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

φ1	φ2	φ4
19 s	117 s	54 s
φ6	φ5	φ8
105 s	31 s	54 s

Lanes, Volumes, Timings

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↗	↔	↕	↗	↔	↕	↗	↔	↕	↗
Volume (vph)	192	683	356	144	674	589	135	293	33	511	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		250	100		0	0		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.90			0.90		0.99			0.97	
Frt			0.850			0.850		0.985			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1825	0	3433	1640	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1425	1770	3539	1425	1770	1825	0	3433	1640	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			1192			291			153	
Travel Time (s)		14.3			18.1			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	683	356	144	674	589	135	293	33	511	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	683	356	144	674	589	135	326	0	511	429	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6						
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0		14.0	41.0	
Total Split (s)	34.0	56.0	30.0	30.0	52.0	54.0	30.0	50.0	0.0	54.0	74.0	0.0
Total Split (%)	17.9%	29.5%	15.8%	15.8%	27.4%	28.4%	15.8%	26.3%	0.0%	28.4%	38.9%	0.0%
Maximum Green (s)	27.0	49.0	23.0	23.0	45.0	47.0	23.0	43.0		47.0	67.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	26.3	55.9	76.9	27.2	56.7	103.9	21.0	39.8		47.2	65.9	
Actuated g/C Ratio	0.14	0.29	0.40	0.14	0.30	0.55	0.11	0.21		0.25	0.35	
v/c Ratio	0.78	0.66	0.60	0.57	0.64	0.72	0.69	0.85		0.60	0.75	
Control Delay	87.6	54.1	29.0	43.2	30.9	33.2	99.0	92.9		66.3	64.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	87.6	54.1	29.0	43.2	30.9	33.2	99.0	92.9		66.3	64.2	
LOS	F	D	C	D	C	C	F	F		E	E	
Approach Delay		52.1			33.1			94.7			65.3	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	233	418	291	129	222	239	165	394		293	473	
Queue Length 95th (ft)	335	510	378	m89	m172	m296	243	511		355	607	
Internal Link Dist (ft)		866			1112			211			73	
Turn Bay Length (ft)	400		250	500		250	100					
Base Capacity (vph)	273	1048	628	253	1057	834	233	432		885	596	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.70	0.65	0.57	0.57	0.64	0.71	0.58	0.75		0.58	0.72	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 53.4 Intersection LOS: D
 Intersection Capacity Utilization 79.0% ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
56 s	30 s	30 s	74 s
ø5	ø6	ø8	ø7
34 s	52 s	50 s	54 s

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

6/21/2010



Lane Group:	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations	↵	↶	↕↕	↶	↵↵	↕↕
Volume (vph)	27	469	1652	20	514	1131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1489	3539	1489	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			896
Travel Time (s)	8.2		14.2			13.6
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	469	1652	20	514	1131
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	469	1652	20	514	1131
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4		2		
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	20.0	41.0	41.0	20.0	41.0
Total Split (s)	41.0	43.0	106.0	41.0	43.0	149.0
Total Split (%)	21.6%	22.6%	55.8%	21.6%	22.6%	78.4%
Maximum Green (s)	34.0	36.0	99.0	34.0	36.0	142.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	12.1	59.9	116.1	126.3	49.7	171.7
Actuated g/C Ratio	0.06	0.32	0.61	0.66	0.26	0.90
v/c Ratio	0.24	0.95	0.76	0.02	0.57	0.35
Control Delay	88.3	87.8	30.5	8.6	61.1	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Crabtree Valley Ave Extension to I-440 (At Grade) PM (2035)

6/21/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	88.3	87.8	30.5	8.6	61.1	3.6
LOS	F	F	C	A	E	A
Approach Delay	87.9		30.2			21.6
Approach LOS	F		C			C
Queue Length 50th (ft)	33	501	904	9	229	119
Queue Length 95th (ft)	70	#717	796	14	m298	m145
Internal Link Dist (ft)	459		647			816
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	335	494	2162	1039	898	3199
Starvation Cap Reductn	0	0	0	0	0	1316
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.95	0.76	0.02	0.57	0.60

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 179 (94%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 34.0
 Intersection Capacity Utilization 84.3%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

Phase	Duration (s)	Phase	Duration (s)	Phase	Duration (s)
ϕ2	106	ϕ1	43	ϕ4	41
ϕ6	149				

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd
 6/21/2010

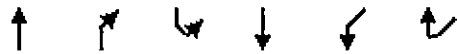


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↓	↘↘
Volume (veh/h)	0	475	0	1316	1184	785
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	475	0	1316	1184	785
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				635	460	
pX, platoon unblocked	0.86	0.73	0.73			
vC, conflicting volume	1842	1184	1184			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	789	1066	1066			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	280	159	473			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	475	658	658	1184	392	392
Volume Left	0	0	0	0	0	0
Volume Right	475	0	0	0	392	392
cSH	159	1700	1700	1700	1700	1700
Volume to Capacity	2.99	0.39	0.39	0.70	0.23	0.23
Queue Length 95th (ft)	1090	0	0	0	0	0
Control Delay (s)	956.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	956.6	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay		120.9				
Intersection Capacity Utilization		98.4%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
 14: Blue Ridge Rd. & Crabtree View Pl Ave Extension to I-440 (At Grade) PM (2035)
 6/21/2010

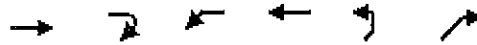


Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1316	110	0	1659	0	0
Sign Control	Free			Free	Stop	
Grade	-2%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1316	110	0	1659	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	285			810		
pX, platoon unblocked			0.74		0.85	0.74
vC, conflicting volume			1426		2200	713
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			873		872	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			569		247	802

Direction, Lane #	NB 1	NB 2	SB 1	SB 2	SW 1
Volume Total	877	549	830	830	0
Volume Left	0	0	0	0	0
Volume Right	0	110	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.52	0.32	0.49	0.49	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary	
Average Delay	0.0
Intersection Capacity Utilization	49.2% ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 16: Crabtree Valley Ave & Edwards Mill Rd
 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1135	44	0	957	0	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1135	44	0	957	0	62
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.91	
vC, conflicting volume				1185	1642	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				1185	1506	602
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				100	100	86
cM capacity (veh/h)				582	101	438

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	757	422	478	478	62
Volume Left	0	0	0	0	0
Volume Right	0	44	0	0	62
cSH	1700	1700	1700	1700	438
Volume to Capacity	0.45	0.25	0.28	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.6
Lane LOS					B
Approach Delay (s)	0.0		0.0		14.6
Approach LOS					B

Intersection Summary					
Average Delay			0.4		
Intersection Capacity Utilization			45.5%		ICU Level of Service
Analysis Period (min)			15		A

Network Totals

Number of Intersections	37
Control Delay / Veh (s/v)	77
Queue Delay / Veh (s/v)	4
Total Delay / Veh (s/v)	81
Total Delay (hr)	6677
Stops / Veh	0.24
Stops (#)	71555
Average Speed (mph)	6
Total Travel Time (hr)	7617
Distance Traveled (mi)	44309
Fuel Consumed (gal)	7210
Fuel Economy (mpg)	6.1
CO Emissions (kg)	503.96
NOx Emissions (kg)	98.05
VOC Emissions (kg)	116.80
Unserved Vehicles (#)	22000
Vehicles in dilemma zone (#)	1175
Performance Index	6875.7

**2035 CVA Extension to I-440
(with a Grade-Separation at CVA /
Blue Ridge Rd Intersection)**

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑↑		↖↖	↑↑↑↑	↖	↖↖	↑↑	↖	↖↖	↑↑	↖↖
Volume (vph)	120	2785	423	306	2827	865	348	658	129	1813	1809	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.99	1.00		0.97	0.98	1.00	
Frt		0.980				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6258	0	3433	5085	1583	3433	3539	1583	3467	3510	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1769	6258	0	3432	5085	1562	3425	3539	1535	3414	3510	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)	6		6	6		6	12		6	12		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	2785	423	306	2827	865	348	658	129	1813	1809	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	3208	0	306	2827	865	348	658	129	1813	2004	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	16.0	78.0	0.0	17.0	79.0	0.0	19.0	34.0	17.0	67.0	82.0	0.0
Total Split (%)	8.2%	39.8%	0.0%	8.7%	40.3%	0.0%	9.7%	17.3%	8.7%	34.2%	41.8%	0.0%
Maximum Green (s)	9.0	71.0		10.0	72.0		12.0	27.0	10.0	60.0	75.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		6			6			12			12	
Act Effct Green (s)	11.0	73.0		12.0	74.0	196.0	14.0	29.0	41.0	62.0	77.0	
Actuated g/C Ratio	0.06	0.37		0.06	0.38	1.00	0.07	0.15	0.21	0.32	0.39	
v/c Ratio	1.21	1.38		1.46	1.47	0.55	1.42	1.26	0.40	1.65	1.45	
Control Delay	227.6	216.5		275.0	254.6	0.8	279.8	196.3	85.2	336.7	249.1	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 1: Glenwood Ave #1 & Creedmoor Rd 6/21/2010



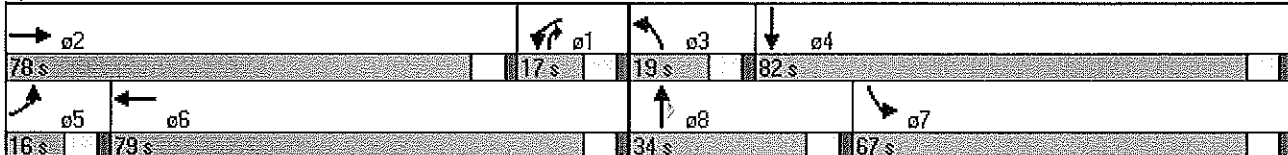
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		96.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	
Total Delay	227.6	216.5		371.0	254.6	0.8	279.8	196.3	85.2	336.7	252.0	
LOS	F	F		F	F	A	F	F	F	F	F	
Approach Delay		216.9			208.6			209.3			292.2	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~188	~1583		~281	~1860	0	~315	~525	124	~1738	~1845	
Queue Length 95th (ft)	#340	#1613		m#358	#1875	0	#433	#705	242	#1861	#1963	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	99	2331		210	1920	1562	245	524	324	1097	1379	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		27	0	0	0	0	0	0	6	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.21	1.38		1.67	1.47	0.55	1.42	1.26	0.40	1.65	1.46	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 61 (31%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.65
 Intersection Signal Delay: 236.9
 Intersection LOS: F
 Intersection Capacity Utilization 147.8%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 2: Glenwood Ave #1 & Marriott Dr 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	4670	43	66	3911	128	47	4	117	156	11	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00			0.97	0.97	0.96	0.98	
Frt		0.999			0.995				0.850		0.882	
Fit Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1752	6334	0	1770	6363	0	0	1790	1591	1778	1611	0
Fit Permitted	0.950			0.950				0.713		0.724		
Satd. Flow (perm)	1752	6334	0	1770	6363	0	0	1291	1542	1307	1611	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1076			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Confl. Peds. (#/hr)	6		6	6		6	12		6	12		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	14	4670	43	66	3911	128	47	4	117	156	11	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	4713	0	66	4039	0	0	51	117	156	51	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	41.0		15.3	38.0		41.0	41.0	15.3	41.0	41.0	
Total Split (s)	15.4	139.7	0.0	15.3	139.6	0.0	41.0	41.0	15.3	41.0	41.0	0.0
Total Split (%)	7.9%	71.3%	0.0%	7.8%	71.2%	0.0%	20.9%	20.9%	7.8%	20.9%	20.9%	0.0%
Maximum Green (s)	8.4	132.7		8.3	132.6		34.0	34.0	8.3	34.0	34.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag				Lag			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		7.0			7.0		11.5	11.5		11.5	11.5	
Pedestrian Calls (#/hr)		6			6		24	24		24	24	
Act Effct Green (s)	9.5	141.8		10.3	148.2			28.9	39.2	28.9	28.9	
Actuated g/C Ratio	0.05	0.72		0.05	0.76			0.15	0.20	0.15	0.15	
v/c Ratio	0.17	1.03		0.71	0.84			0.27	0.38	0.81	0.21	
Control Delay	107.6	26.0		108.0	52.7			75.7	66.8	109.6	73.6	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	23.9		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	107.6	49.8		108.0	52.7			75.7	66.8	109.6	73.6	
LOS	F	D		F	D			E	E	F	E	
Approach Delay		50.0			53.6			69.5			100.7	
Approach LOS		D			D			E			F	
Queue Length 50th (ft)	18	~993		80	1224			59	127	197	59	
Queue Length 95th (ft)	m12	m79		m43	m567			105	188	283	103	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	93	4582		93	4812			237	311	240	296	
Starvation Cap Reductn	0	241		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.15	1.09		0.71	0.84			0.22	0.38	0.65	0.17	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 15 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 53.1 Intersection LOS: D
 Intersection Capacity Utilization 102.8% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø2	ø1	ø4
139.7 s	15.3 s	41 s
ø5	ø6	
15.4 s	139.6 s	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	555	4204	184	294	3802	870	91	346	218	1804	1650	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00		0.98	0.99		0.98	0.99	0.99	
Frt		0.994				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6299	0	3433	5085	1583	1752	3504	1567	5040	3479	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3398	6299	0	3433	5085	1544	1742	3504	1538	5010	3479	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			354			460			524	
Travel Time (s)		24.5			5.4			9.0			10.2	
Confl. Peds. (#/hr)	6		6	6		6	24		6	6		24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	555	4204	184	294	3802	870	91	346	218	1804	1650	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	4388	0	294	3802	870	91	346	218	1804	1863	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	24.0	92.0	0.0	18.0	86.0	41.0	15.0	45.0	18.0	41.0	71.0	0.0
Total Split (%)	12.2%	46.9%	0.0%	9.2%	43.9%	20.9%	7.7%	23.0%	9.2%	20.9%	36.2%	0.0%
Maximum Green (s)	17.0	85.0		11.0	79.0	34.0	8.0	38.0	11.0	34.0	64.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		6			6						24	
Act Effct Green (s)	19.0	87.0		13.0	81.0	117.0	10.0	40.0	53.0	36.0	66.0	
Actuated g/C Ratio	0.10	0.44		0.07	0.41	0.60	0.05	0.20	0.27	0.18	0.34	
v/c Ratio	1.69	1.57		1.29	1.81	0.94	1.02	0.48	0.52	1.95	1.59	
Control Delay	356.3	283.4		207.1	401.5	36.6	184.8	70.5	43.2	466.0	304.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	23.2	0.0	0.2	0.0	0.0	88.4	
Total Delay	356.3	283.4		207.1	401.5	59.8	184.8	70.6	43.2	466.0	392.4	
LOS	F	F		F	F	E	F	E	D	F	F	
Approach Delay		291.6			330.1			77.4			428.6	
Approach LOS		F			F			E			F	
Queue Length 50th (ft)	~537	~2322		~249	~2715	776	~123	220	191	~1269	~1792	
Queue Length 95th (ft)	m#524	m#2229		m#241	m#2641	m750	#261	289	228	#1354	#1914	
Internal Link Dist (ft)		1540			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	329	2796		228	2101	929	89	715	418	926	1172	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	129	
Spillback Cap Reductn	0	0		0	0	96	0	52	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.69	1.57		1.29	1.81	1.04	1.02	0.52	0.52	1.95	1.79	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 96 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.95
 Intersection Signal Delay: 330.5
 Intersection LOS: F
 Intersection Capacity Utilization 164.4%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø2	ø1	ø4	ø3
92 s	18 s	71 s	15 s
ø5	ø6	ø7	ø8
24 s	86 s	41 s	45 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

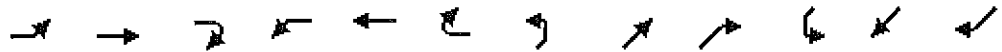
4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↗		↑↑↑↑				↖			↖↖↖
Volume (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Ped Bike Factor			0.97						0.98			
Frt			0.850						0.865			0.850
Flt Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Flt Permitted												
Satd. Flow (perm)	0	4984	1512	0	7620	0	0	0	1586	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		819			490			314			640	
Travel Time (s)		12.4			7.4			4.8			17.5	
Confl. Peds. (#/hr)			12						12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	121.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	38.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	61.7%
Maximum Green (s)					68.0							114.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lead							Lag
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		196.0	196.0		70.0				196.0			116.0
Actuated g/C Ratio		1.00	1.00		0.36				1.00			0.59
v/c Ratio		1.00	0.89		1.01				0.78			1.03
Control Delay		28.3	17.8		60.1				3.9			66.2
Queue Delay		56.4	0.0		0.0				1.8			0.0
Total Delay		84.7	17.8		60.1				5.7			66.2
LOS		F	B		E				A			E
Approach Delay		70.4			60.1							
Approach LOS		E			E							
Queue Length 50th (ft)		1372	913		~925				0			~1329

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave 6/21/2010

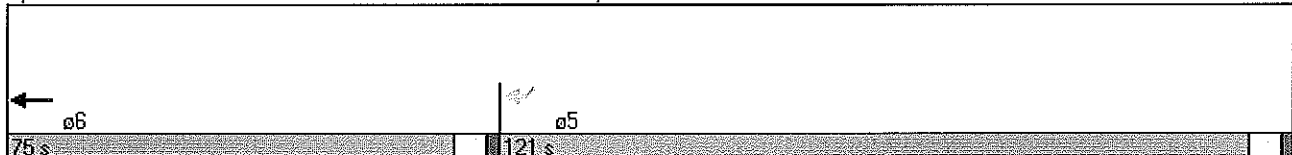


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 95th (ft)		m0	m0		m810				m0			#1419
Internal Link Dist (ft)		739			410			234			560	
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1512		2721				1586			2147
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		614	0		0				195			0
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		1.14	0.89		1.01				0.89			1.03

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 165 (84%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 61.0 Intersection LOS: E
 Intersection Capacity Utilization 99.4% ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

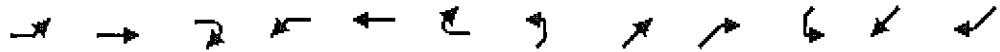


Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↔	↔	↑↑↑	↔	↔	↑↑	↔			
Volume (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	2		1	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93	1.00			0.99	1.00	0.98			
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.983				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3134	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1446	1831	5263	1639	2991	0	1538	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12	12			12		12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Shared Lane Traffic (%)							26%					
Lane Group Flow (vph)	0	3222	1096	100	1826	587	834	869	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	126.0	55.0	15.0	141.0	141.0	55.0	55.0	15.0	0.0	0.0	0.0
Total Split (%)	0.0%	64.3%	28.1%	7.7%	71.9%	71.9%	28.1%	28.1%	7.7%	0.0%	0.0%	0.0%
Maximum Green (s)		119.0	48.0	8.0	134.0	134.0	48.0	48.0	8.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		121.0	171.0	10.0	136.0	136.0	50.0	50.0	60.0			
Actuated g/C Ratio		0.62	0.87	0.05	0.69	0.69	0.26	0.26	0.31			
v/c Ratio		1.05	0.85	1.08	0.50	0.52	1.08	1.09	0.79			
Control Delay		62.2	7.3	195.3	14.6	16.3	121.8	123.8	74.6			

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		47.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		109.7	7.8	195.3	14.6	16.3	121.8	123.8	74.6			
LOS		F	A	F	B	B	F	F	E			
Approach Delay		83.8			22.2			114.1				
Approach LOS		F			C			F				
Queue Length 50th (ft)		~1646	347	~142	384	343	~694	~727	426			
Queue Length 95th (ft)		m#1661	m382	#284	413	438	#849	#882	562			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		3077	1289	93	3652	1137	773	799	473			
Starvation Cap Reductn		292	32	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.16	0.87	1.08	0.50	0.52	1.08	1.09	0.79			

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 180 (92%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 73.5 Intersection LOS: E
 Intersection Capacity Utilization 104.9% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

ø2	ø1	ø3
126 s	15 s	55 s
ø6		ø8
141 s		55 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor		0.99	0.97	0.99	0.99		1.00		0.96	0.99	1.00	
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1622	0	1717	3433	1536	1823	5230	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1801	1549	1610	1603	0	1715	3433	1472	1812	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	14.0	51.0	51.0	0.0	14.0	112.0	51.0	19.0	117.0	0.0
Total Split (%)	7.1%	7.1%	7.1%	26.0%	26.0%	0.0%	7.1%	57.1%	26.0%	9.7%	59.7%	0.0%
Maximum Green (s)	7.0	7.0	7.0	44.0	44.0		7.0	105.0	44.0	12.0	110.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			6	12		6	
Act Effct Green (s)		9.0	14.4	48.6	48.6		9.0	111.9	160.5	12.1	115.0	
Actuated g/C Ratio		0.05	0.07	0.25	0.25		0.05	0.57	0.82	0.06	0.59	
v/c Ratio		0.20	0.55	0.93	0.92		0.85	0.73	0.23	0.61	0.95	
Control Delay		96.1	101.0	101.3	98.8		86.6	25.1	1.6	112.0	46.1	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	16.2	0.0	0.0		0.0	5.3	0.2	0.0	22.1	
Total Delay		96.1	117.2	101.3	98.8		86.6	30.3	1.8	112.0	68.2	
LOS		F	F	F	F		F	C	A	F	E	
Approach Delay		112.8			100.1			27.9			69.2	
Approach LOS		F			F			C			E	
Queue Length 50th (ft)		22	77	517	504		89	472	27	88	1302	
Queue Length 95th (ft)		53	134	#765	#743		m91	m436	m24	150	1356	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		83	116	405	403		79	1959	1221	130	3068	
Starvation Cap Reductn		0	0	0	0		0	471	389	0	0	
Spillback Cap Reductn		0	36	0	0		0	0	0	0	289	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.20	0.80	0.93	0.92		0.85	0.96	0.34	0.53	1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 3 (2%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 60.9
 Intersection LOS: E
 Intersection Capacity Utilization 97.1%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
19 s	112 s	14 s	51 s
ø6	ø5		
117 s	14 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	21	90	10	24	69	145	959	46	82	2427	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor	0.99	0.98			1.00	0.97	1.00	1.00		0.99	1.00	
Frt		0.878				0.850		0.993			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1592	0	0	1837	2787	1805	5144	0	3416	3491	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1736	1592	0	0	1830	2713	1803	5144	0	3392	3491	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	69	145	959	46	82	2427	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	69	145	1005	0	82	2533	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0	14.0	14.0	38.0		14.0	38.0	
Total Split (s)	38.0	38.0	0.0	38.0	38.0	14.0	18.0	106.0	0.0	14.0	102.0	0.0
Total Split (%)	19.4%	19.4%	0.0%	19.4%	19.4%	7.1%	9.2%	54.1%	0.0%	7.1%	52.0%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0	7.0	11.0	99.0		7.0	95.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	6	6		6	6			6			6	
Act Effct Green (s)	21.0	21.0			13.6	23.9	13.0	132.1		12.1	131.2	
Actuated g/C Ratio	0.11	0.11			0.07	0.12	0.07	0.67		0.06	0.67	
v/c Ratio	0.57	0.65			0.27	0.21	1.21	0.29		0.39	1.08	
Control Delay	94.0	100.9			89.0	53.6	222.5	13.1		100.5	61.3	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	21.9	
Total Delay	94.0	100.9			89.0	53.6	222.5	13.1		100.5	83.2	
LOS	F	F			F	D	F	B		F	F	
Approach Delay		97.5			65.3			39.5			83.8	
Approach LOS		F			E			D			F	
Queue Length 50th (ft)	134	140			43	38	~232	336		55	~977	
Queue Length 95th (ft)	201	210			80	52	#400	172		m37	m380	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)	296	268			309	336	120	3467		211	2337	
Starvation Cap Reductn	0	0			0	0	0	0		0	104	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.36	0.41			0.11	0.21	1.21	0.29		0.39	1.13	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 170 (87%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 71.6
 Intersection LOS: E
 Intersection Capacity Utilization 105.0%
 ICU Level of Service G
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø1	ø2	ø4	ø3
14 s	106 s	38 s	38 s
ø6	ø5		
102 s	18 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/21/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↙	↑↑	↘	↙↙	↑↑
Volume (vph)	650	192	958	375	544	1983
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor	0.98	0.97		0.97	0.99	
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3349	1542	3539	1542	3402	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	45
Link Distance (ft)	523		1673			822
Travel Time (s)	7.9		25.3			12.5
Confl. Peds. (#/hr)	6	6		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	192	958	375	544	1983
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	192	958	375	544	1983
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	55.0	48.0	93.0	55.0	48.0	141.0
Total Split (%)	28.1%	24.5%	47.4%	28.1%	24.5%	71.9%
Maximum Green (s)	48.0	41.0	86.0	48.0	41.0	134.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		7.0
Flash Dont Walk (s)	17.0		10.0	17.0		10.0
Pedestrian Calls (#/hr)	0		6	0		6
Act Effct Green (s)	44.7	87.3	93.7	138.3	42.7	141.3
Actuated g/C Ratio	0.23	0.45	0.48	0.71	0.22	0.72
v/c Ratio	0.83	0.28	0.57	0.34	0.73	0.78
Control Delay	49.7	19.0	41.2	12.0	54.2	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	2.3

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/21/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	49.7	19.0	41.2	12.0	54.2	11.7
LOS	D	B	D	B	D	B
Approach Delay	42.7		33.0			20.8
Approach LOS	D		C			C
Queue Length 50th (ft)	186	87	405	118	~378	300
Queue Length 95th (ft)	390	79	632	270	m266	m33
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	876	721	1802	1124	865	2552
Starvation Cap Reductn	0	0	0	0	0	418
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.27	0.53	0.33	0.63	0.93

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 141 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 28.2 Intersection LOS: C
 Intersection Capacity Utilization 82.0% ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ø2	↖ ø1	↗ ø3
93 s	48 s	55 s
↓ ø6		
141 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations	↙	↗	↙↗	↑↑	↑↑↑				
Volume (vph)	176	184	324	572	1799	0	220	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor	0.97	0.96	1.00						
Frt		0.850			0.984				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	5015	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1710	1512	3491	3539	5015	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			234	
Travel Time (s)	5.9			5.8	5.5			3.5	
Confl. Peds. (#/hr)	12	12	12						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	176	184	324	572	1799	0	220	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	176	184	324	572	2019	0	0	0	0
Turn Type		custom	Prot						
Protected Phases			5	2	6				
Permitted Phases	4	4 5							
Detector Phase	4	4 5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	44.0	80.0	36.0	152.0	116.0	0.0	0.0	0.0	0.0
Total Split (%)	22.4%	40.8%	18.4%	77.6%	59.2%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	37.0		29.0	145.0	109.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lag		Lead				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	27.4	58.3	25.9	158.6	127.7				
Actuated g/C Ratio	0.14	0.30	0.13	0.81	0.65				
v/c Ratio	0.74	0.41	0.70	0.20	0.62				
Control Delay	93.9	52.4	68.1	3.2	8.4				
Queue Delay	0.0	0.0	0.0	0.0	0.5				
Total Delay	93.9	52.4	68.1	3.2	8.9				
LOS	F	D	E	A	A				

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/21/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	72.7			26.7	8.9				
Approach LOS	E			C	A				
Queue Length 50th (ft)	213	178	149	52	85				
Queue Length 95th (ft)	329	278	203	78	m371				
Internal Link Dist (ft)	307			220	204			154	
Turn Bay Length (ft)									
Base Capacity (vph)	340	536	561	2864	3268				
Starvation Cap Reductn	0	0	0	0	714				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.52	0.34	0.58	0.20	0.79				

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 18 (9%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 20.8 Intersection LOS: C
 Intersection Capacity Utilization 74.5% ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2	ø4
152 s	44 s
↓ ø6	ø5
116 s	36 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 11: Crabtree Valley Ave & Mall Parking Deck

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖↗	↖	↖↗		↖	↖↗	
Volume (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99					0.94				0.98	0.98	
Fr _t		0.999				0.850		0.908			0.904	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3536	0	1770	3539	1583	1770	1691	0	1770	1649	0
Flt Permitted	0.950			0.950			0.748			0.749		
Satd. Flow (perm)	1746	3536	0	1770	3539	1486	1393	1691	0	1367	1649	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)	6					6				6		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	896	0	24	823	103	10	13	0	34	14	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	25.0	129.0	0.0	21.0	125.0	125.0	46.0	46.0	0.0	46.0	46.0	0.0
Total Split (%)	12.8%	65.8%	0.0%	10.7%	63.8%	63.8%	23.5%	23.5%	0.0%	23.5%	23.5%	0.0%
Maximum Green (s)	18.0	122.0		14.0	118.0	118.0	39.0	39.0		39.0	39.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		6			6	6				12	12	
Act Effct Green (s)	11.0	163.2		13.0	162.6	162.6	13.6	13.6		13.9	13.9	
Actuated g/C Ratio	0.06	0.83		0.07	0.83	0.83	0.07	0.07		0.07	0.07	
v/c Ratio	0.30	0.30		0.21	0.28	0.08	0.10	0.11		0.35	0.12	
Control Delay	103.2	3.8		61.6	0.5	0.3	84.7	84.6		94.7	84.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	103.2	3.8		61.6	0.5	0.3	84.7	84.6		94.7	84.9	
LOS	F	A		E	A	A	F	F		F	F	
Approach Delay		7.1			2.0			84.7			91.9	
Approach LOS		A			A			F			F	
Queue Length 50th (ft)	39	63		31	0	0	12	16		43	17	
Queue Length 95th (ft)	m71	129		m63	10	3	35	41		85	44	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	181	2944		146	2937	1233	291	354		286	345	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.30		0.16	0.28	0.08	0.03	0.04		0.12	0.04	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 113 (58%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 7.6 Intersection LOS: A
 Intersection Capacity Utilization 42.8% ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

ø2	ø1	ø4
129 s	21 s	46 s
ø5	ø6	ø3
25 s	125 s	46 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/21/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	475	387	523	797	218	88	69	390	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor	0.99		0.96	0.98		0.94	0.98		0.97	0.98	0.98	
Fr _t			0.850			0.850			0.850		0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1616	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1745	3539	1525	3358	3539	1486	1737	1863	1532	3368	1616	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)	6		6	6		6	6		6	6		6
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	475	387	523	797	218	88	69	390	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	475	387	523	797	218	88	69	390	27	88	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	23.0	52.0	49.0	52.0	81.0	19.0	49.0	73.0	52.0	19.0	43.0	0.0
Total Split (%)	11.7%	26.5%	25.0%	26.5%	41.3%	9.7%	25.0%	37.2%	26.5%	9.7%	21.9%	0.0%
Maximum Green (s)	16.0	45.0	42.0	45.0	74.0	12.0	42.0	66.0	45.0	12.0	36.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		6			6			6			6	
Act Effct Green (s)	31.5	78.9	115.6	42.3	89.8	104.0	36.7	40.5	82.9	14.2	18.0	
Actuated g/C Ratio	0.16	0.40	0.59	0.22	0.46	0.53	0.19	0.21	0.42	0.07	0.09	
v/c Ratio	0.24	0.33	0.43	0.71	0.49	0.27	0.27	0.18	0.59	0.11	0.59	
Control Delay	77.4	22.5	6.1	76.3	39.7	14.4	69.5	63.5	31.9	84.9	100.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/21/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	77.4	22.5	6.1	76.3	39.7	14.4	69.5	63.5	31.9	84.9	100.7	
LOS	E	C	A	E	D	B	E	E	C	F	F	
Approach Delay		19.8			48.6			41.9			97.0	
Approach LOS		B			D			D			F	
Queue Length 50th (ft)	92	105	32	323	388	81	97	74	287	17	111	
Queue Length 95th (ft)	155	184	92	383	476	124	158	122	328	36	175	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	284	1425	970	824	1621	801	397	646	697	262	313	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.24	0.33	0.40	0.63	0.49	0.27	0.22	0.11	0.56	0.10	0.28	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 80 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 40.6 Intersection LOS: D
 Intersection Capacity Utilization 59.4% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

→ ø2	↘ ø1	↘ ø3	↓ ø4
52 s	52 s	49 s	43 s
← ø6	↗ ø5	↗ ø7	↑ ø8
81 s	23 s	19 s	73 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/21/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations	↖	↗	↕	↖	↖↗	↕
Volume (vph)	153	266	630	55	536	617
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor	0.99	0.96		0.96	0.99	
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1748	1525	3539	1525	3403	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)	6	6		6	3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	266	630	55	536	617
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	266	630	55	536	617
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	54.0	66.0	76.0	54.0	66.0	142.0
Total Split (%)	27.6%	33.7%	38.8%	27.6%	33.7%	72.4%
Maximum Green (s)	47.0	59.0	69.0	47.0	59.0	135.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		7.0
Flash Dont Walk (s)	7.0		7.0	7.0		7.0
Pedestrian Calls (#/hr)	6		6	6		6
Act Effct Green (s)	24.4	62.9	118.1	142.4	38.6	161.6
Actuated g/C Ratio	0.12	0.32	0.60	0.73	0.20	0.82
v/c Ratio	0.70	0.53	0.30	0.05	0.79	0.21
Control Delay	98.2	53.8	20.6	7.2	50.8	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) AM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/21/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	98.2	53.8	20.6	7.2	50.8	7.9
LOS	F	D	C	A	D	A
Approach Delay	70.0		19.5			27.8
Approach LOS	E		B			C
Queue Length 50th (ft)	193	271	202	17	295	163
Queue Length 95th (ft)	270	325	291	36	323	258
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	443	682	2132	1314	1068	2919
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.39	0.30	0.04	0.50	0.21

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 183 (93%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 33.1 Intersection LOS: C
 Intersection Capacity Utilization 54.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

ø1	ø2	ø4
66 s	76 s	54 s
ø6		
142 s		

HCM Unsignalized Intersection Capacity Analysis Extension to I-440 (Grade Separate) AM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/21/2010



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑	↘↘
Volume (veh/h)	0	119	0	655	1900	228
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	119	0	655	1900	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	460	
pX, platoon unblocked	0.66	0.65	0.65			
vC, conflicting volume	2228	1900	1900			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2484	2118	2118			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	16	27	165			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	119	328	328	1900	114	114
Volume Left	0	0	0	0	0	0
Volume Right	119	0	0	0	114	114
cSH	27	1700	1700	1700	1700	1700
Volume to Capacity	4.43	0.19	0.19	1.12	0.07	0.07
Queue Length 95th (ft)	Err	0	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	Err	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay		410.0				
Intersection Capacity Utilization		114.0%		ICU Level of Service		H
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis Extension to I-440 (Grade Separate) AM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/21/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	856	63	0	842	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	856	63	0	842	0	70
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.95	
vC, conflicting volume			925		1314	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			925		1219	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			730		163	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	571	348	421	421	70
Volume Left	0	0	0	0	0
Volume Right	0	63	0	0	70
cSH	1700	1700	1700	1700	533
Volume to Capacity	0.34	0.20	0.25	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.8
Approach LOS					B

Intersection Summary	
Average Delay	0.5
Intersection Capacity Utilization	38.9% ICU Level of Service A
Analysis Period (min)	15

Network Totals

Number of Intersections	40
Control Delay / Veh (s/v)	41
Queue Delay / Veh (s/v)	3
Total Delay / Veh (s/v)	44
Total Delay (hr)	3380
Stops / Veh	0.19
Stops (#)	52354
Average Speed (mph)	10
Total Travel Time (hr)	4214
Distance Traveled (mi)	40591
Fuel Consumed (gal)	4485
Fuel Economy (mpg)	9.1
CO Emissions (kg)	313.48
NOx Emissions (kg)	60.99
VOC Emissions (kg)	72.65
Unserved Vehicles (#)	9368
Vehicles in dilemma zone (#)	1062
Performance Index	3525.6

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	13618.7	13911.1	14090.4	14163.9	13839.4	13709.6	13875.7
Delay / Veh (s)	2571.9	2698.0	2800.4	2821.3	2655.7	2659.2	2677.7
Stop Delay (hr)	13246.3	13538.6	13733.1	13821.1	13482.1	13334.8	13528.2
St Del/Veh (s)	2501.5	2625.7	2729.3	2753.1	2587.2	2586.5	2610.6
Total Stops	65345	66866	66666	63394	63832	66044	63693
Stop/Veh	3.43	3.60	3.68	3.51	3.40	3.56	3.41
Travel Dist (mi)	24166.5	23812.4	23004.3	22759.4	23791.6	23714.7	23575.4
Travel Time (hr)	14171.3	14455.7	14617.7	14682.9	14383.1	14254.9	14413.7
Avg Speed (mph)	9	8	8	8	9	9	9
Fuel Used (gal)	3979.9	4034.1	4046.5	4057.0	4019.8	3986.2	4020.4
Fuel Eff. (mpg)	6.1	5.9	5.7	5.6	5.9	5.9	5.9
HC Emissions (g)	21661	19822	20296	21169	20330	20106	21083
CO Emissions (g)	832764	802652	799764	816018	817563	801374	822613
NOx Emissions (g)	53061	50049	49233	50813	49885	49985	51212
Vehicles Entered	19510	19011	18627	18675	19251	19045	19195
Vehicles Exited	18616	18114	17601	17471	18270	18076	18116
Hourly Exit Rate	18616	18114	17601	17471	18270	18076	18116
Input Volume	384365	384365	384365	384365	384365	384365	384365
% of Volume	5	5	5	5	5	5	5
Denied Entry Before	2258	2283	2295	2415	2265	2354	2382
Denied Entry After	21644	22076	22654	22699	22046	22026	22101

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	13933.7	14119.0	13720.3	13898.2
Delay / Veh (s)	2787.4	2831.0	2613.9	2709.5
Stop Delay (hr)	13596.9	13757.6	13351.1	13539.0
St Del/Veh (s)	2720.0	2758.6	2543.6	2639.5
Total Stops	63879	65907	65320	65098
Stop/Veh	3.55	3.67	3.46	3.53
Travel Dist (mi)	22590.1	22931.0	23858.7	23420.4
Travel Time (hr)	14450.3	14645.8	14264.4	14434.0
Avg Speed (mph)	8	8	8	8
Fuel Used (gal)	4000.1	4048.1	3989.4	4018.2
Fuel Eff. (mpg)	5.6	5.7	6.0	5.8
HC Emissions (g)	20507	19546	21381	20590
CO Emissions (g)	804463	780480	822201	809989
NOx Emissions (g)	49913	47760	51174	50308
Vehicles Entered	18561	18444	19552	18988
Vehicles Exited	17431	17465	18240	17941
Hourly Exit Rate	17431	17465	18240	17941
Input Volume	384365	384365	384365	384365
% of Volume	5	5	5	5
Denied Entry Before	2288	2386	2368	2329
Denied Entry After	22636	22825	21889	22256

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	64	841.1	872.9	0.4	5	5	752.4
	61	129.8	143.2	0.2	4	4	119.1
	68	70.1	77.0	0.1	4	4	63.9
Creedmoor Rd	1	523.9	555.6	0.4	3	3	481.4
Crabtree Mall Entr	2	221.7	238.9	0.2	3	3	208.1
Blue Ridge Rd	3	279.6	304.2	0.3	4	4	271.9
Crabtree View Pl	81	11.2	16.7	0.1	14	16	9.8
I-440 WB On/Off Ramp	4	37.4	50.3	0.2	11	12	34.4
WB I-440 On Ramp fro	44	10.1	16.4	0.1	20	20	10.1
EB I-440 On Ramp fro	23	7.2	11.7	0.0	13	13	7.5
Ridge Rd Extension	5	41.8	47.2	0.1	5	5	38.8
Total		2174.0	2334.0	2.0	4	4	1997.4

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 10 Speed	Run 10 Delay	Run 9 Speed	Run 9 Delay	Run 8 Speed	Run 8 Delay	Run 7 Speed
	5	723.9	5	800.0	4	117.3	5
	5	112.5	4	131.4	3	163.1	4
	4	60.2	4	71.1	3	91.7	4
Creedmoor Rd	3	480.8	2	555.6	3	536.5	3
Crabtree Mall Entr	3	214.0	3	236.0	3	217.7	3
Blue Ridge Rd	4	268.6	4	279.9	4	275.3	4
Crabtree View Pl	15	10.6	15	10.7	13	12.6	14
I-440 WB On/Off Ramp	11	39.5	12	32.9	10	43.1	11
WB I-440 On Ramp fro	21	10.0	21	9.2	20	10.6	20
EB I-440 On Ramp fro	13	7.7	14	7.1	13	8.0	12
Ridge Rd Extension	5	42.8	5	41.2	5	43.8	5
Total	4	1976.6	4	2178.7	4	2359.5	4

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
	750.8	5	854.4	5	736.7	4	1132.2
	122.1	4	123.7	5	115.1	4	147.2
	65.4	4	65.9	4	63.2	3	80.0
Creedmoor Rd	513.0	3	499.3	3	502.1	2	604.6
Crabtree Mall Entr	230.4	3	192.7	3	245.9	3	235.1
Blue Ridge Rd	280.5	4	255.5	3	302.0	3	308.8
Crabtree View Pl	11.2	16	9.5	13	13.5	13	12.6
I-440 WB On/Off Ramp	39.8	13	30.0	10	43.5	11	39.0
WB I-440 On Ramp fro	10.6	21	9.9	20	10.4	20	10.8
EB I-440 On Ramp fro	8.1	13	7.8	15	5.8	14	6.9
Ridge Rd Extension	41.1	5	39.9	5	40.0	5	45.8
Total	2073.0	4	2088.5	4	2078.2	4	2623.0

Arterial Level of Service: EB Glenwood Ave #1

	Flow Rate	Flow Rate	Flow Rate	Flow Rate
	4	137.1	4	137.1
	4	73.8	4	73.0
Creedmoor Rd	3	538.7	3	546.6
Crabtree Mall Entr	3	220.8	3	219.9
Blue Ridge Rd	4	277.4	4	281.9
Crabtree View Pl	14	11.1	15	10.5
I-440 WB On/Off Ramp	12	33.6	11	38.9
WB I-440 On Ramp fro	21	9.4	20	10.3
EB I-440 On Ramp fro	13	7.4	15	5.9
Ridge Rd Extension	5	44.5	5	41.2
Total	4	2237.8	4	2232.0

Arterial Level of Service: WB Glenwood Ave #1

Gross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB I-440 On Ramp fro	5	665.6	686.9	0.3	22	22	618.7
EB I-440 On Ramp fro	23	3.4	7.0	0.1	34	34	3.4
WB I-440 On Ramp fro	44	8.7	14.8	0.0	11	11	8.2
I-440 WB Off Ramp to	4	64.6	71.3	0.1	5	5	58.4
Crabtree View Pl	81	113.6	127.1	0.2	4	5	110.2
Lead Mine Rd	3	64.6	69.5	0.1	3	3	65.4
Marriott Dr	2	41.8	67.2	0.3	16	17	41.0
Creedmoor Rd	1	64.1	80.4	0.2	9	9	66.9
	68	10.2	44.0	0.4	33	33	10.4
	61	0.7	7.4	0.1	40	40	0.7
	64	1.4	14.6	0.2	40	40	1.4
Total		1038.7	1190.3	1.8	12	12	984.6

Arterial Level of Service: WB Glenwood Ave #1

Gross Street	Run 10 Speed	Run 10 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay
EB I-440 On Ramp fro	21	665.6	22	721.7	22	665.6	23	707.7
EB I-440 On Ramp fro	32	3.7	35	3.3	31	4.0	39	3.9
WB I-440 On Ramp fro	10	9.6	11	8.8	10	10.3	15	15.0
I-440 WB Off Ramp to	4	68.5	4	69.6	5	64.2	5	5.0
Crabtree View Pl	4	117.0	4	116.8	4	112.8	5	5.0
Lead Mine Rd	4	63.9	3	65.8	3	64.5	3	3.0
Marriott Dr	16	41.7	17	40.8	16	44.9	17	17.0
Creedmoor Rd	9	63.2	9	62.0	9	63.0	9	9.0
	33	9.9	33	10.2	33	10.2	33	33.0
	40	0.7	40	0.7	40	0.7	40	40.0
	40	1.4	40	1.4	40	1.3	40	40.0
Total	12	1073.4	12	1101.1	12	1065.7	13	13.0

Arterial Level of Service: WB Glenwood Ave #1

Gross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	610.1	23	574.5	23	674.2	23	700.7
EB I-440 On Ramp fro	2.5	33	3.7	32	3.7	36	3.0
WB I-440 On Ramp fro	4.3	9	11.0	9	10.8	12	7.2
I-440 WB Off Ramp to	56.4	4	71.4	5	65.0	5	63.0
Crabtree View Pl	108.2	4	116.4	5	109.5	4	116.6
Lead Mine Rd	65.7	3	65.4	4	62.9	3	64.3
Marriott Dr	40.6	16	42.5	17	38.8	17	41.6
Creedmoor Rd	65.2	9	62.9	9	67.9	9	64.1
	10.1	33	9.9	33	10.4	33	10.2
	0.6	40	0.6	40	0.7	40	0.7
	1.3	41	1.1	40	1.4	40	1.3
Total	965.0	12	959.6	12	1045.3	12	1130.7

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On Ramp fro	22	478.6	23	860.1
EB I-440 On Ramp fro	31	4.0	36	3.1
WB I-440 On Ramp fro	9	11.1	13	5.6
I-440 WB Off Ramp to	4	72.0	5	56.3
Crabtree View Pl	4	119.0	5	109.0
Lead Mine Rd	3	64.4	4	63.6
Marriott Dr	16	42.8	16	42.8
Creedmoor Rd	9	63.6	9	62.6
	33	10.3	33	10.7
	40	0.7	40	0.8
	40	1.5	40	1.4
Total	12	868.1	13	1215.9

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑	↔	↔	↑↑	↔	↔	↑↑	↔
Volume (vph)	322	3512	407	293	3692	1743	1018	1878	240	1239	1266	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor		1.00				0.98			0.95		0.99	
Frt		0.984				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6279	0	3433	5085	1583	3433	3539	1583	3467	3494	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6279	0	3433	5085	1559	3433	3539	1505	3467	3494	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	322	3512	407	293	3692	1743	1018	1878	240	1239	1266	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	3919	0	293	3692	1743	1018	1878	240	1239	1432	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	24.0	85.0	0.0	17.0	78.0	0.0	40.0	60.0	17.0	34.0	54.0	0.0
Total Split (%)	12.2%	43.4%	0.0%	8.7%	39.8%	0.0%	20.4%	30.6%	8.7%	17.3%	27.6%	0.0%
Maximum Green (s)	17.0	78.0		10.0	71.0		33.0	53.0	10.0	27.0	47.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	19.0	80.0		12.0	73.0	196.0	35.0	55.0	67.0	29.0	49.0	
Actuated g/C Ratio	0.10	0.41		0.06	0.37	1.00	0.18	0.28	0.34	0.15	0.25	
v/c Ratio	1.87	1.53		1.40	1.95	1.12	1.66	1.89	0.46	2.42	1.64	
Control Delay	453.9	278.5		251.9	452.4	86.0	339.5	433.5	20.0	671.6	334.1	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/24/2010



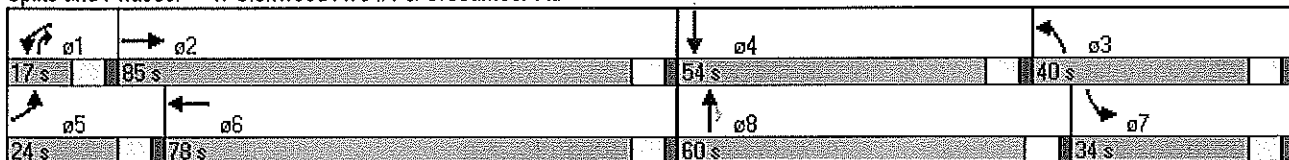
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	453.9	278.5		251.9	452.4	86.0	339.5	433.5	20.0	671.6	334.1	
LOS	F	F		F	F	F	F	F	B	F	F	
Approach Delay		291.8			330.6			371.4			490.7	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~630	~2045		~257	~2678	~1570	~985	~1950	135	~1351	~1397	
Queue Length 95th (ft)	#849	#2049		m#148	m#1658	m1360	m#1123	#2060	m112	#1487	#1533	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	172	2563		210	1894	1559	613	993	519	513	874	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.87	1.53		1.40	1.95	1.12	1.66	1.89	0.46	2.42	1.64	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.42
 Intersection Signal Delay: 355.4
 Intersection LOS: F
 Intersection Capacity Utilization 193.1%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↑↑↑		↔	↑↑↑			↔	↗	↖	↓	↘
Volume (vph)	36	4683	272	412	5427	112	242	9	698	289	13	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%			-1%	
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	1		0	2		0	0		1	1		0
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	1.00	0.86	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00				0.95		0.96	
Frt		0.992			0.997				0.850		0.877	
Fit Protected	0.950			0.950				0.954		0.950		
Satd. Flow (prot)	1752	6258	0	1770	6375	0	0	1786	1591	1778	1575	0
Fit Permitted	0.950			0.950				0.670		0.402		
Satd. Flow (perm)	1752	6258	0	1770	6375	0	0	1254	1513	753	1575	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		1076			1620			201			281	
Travel Time (s)		16.3			24.5			5.5			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	36	4683	272	412	5427	112	242	9	698	289	13	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	4955	0	412	5539	0	0	251	698	289	72	0
Turn Type	Prot			Prot			Perm		pm+ov	Perm		
Protected Phases	5	2		1	6			4	1		4	
Permitted Phases							4		4	4		
Detector Phase	5	2		1	6		4	4	1	4	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		15.0	15.0	7.0	15.0	15.0	
Minimum Split (s)	15.4	41.0		15.3	38.0		41.0	41.0	15.3	41.0	41.0	
Total Split (s)	15.4	104.0	0.0	33.0	121.6	0.0	59.0	59.0	33.0	59.0	59.0	0.0
Total Split (%)	7.9%	53.1%	0.0%	16.8%	62.0%	0.0%	30.1%	30.1%	16.8%	30.1%	30.1%	0.0%
Maximum Green (s)	8.4	97.0		26.0	114.6		52.0	52.0	26.0	52.0	52.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead				Lead			
Lead-Lag Optimize?	Yes	Yes		Yes	Yes				Yes			
Vehicle Extension (s)	3.0	2.0		3.0	2.0		2.0	2.0	3.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		7.0			7.0		11.5	11.5		11.5	11.5	
Pedestrian Calls (#/hr)		12			12		24	24		24	24	
Act Effct Green (s)	10.1	99.0		28.0	119.7			54.0	82.0	54.0	54.0	
Actuated g/C Ratio	0.05	0.51		0.14	0.61			0.28	0.42	0.28	0.28	
v/c Ratio	0.40	1.57		1.63	1.42			0.73	1.08	1.40	0.17	
Control Delay	59.7	276.2		328.0	221.3			78.1	110.0	253.3	55.2	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 2: Glenwood Ave #1 & Marriott Dr 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	7.2		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	59.7	283.4		328.0	221.3			78.1	110.0	253.3	55.2	
LOS	E	F		F	F			E	F	F	E	
Approach Delay		281.8			228.7			101.6			213.8	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	43	~2602		~753	~2877			296	~1003	~494	71	
Queue Length 95th (ft)	m28	m554		m191	m812			418	#957	#705	122	
Internal Link Dist (ft)		996			1540			121			201	
Turn Bay Length (ft)	200			475								
Base Capacity (vph)	93	3161		253	3892			345	644	207	434	
Starvation Cap Reductn	0	32		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.39	1.58		1.63	1.42			0.73	1.08	1.40	0.17	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 184 (94%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.63
 Intersection Signal Delay: 240.0
 Intersection LOS: F
 Intersection Capacity Utilization 145.4%
 ICU Level of Service H
 Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1	ø2	ø4
33 s	104 s	59 s
ø6	ø5	
121.6 s	15.4 s	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑↑		↔↔	↑↑↑↑	↔	↔	↑↑	↔	↔↔↔	↑↑	
Volume (vph)	676	4837	157	684	5661	1875	121	718	258	985	1128	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00				0.96					0.99	
Frt		0.995				0.850			0.850		0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6305	0	3433	5085	1583	1752	3504	1567	5040	3464	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6305	0	3433	5085	1524	1752	3504	1567	5040	3464	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			354			460			524	
Travel Time (s)		24.5			5.4			9.0			10.2	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	676	4837	157	684	5661	1875	121	718	258	985	1128	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	676	4994	0	684	5661	1875	121	718	258	985	1297	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	27.0	93.0	0.0	27.0	93.0	35.0	19.0	41.0	27.0	35.0	57.0	0.0
Total Split (%)	13.8%	47.4%	0.0%	13.8%	47.4%	17.9%	9.7%	20.9%	13.8%	17.9%	29.1%	0.0%
Maximum Green (s)	20.0	86.0		20.0	86.0	28.0	12.0	34.0	20.0	28.0	50.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		12			12						24	
Act Effct Green (s)	22.0	88.0		22.0	88.0	118.0	14.0	36.0	58.0	30.0	52.0	
Actuated g/C Ratio	0.11	0.45		0.11	0.45	0.60	0.07	0.18	0.30	0.15	0.27	
v/c Ratio	1.77	1.76		1.78	2.48	2.02	0.97	1.11	0.56	1.28	1.41	
Control Delay	382.6	375.9		395.5	690.6	487.5	148.1	135.1	34.9	186.8	232.8	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	213.7	0.0	0.0	0.0	0.0	29.5	
Total Delay	382.6	375.9		395.5	690.6	701.2	148.1	135.1	34.9	186.8	262.3	
LOS	F	F		F	F	F	F	F	C	F	F	
Approach Delay		376.7			668.5			113.0			229.7	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~664	~2812		~681	~4463	~3804	158	~561	128	~556	~1184	
Queue Length 95th (ft)	m#363	m#1541		m#300	m#2221	m#1446	#310	#690	183	m#645	m#1319	
Internal Link Dist (ft)		1540			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	382	2831		385	2283	927	125	644	464	771	919	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	41	
Spillback Cap Reductn	0	0		0	0	377	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.77	1.76		1.78	2.48	3.41	0.97	1.11	0.56	1.28	1.48	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 104 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.48
 Intersection Signal Delay: 479.4
 Intersection LOS: F
 Intersection Capacity Utilization 188.9%
 ICU Level of Service H
 Analysis Period (min) 15

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ρ2	↗ ρ1	↖ ρ3	↓ ρ4
93 s	27 s	19 s	57 s
↖ ρ5	← ρ6	↘ ρ7	↑ ρ8
27 s	93 s	35 s	41 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑↑	↑		↑↑↑↑				↑			↑↑↑↑
Volume (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Ped Bike Factor			0.97						0.98			
Frt			0.850						0.865			0.850
Flt Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Flt Permitted												
Satd. Flow (perm)	0	4984	1512	0	7620	0	0	0	1586	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		819			490			314				640
Travel Time (s)		12.4			7.4			4.8				17.5
Confl. Peds. (#/hr)			12						12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	78.0	0.0	0.0	0.0	0.0	0.0	0.0	118.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	39.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	60.2%
Maximum Green (s)					71.0							111.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lag							Lead
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		196.0	196.0		73.0				196.0			113.0
Actuated g/C Ratio		1.00	1.00		0.37				1.00			0.58
v/c Ratio		0.91	1.09		1.63				0.67			1.72
Control Delay		26.9	76.0		316.8				2.2			356.7
Queue Delay		0.6	0.0		37.6				0.1			2.6
Total Delay		27.6	76.0		354.5				2.3			359.3
LOS		C	E		F				A			F
Approach Delay		40.5			354.5							
Approach LOS		D			F							
Queue Length 50th (ft)		1136	~1511		~2110				0			~2997

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010

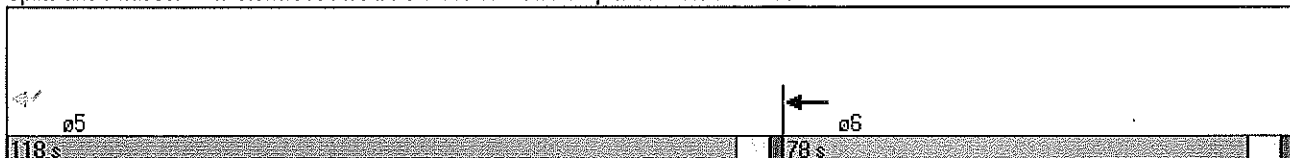


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 95th (ft)		m3	m209		m#2004				m0			#3021
Internal Link Dist (ft)		739			410			234			560	
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1512		2838				1586			2092
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		168	0		139				53			7
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		0.94	1.09		1.71				0.69			1.73

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 3 (2%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.72
 Intersection Signal Delay: 205.9
 Intersection LOS: F
 Intersection Capacity Utilization 145.9%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

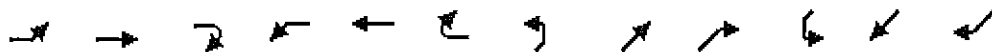


Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↗	↖	↑↑↑	↗	↖↖	↖↑	↗			
Volume (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93									
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.974				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3105	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1446	1832	5263	1639	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Shared Lane Traffic (%)							33%					
Lane Group Flow (vph)	0	2258	1145	100	2992	524	1267	1190	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	96.0	84.0	16.0	112.0	112.0	84.0	84.0	16.0	0.0	0.0	0.0
Total Split (%)	0.0%	49.0%	42.9%	8.2%	57.1%	57.1%	42.9%	42.9%	8.2%	0.0%	0.0%	0.0%
Maximum Green (s)		89.0	77.0	9.0	105.0	105.0	77.0	77.0	9.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		91.0	170.0	11.0	107.0	107.0	79.0	79.0	95.0			
Actuated g/C Ratio		0.46	0.87	0.06	0.55	0.55	0.40	0.40	0.48			
v/c Ratio		0.98	0.88	0.97	1.04	0.59	1.04	0.95	0.50			
Control Delay		56.1	10.5	168.4	71.8	33.0	91.6	72.3	37.1			

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		62.7	10.5	168.4	71.8	33.0	91.6	72.3	37.1			
LOS		E	B	F	E	C	F	E	D			
Approach Delay		45.1			68.8			76.2				
Approach LOS		D			E			E				
Queue Length 50th (ft)		1026	432	132	~1519	444	~1018	865	329			
Queue Length 95th (ft)		#1123	602	#271	#1566	571	#1171	#1030	434			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2314	1297	103	2873	895	1221	1252	763			
Starvation Cap Reductn		76	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.01	0.88	0.97	1.04	0.59	1.04	0.95	0.50			

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 149 (76%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 62.8
 Intersection Capacity Utilization 102.1%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

02	01	03
96 s	16 s	84 s
06	08	
112 s	84 s	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↘	↙		↘	↖↗	↗	↘	↖↗↘	
Volume (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.96		0.99				0.94		1.00	
Frt			0.850		0.957				0.850		0.999	
Flt Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1570	0	1717	3433	1536	1823	5230	0
Flt Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1540	1631	1570	0	1717	3433	1440	1823	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2494	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	24.0	34.0	34.0	0.0	24.0	134.0	34.0	14.0	124.0	0.0
Total Split (%)	7.1%	7.1%	12.2%	17.3%	17.3%	0.0%	12.2%	68.4%	17.3%	7.1%	63.3%	0.0%
Maximum Green (s)	7.0	7.0	17.0	27.0	27.0		17.0	127.0	27.0	7.0	117.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)		9.0	23.2	31.0	31.0		16.0	129.8	160.8	9.0	122.8	
Actuated g/C Ratio		0.05	0.12	0.16	0.16		0.08	0.66	0.82	0.05	0.63	
v/c Ratio		0.49	0.33	0.94	0.96		0.72	1.10	0.56	0.79	0.56	
Control Delay		111.5	56.9	121.2	125.3		88.0	73.5	2.6	141.4	22.2	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0	0.0	0.0		0.0	226.4	2.8	0.0	0.1	
Total Delay		111.5	56.9	121.2	125.3		88.0	299.8	5.3	141.4	22.2	
LOS		F	E	F	F		F	F	A	F	C	
Approach Delay		78.8			123.2			232.6			26.4	
Approach LOS		E			F			F			C	
Queue Length 50th (ft)		53	55	~335	~338		129	~1891	98	86	489	
Queue Length 95th (ft)		101	95	#551	#547		m76	m452	m46	#184	542	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		83	212	258	248		166	2273	1197	84	3277	
Starvation Cap Reductn		0	0	0	0		0	718	393	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	207	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.49	0.29	0.94	0.96		0.61	1.60	0.84	0.79	0.59	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 184 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 152.9 Intersection LOS: F
 Intersection Capacity Utilization 108.3% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø3	ø4
14 s	134 s	14 s	34 s
ø5	ø6		
24 s	124 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Volume (vph)	138	28	72	127	25	561	110	2437	150	409	1799	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.97				0.96		1.00			1.00	
Frt		0.892				0.850		0.991			0.993	
Fit Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1605	0	0	1788	2787	1805	5127	0	3416	3480	0
Fit Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1605	0	0	1788	2673	1805	5127	0	3416	3480	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	561	110	2437	150	409	1799	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	561	110	2587	0	409	1886	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0	14.0	14.0	38.0		14.0	38.0	
Total Split (s)	38.0	38.0	0.0	38.0	38.0	26.0	16.0	94.0	0.0	26.0	104.0	0.0
Total Split (%)	19.4%	19.4%	0.0%	19.4%	19.4%	13.3%	8.2%	48.0%	0.0%	13.3%	53.1%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0	19.0	9.0	87.0		19.0	97.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	6	6		6	6			6			6	
Act Effct Green (s)	22.7	22.7			23.9	44.9	11.0	108.4		21.0	118.4	
Actuated g/C Ratio	0.12	0.12			0.12	0.23	0.06	0.55		0.11	0.60	
v/c Ratio	0.68	0.54			0.70	0.90	1.09	0.91		1.12	0.90	
Control Delay	99.1	91.5			98.7	73.5	126.5	23.2		117.9	24.6	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	25.4		0.0	10.0	
Total Delay	99.1	91.5			98.7	73.5	126.5	48.6		117.9	34.6	
LOS	F	F			F	E	F	D		F	C	
Approach Delay		95.9			78.9			51.8			49.5	
Approach LOS		F			E			D			D	
Queue Length 50th (ft)	174	124			192	311	~160	835		~317	583	
Queue Length 95th (ft)	250	188			270	331	m#154	m#1266		m203	m304	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)	296	270			301	625	101	2836		366	2103	
Starvation Cap Reductn	0	0			0	0	0	377		0	223	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.47	0.37			0.50	0.90	1.09	1.05		1.12	1.00	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 50 (26%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.12
 Intersection Signal Delay: 55.9
 Intersection Capacity Utilization 95.6%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service F

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

↑ ø2	↙ ø1	↘ ø3	↗ ø4
94 s	26 s	38 s	38 s
↓ ø6	↖ ø5		
104 s	16 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↙	↑↑	↘	↙↙	↑↑
Volume (vph)	489	468	2229	685	494	1504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1519	3539	1519	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45			45
Link Distance (ft)	523		1673			822
Travel Time (s)	7.9		25.3			12.5
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	489	468	2229	685	494	1504
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	468	2229	685	494	1504
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	32.0	123.0	41.0	32.0	155.0
Total Split (%)	20.9%	16.3%	62.8%	20.9%	16.3%	79.1%
Maximum Green (s)	34.0	25.0	116.0	34.0	25.0	148.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	34.2	61.2	119.8	154.0	27.0	151.8
Actuated g/C Ratio	0.17	0.31	0.61	0.79	0.14	0.77
v/c Ratio	0.82	0.97	1.03	0.57	1.04	0.55
Control Delay	68.0	75.3	64.6	8.5	92.6	1.2
Queue Delay	0.0	0.0	17.2	0.0	0.0	0.2

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	68.0	75.3	81.7	8.5	92.6	1.5
LOS	E	E	F	A	F	A
Approach Delay	71.5		64.5			24.0
Approach LOS	E		E			C
Queue Length 50th (ft)	247	347	~1633	260	~349	43
Queue Length 95th (ft)	337	#808	#1741	334	m#431	44
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	631	483	2163	1216	473	2741
Starvation Cap Reductn	0	0	0	0	0	477
Spillback Cap Reductn	0	0	88	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.97	1.07	0.56	1.04	0.66

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 11 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 51.9 Intersection LOS: D
 Intersection Capacity Utilization 104.2% ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ø2	↖ ø1	↗ ø3
123 s	32 s	41 s
↓ ø6		
155 s		

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations	↙	↗	↙↗	↑↑	↑↑↑				
Volume (vph)	257	412	601	950	1516	0	143	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor		0.96			1.00				
Frt		0.850			0.987				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	5010	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1770	1512	3502	3539	5010	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			283	
Travel Time (s)	5.9			5.8	5.5			4.3	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	257	412	601	950	1516	0	143	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	257	412	601	950	1659	0	0	0	0
Turn Type		custom	Prot						
Protected Phases			5	2	6				
Permitted Phases	4	4 5							
Detector Phase	4	4 5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	50.0	104.0	54.0	146.0	92.0	0.0	0.0	0.0	0.0
Total Split (%)	25.5%	53.1%	27.6%	74.5%	46.9%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	43.0		47.0	139.0	85.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	43.9	90.5	41.6	142.1	95.5				
Actuated g/C Ratio	0.22	0.46	0.21	0.72	0.49				
v/c Ratio	0.65	0.59	0.81	0.37	0.68				
Control Delay	82.5	34.5	68.1	6.3	23.5				
Queue Delay	0.0	0.0	0.0	0.0	0.0				
Total Delay	82.5	34.5	68.1	6.3	23.5				
LOS	F	C	E	A	C				

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	52.9			30.3	23.5				
Approach LOS	D			C	C				
Queue Length 50th (ft)	306	342	385	279	407				
Queue Length 95th (ft)	m407	m375	359	65	m361				
Internal Link Dist (ft)	307			220	204			203	
Turn Bay Length (ft)									
Base Capacity (vph)	417	751	876	2587	2445				
Starvation Cap Reductn	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.62	0.55	0.69	0.37	0.68				

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 30 (15%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 31.3 Intersection LOS: C
 Intersection Capacity Utilization 77.5% ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2	↖ ø4
146 s	50 s
↙ ø5	↓ ø6
54 s	92 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↘	↖	↕	↗	↖	↗	↘	↖	↗	↘
Volume (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.95	
Frt		0.998				0.850		0.888			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3528	0	1770	3539	1583	1770	1622	0	1770	1514	0
Flt Permitted	0.950			0.950			0.445			0.744		
Satd. Flow (perm)	1770	3528	0	1770	3539	1421	829	1622	0	1386	1514	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1113	0	30	818	221	16	20	0	115	128	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	32.0	121.0	0.0	20.0	109.0	109.0	55.0	55.0	0.0	55.0	55.0	0.0
Total Split (%)	16.3%	61.7%	0.0%	10.2%	55.6%	55.6%	28.1%	28.1%	0.0%	28.1%	28.1%	0.0%
Maximum Green (s)	25.0	114.0		13.0	102.0	102.0	48.0	48.0		48.0	48.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	16.5	148.6		10.9	140.5	140.5	24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.08	0.76		0.06	0.72	0.72	0.12	0.12		0.12	0.12	
v/c Ratio	0.56	0.42		0.31	0.32	0.22	0.16	0.10		0.68	0.69	
Control Delay	93.2	5.2		92.0	7.9	7.9	77.5	74.4		101.1	100.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 11: Crabtree Valley Ave & Mall Parking Deck 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	93.2	5.2		92.0	7.9	7.9	77.5	74.4		101.1	100.6	
LOS	F	A		F	A	A	E	E		F	F	
Approach Delay		11.4			10.3			75.8			100.9	
Approach LOS		B			B			E			F	
Queue Length 50th (ft)	109	132		38	141	72	19	23		145	161	
Queue Length 95th (ft)	m146	m174		m67	141	m84	46	53		215	234	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	244	2675		135	2537	1019	211	414		354	386	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.34	0.42		0.22	0.32	0.22	0.08	0.05		0.32	0.33	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 18 (9%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 20.4 Intersection LOS: C
 Intersection Capacity Utilization 60.1% ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

→ ø2	↙ ø1	↓ ø4
121 s	20 s	55 s
← ø6	↘ ø5	↑ ø8
109 s	32 s	55 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/24/2010

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	683	356	637	674	589	135	293	603	511	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.90			0.95		0.97	
Frt			0.850			0.850			0.850		0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1639	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1486	3433	3539	1421	1770	1863	1500	3433	1639	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	683	356	637	674	589	135	293	603	511	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	683	356	637	674	589	135	293	603	511	429	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	37.0	50.0	27.0	53.0	66.0	44.0	27.0	49.0	53.0	44.0	66.0	0.0
Total Split (%)	18.9%	25.5%	13.8%	27.0%	33.7%	22.4%	13.8%	25.0%	27.0%	22.4%	33.7%	0.0%
Maximum Green (s)	30.0	43.0	20.0	46.0	59.0	37.0	20.0	42.0	46.0	37.0	59.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	27.5	51.7	73.6	46.1	70.3	111.2	21.8	37.3	83.3	40.9	56.3	
Actuated g/C Ratio	0.14	0.26	0.38	0.24	0.36	0.57	0.11	0.19	0.42	0.21	0.29	
v/c Ratio	0.77	0.73	0.63	0.79	0.53	0.70	0.69	0.83	0.92	0.71	0.91	
Control Delay	114.4	57.3	28.2	78.1	53.5	22.3	101.9	95.3	49.1	78.4	91.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	114.4	57.3	28.2	78.1	53.5	22.3	101.9	95.3	49.1	78.4	91.0	
LOS	F	E	C	E	D	C	F	F	D	E	F	
Approach Delay		57.8			52.1			69.1			84.2	
Approach LOS		E			D			E			F	
Queue Length 50th (ft)	222	320	152	397	381	274	169	367	332	311	528	
Queue Length 95th (ft)	343	442	200	474	464	402	256	473	425	395	#701	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	289	935	575	841	1270	845	204	418	673	726	510	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.66	0.73	0.62	0.76	0.53	0.70	0.66	0.70	0.90	0.70	0.84	

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 152 (78%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 62.8
 Intersection LOS: E
 Intersection Capacity Utilization 86.8%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø1	ø2	ø4	ø3
53 s	50 s	66 s	27 s
ø5	ø6	ø8	ø7
37 s	66 s	49 s	44 s

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	187	309	1242	20	514	638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1486	3539	1486	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	309	1242	20	514	638
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	309	1242	20	514	638
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	45.0	50.0	101.0	45.0	50.0	151.0
Total Split (%)	23.0%	25.5%	51.5%	23.0%	25.5%	77.0%
Maximum Green (s)	38.0	43.0	94.0	38.0	43.0	144.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	28.0	65.3	115.7	143.7	37.3	158.0
Actuated g/C Ratio	0.14	0.33	0.59	0.73	0.19	0.81
v/c Ratio	0.74	0.60	0.59	0.02	0.79	0.22
Control Delay	97.3	54.0	28.5	7.0	63.3	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings Crabtree Valley Ave Extension to I-440 (Grade Separate) PM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	97.3	54.0	28.5	7.0	63.3	4.5
LOS	F	D	C	A	E	A
Approach Delay	70.3		28.2			30.8
Approach LOS	E		C			C
Queue Length 50th (ft)	235	319	521	6	312	88
Queue Length 95th (ft)	318	371	716	17	327	56
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	361	548	2088	1145	790	2853
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.56	0.59	0.02	0.65	0.22

Intersection Summary

Area Type: Other
 Cycle Length: 196
 Actuated Cycle Length: 196
 Offset: 180 (92%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 36.4
 Intersection Capacity Utilization 72.3%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service C

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

ø2	ø1	ø4
101 s	50 s	45 s
ø6		
151 s		

HCM Unsignalized Intersection Capacity Analysis Extension to I-440 (Grade Separate) PM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/24/2010

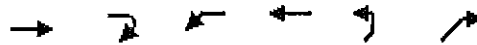


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↑		↑↑	↑	↑↑
Volume (veh/h)	0	475	0	1097	1184	785
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	475	0	1097	1184	785
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	460	
pX, platoon unblocked	0.77	0.73	0.73			
vC, conflicting volume	1732	1184	1184			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1338	1065	1065			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	112	159	472			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	475	548	548	1184	392	392
Volume Left	0	0	0	0	0	0
Volume Right	475	0	0	0	392	392
cSH	159	1700	1700	1700	1700	1700
Volume to Capacity	2.99	0.32	0.32	0.70	0.23	0.23
Queue Length 95th (ft)	1091	0	0	0	0	0
Control Delay (s)	957.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	957.7	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay	128.5					
Intersection Capacity Utilization	98.4%			ICU Level of Service		F
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis Extension to I-440 (Grade Separate) PM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/24/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1135	44	0	957	0	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1135	44	0	957	0	62
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.91	
vC, conflicting volume	1185			1642	602	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1185			1513	602	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			100	86	
cM capacity (veh/h)	582			100	438	

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	757	422	478	478	62
Volume Left	0	0	0	0	0
Volume Right	0	44	0	0	62
cSH	1700	1700	1700	1700	438
Volume to Capacity	0.45	0.25	0.28	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.6
Lane LOS	B				
Approach Delay (s)	0.0		0.0		14.6
Approach LOS	B				

Intersection Summary					
Average Delay	0.4				
Intersection Capacity Utilization	45.5%		ICU Level of Service A		
Analysis Period (min)	15				

Network Totals

Number of Intersections	40
Control Delay / Veh (s/v)	99
Queue Delay / Veh (s/v)	4
Total Delay / Veh (s/v)	103
Total Delay (hr)	8776
Stops / Veh	0.23
Stops (#)	69846
Average Speed (mph)	5
Total Travel Time (hr)	9719
Distance Traveled (mi)	44574
Fuel Consumed (gal)	8748
Fuel Economy (mpg)	5.1
CO Emissions (kg)	611.50
NOx Emissions (kg)	118.98
VOC Emissions (kg)	141.72
Unserved Vehicles (#)	21582
Vehicles in dilemma zone (#)	1053
Performance Index	8969.8

Total Network Performance By Run

Run Number	1	10	11	2	3	4	6
Total Delay (hr)	15359.0	15785.4	15509.0	15391.6	15481.5	15465.1	15404.5
Delay / Veh (s)	2933.9	3095.7	3007.2	2947.3	3002.4	2992.4	2961.6
Stop Delay (hr)	14937.4	15369.6	15078.4	14967.8	15052.1	15046.2	14973.3
St Del/Veh (s)	2853.4	3014.1	2923.7	2866.2	2919.1	2911.4	2878.7
Total Stops	86530	86139	87376	85067	86407	84567	87759
Stop/Veh	4.59	4.69	4.71	4.52	4.65	4.55	4.69
Travel Dist (mi)	23600.0	22913.1	23387.9	23511.7	23188.2	23167.0	23548.1
Travel Time (hr)	15922.5	16334.6	16069.5	15956.1	16037.6	16020.7	15967.7
Avg Speed (mph)	8	8	8	8	8	8	8
Fuel Used (gal)	4356.4	4423.5	4383.5	4362.7	4370.8	4363.0	4363.4
Fuel Eff. (mpg)	5.4	5.2	5.3	5.4	5.3	5.3	5.4
HC Emissions (g)	20342	21020	20720	21477	21430	21685	20912
CO Emissions (g)	789353	786270	782647	800565	792978	796925	784792
NOx Emissions (g)	49854	48856	49619	51294	50733	50970	49185
Vehicles Entered	19461	19076	19247	19516	19257	19285	19476
Vehicles Exited	18232	17639	17885	18084	17870	17925	17974
Hourly Exit Rate	18232	17639	17885	18084	17870	17925	17974
Input Volume	428053	428053	428053	428053	428053	428053	428053
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	1357	1364	1247	1256	1215	1346	1288
Denied Entry After	26188	26920	26464	26265	26512	26341	26175

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	15476.9	15408.2	15315.6	15459.7
Delay / Veh (s)	2984.0	2945.2	2921.3	2978.6
Stop Delay (hr)	15045.9	14972.5	14879.3	15032.3
St Del/Veh (s)	2900.9	2861.9	2838.1	2896.2
Total Stops	87579	86529	87966	86597
Stop/Veh	4.69	4.59	4.66	4.63
Travel Dist (mi)	23341.5	23592.6	23649.9	23390.0
Travel Time (hr)	16037.0	15974.0	15882.0	16020.2
Avg Speed (mph)	8	8	8	8
Fuel Used (gal)	4375.7	4370.1	4350.2	4371.9
Fuel Eff. (mpg)	5.3	5.4	5.4	5.4
HC Emissions (g)	21256	20230	21277	21035
CO Emissions (g)	797667	786421	799317	791693
NOx Emissions (g)	50970	49695	51162	50234
Vehicles Entered	19380	19506	19598	19378
Vehicles Exited	17965	18162	18151	17990
Hourly Exit Rate	17965	18162	18151	17990
Input Volume	428053	428053	428053	428053
% of Volume	4	4	4	4
Denied Entry Before	1184	1257	1233	1271
Denied Entry After	26291	26376	26328	26387

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Queue	Delay	Travel	Dist	Arterial	Run 1	Run 1
	Length	(Sec)	(Min)	(mi)	Speed	Speed	Delay
	61	95.6	108.9	0.2	5	5	99.3
	68	49.6	56.4	0.1	5	5	52.1
Creedmoor Rd	1	374.0	406.7	0.4	4	4	375.5
Crabtree Mall Entr	2	135.8	153.2	0.2	5	5	141.5
Blue Ridge Rd	3	312.2	336.6	0.3	3	3	309.2
Crabtree View Pl	81	14.6	20.2	0.1	12	12	14.6
I-440 WB On/Off Ramp	4	27.6	40.5	0.2	14	12	32.2
WB I-440 On Ramp fro	44	7.7	14.0	0.1	24	22	8.9
EB I-440 On Ramp fro	23	2.1	6.6	0.0	24	23	2.3
Ridge Rd Extension	5	45.2	50.6	0.1	5	5	46.9
Total		2026.6	2188.0	2.0	5	5	2001.9

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 10	Run 10	Run 11	Run 11	Run 2	Run 2	Run 3
	Speed	Delay	Speed	Delay	Speed	Delay	Speed
	6	1175.8	6	927.6	6	857.0	6
	5	102.7	5	93.7	6	88.9	5
	5	54.0	5	48.7	5	47.2	5
Creedmoor Rd	3	410.7	4	365.7	4	365.7	4
Crabtree Mall Entr	5	143.5	5	132.6	5	128.5	5
Blue Ridge Rd	3	321.6	3	316.3	3	303.3	3
Crabtree View Pl	12	14.6	12	15.0	13	12.8	12
I-440 WB On/Off Ramp	17	20.5	13	28.6	17	20.6	13
WB I-440 On Ramp fro	27	5.9	23	8.0	26	6.4	22
EB I-440 On Ramp fro	24	2.1	24	2.2	24	2.0	23
Ridge Rd Extension	5	46.2	5	40.8	5	47.3	5
Total	5	2297.5	5	1979.2	5	1879.8	5

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 3	Run 4	Run 4	Run 6	Run 6	Run 7	Run 7
	Delay	Speed	Delay	Speed	Delay	Speed	Delay
	989.0	6	1026.2	6	867.2	6	1036.2
	99.0	5	99.5	6	89.5	5	100.0
	48.0	5	52.7	6	47.0	5	53.5
Creedmoor Rd	362.0	3	409.9	4	353.7	3	409.5
Crabtree Mall Entr	130.8	5	145.0	5	128.1	4	155.1
Blue Ridge Rd	323.0	3	321.4	3	312.3	3	307.1
Crabtree View Pl	15.3	12	15.0	12	15.0	11	15.8
I-440 WB On/Off Ramp	30.8	13	28.6	13	28.6	11	36.7
WB I-440 On Ramp fro	8.8	24	7.7	24	7.8	23	8.5
EB I-440 On Ramp fro	2.3	24	2.0	24	2.1	25	1.9
Ridge Rd Extension	45.9	5	46.2	4	48.1	5	40.4
Total	2054.9	5	2154.3	5	1899.3	5	2164.8

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
	6	919.6	6	922.9
	6	90.5	5	93.9
	5	47.1	6	46.5
Creedmoor Rd	4	351.3	4	341.7
Crabtree Mall Entr	5	131.3	5	123.8
Blue Ridge Rd	3	302.2	3	305.8
Crabtree View Pl	12	14.5	13	13.7
I-440 WB On/Off Ramp	14	26.4	16	22.1
WB I-440 On Ramp fro	23	8.3	25	6.9
EB I-440 On Ramp fro	24	2.0	23	2.3
Ridge Rd Extension	5	45.7	5	44.5
Total	5	1939.0	5	1924.1

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Queue	Delay (s/veh)	Travel Time (s)	LOS	Arrival (veh)	Plan 1 Queue	Plan 1 Delay
EB I-440 On Ramp fro	5	2791.5	2913.5	0.3	6	6	2911.7
EB I-440 On Ramp fro	23	14.7	18.3	0.1	13	13	14.7
WB I-440 On Ramp fro	44	19.9	26.0	0.0	6	6	19.7
I-440 WB Off Ramp to	4	69.9	76.6	0.1	4	4	69.8
Crabtree View Pl	81	108.0	121.5	0.2	5	5	106.0
Lead Mine Rd	3	61.0	65.9	0.1	4	4	61.9
Marriott Dr	2	23.7	49.2	0.3	22	23	23.6
Creedmoor Rd	1	22.2	38.4	0.2	19	21	19.4
	68	8.6	42.3	0.4	34	35	8.4
	61	0.6	7.3	0.1	40	40	0.7
	64	1.2	14.4	0.2	40	40	1.3
Total		3121.6	3273.6	1.8	11	11	3159.1

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 10 Speed	Run 10 Delay	Run 11 Speed	Run 11 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed
EB I-440 On Ramp fro	6	2918.2	5	2931.5	6	2979.3	6
EB I-440 On Ramp fro	12	15.7	12	16.6	14	13.6	13
WB I-440 On Ramp fro	6	22.0	6	21.8	6	18.8	6
I-440 WB Off Ramp to	4	72.6	4	70.3	4	68.6	4
Crabtree View Pl	5	110.3	5	105.0	4	111.1	5
Lead Mine Rd	4	62.2	4	57.8	4	63.7	4
Marriott Dr	24	20.4	24	20.3	24	21.4	24
Creedmoor Rd	19	21.7	20	21.2	20	20.2	20
	35	8.2	35	8.4	34	8.9	34
	41	0.5	41	0.5	40	0.7	40
	41	1.1	41	1.1	40	1.3	41
Total	11	3253.0	10	3254.5	11	3307.5	11

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	2664.5	6	2653.2	6	2574.0	6	2705.0
EB I-440 On Ramp fro	14.7	13	14.5	14	14.0	13	14.1
WB I-440 On Ramp fro	20.1	6	19.2	6	18.7	6	18.1
I-440 WB Off Ramp to	72.5	4	70.1	4	68.7	5	67.0
Crabtree View Pl	108.5	4	110.7	5	106.6	5	108.6
Lead Mine Rd	59.3	4	59.9	4	61.9	4	62.0
Marriott Dr	20.9	24	21.6	24	20.8	16	44.3
Creedmoor Rd	20.8	20	20.2	19	21.5	15	32.0
	8.8	35	8.3	35	8.5	34	9.2
	0.6	40	0.6	40	0.6	40	0.6
	1.1	40	1.2	41	1.2	40	1.2
Total	2991.7	11	2979.5	11	2896.4	10	3062.1

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On Ramp fro	6	2937.2	6	2756.7
EB I-440 On Ramp fro	12	15.8	14	13.5
WB I-440 On Ramp fro	6	20.5	6	20.0
I-440 WB Off Ramp to	4	68.8	4	70.3
Crabtree View Pl	5	108.4	5	104.8
Lead Mine Rd	4	62.0	4	59.3
Marriott Dr	22	23.9	24	20.1
Creedmoor Rd	19	22.7	19	22.7
	34	8.7	34	9.0
	40	0.6	40	0.6
	40	1.3	40	1.2
Total	11	3269.9	11	3078.3

**2035 CVA Extension to I-440 and
Creedmoor Road Interchange
(SPUI)**

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	134	279	423	306	283	854	384	673	129	1969	1820	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		0	275		310			450		
Storage Lanes	2	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	0.97	1.00	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor			0.98			0.98		0.95			1.00	
Frt			0.850			0.850		0.850			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	3539	1583	3433	3539	1583	3467	3506	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1863	1545	3433	3539	1559	3433	3539	1512	3467	3506	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								664			1586	
Travel Time (s)								12.9			24.0	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	134	279	423	306	283	854	384	673	129	1969	1820	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	279	423	306	283	854	384	673	129	1969	2015	0
Turn Type	Prot	custom	custom	Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			3 2			Free			8 1			
Detector Phase	5	2	3 2	1	6		3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5		14.0	25.5	
Total Split (s)	18.0	32.0	57.0	20.0	34.0	0.0	25.0	34.0	54.0	88.0	97.0	0.0
Total Split (%)	10.3%	18.4%	32.8%	11.5%	19.5%	0.0%	14.4%	19.5%	31.0%	50.6%	55.7%	0.0%
Maximum Green (s)	11.0	25.0		13.0	27.0		18.0	27.0		81.0	90.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	10.1	25.0	50.0	13.0	27.9	174.0	18.0	29.4	40.0	81.0	92.4	
Actuated g/C Ratio	0.06	0.14	0.29	0.07	0.16	1.00	0.10	0.17	0.23	0.47	0.53	
v/c Ratio	0.67	1.04	0.95	1.20	0.50	0.55	1.08	1.13	0.37	1.22	1.08	
Control Delay	96.9	135.3	92.4	135.7	39.2	10.2	128.5	129.0	39.2	144.9	85.8	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	96.9	135.3	92.4	135.7	39.2	10.2	128.5	129.0	39.2	144.9	85.8	
LOS	F	F	F	F	D	B	F	F	D	F	F	
Approach Delay								119.1			115.0	
Approach LOS								F			F	
Queue Length 50th (ft)	78	~343	478	~211	122	402	~256	~475	135	~1414	~1347	
Queue Length 95th (ft)	118	#544	#702	m88	m61	m0	#372	#611	194	#1538	#1473	
Internal Link Dist (ft)								584			1506	
Turn Bay Length (ft)					275	275	310		175	450		
Base Capacity (vph)	217	268	444	256	567	1559	355	598	348	1614	1862	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	1.04	0.95	1.20	0.50	0.55	1.08	1.13	0.37	1.22	1.08	

Intersection Summary

Area Type: Other

Cycle Length: 174

Actuated Cycle Length: 174

Offset: 149 (86%), Referenced to phase 2:EBR and 6:WBR, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 100.8

Intersection LOS: F

Intersection Capacity Utilization 120.5%

ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.

ø2	ø1	ø4	ø3
32 s	20 s	97 s	25 s
ø5	ø6	ø7	ø8
18 s	34 s	88 s	34 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	555	4204	184	294	3802	870	91	346	218	1804	1650	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00				0.97					0.99	
Frt		0.994				0.850			0.850		0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6297	0	3433	5085	1583	1752	3504	1567	5040	3482	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6297	0	3433	5085	1528	1752	3504	1567	5040	3482	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1620			354			460			524	
Travel Time (s)		24.5			5.4			9.0			10.2	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	555	4204	184	294	3802	870	91	346	218	1804	1650	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	4388	0	294	3802	870	91	346	218	1804	1863	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	22.0	78.0	0.0	17.0	73.0	35.0	15.0	44.0	17.0	35.0	64.0	0.0
Total Split (%)	12.6%	44.8%	0.0%	9.8%	42.0%	20.1%	8.6%	25.3%	9.8%	20.1%	36.8%	0.0%
Maximum Green (s)	15.0	71.0		10.0	66.0	28.0	8.0	37.0	10.0	28.0	57.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		12			12						24	
Act Effct Green (s)	17.0	73.0		12.0	68.0	113.4	10.0	23.6	40.6	45.4	59.0	
Actuated g/C Ratio	0.10	0.42		0.07	0.39	0.65	0.06	0.14	0.23	0.26	0.34	
v/c Ratio	1.67	1.66		1.24	1.91	0.86	0.90	0.73	0.60	1.37	1.58	
Control Delay	358.0	326.3		177.1	442.4	19.7	149.6	66.0	50.8	209.9	297.3	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	4.4	0.0	0.5	0.0	0.0	74.3	
Total Delay	358.0	326.3		177.1	442.4	24.1	149.6	66.5	50.8	209.9	371.6	
LOS	F	F		F	F	C	F	E	D	F	F	
Approach Delay		329.9			353.4			72.8			292.1	
Approach LOS		F			F			E			F	
Queue Length 50th (ft)	~473	~2106		~215	~2457	687	108	211	244	~957	~1580	
Queue Length 95th (ft)	m#494	m#1889		m#204	m#2358	m666	#229	206	214	m#1052	m#1623	
Internal Link Dist (ft)		1540			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	332	2642		237	1987	1010	101	785	366	1315	1181	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	112	
Spillback Cap Reductn	0	0		0	0	88	0	156	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.67	1.66		1.24	1.91	0.94	0.90	0.55	0.60	1.37	1.74	

Intersection Summary

Area Type: Other

Cycle Length: 174

Actuated Cycle Length: 174

Offset: 79 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.91

Intersection Signal Delay: 316.5

Intersection LOS: F

Intersection Capacity Utilization 164.4%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ø2 78 s	↖ ø1 17 s	↓ ø4 64 s	↗ ø3 15 s
↖ ø5 22 s	← ø6 73 s	↑ ø8 44 s	↘ ø7 35 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



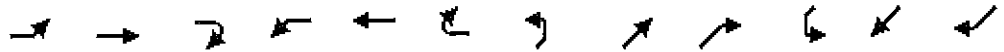
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑						↑			↑↑↑
Volume (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Ped Bike Factor			0.97						0.98			
Fr t			0.850						0.865			0.850
Fit Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Fit Permitted												
Satd. Flow (perm)	0	4984	1512	0	7620	0	0	0	1586	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				25
Link Distance (ft)		819			490			314				640
Travel Time (s)		12.4			7.4			4.8				17.5
Confl. Peds. (#/hr)			12						12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4970	1349	0	2756	0	0	0	1238	0	0	2210
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	66.0	0.0	0.0	0.0	0.0	0.0	0.0	108.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	37.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	62.1%
Maximum Green (s)					59.0							101.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lead							Lag
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		174.0	174.0		61.0				174.0			103.0
Actuated g/C Ratio		1.00	1.00		0.35				1.00			0.59
y/c Ratio		1.00	0.89		1.03				0.78			1.03
Control Delay		20.8	13.8		61.2				3.9			62.0
Queue Delay		48.8	0.0		0.0				1.4			0.0
Total Delay		69.6	13.8		61.2				5.3			62.0
LOS		E	B		E				A			E
Approach Delay		57.6			61.2							
Approach LOS		E			E							
Queue Length 50th (ft)		635	386		~815				0			~1177

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 95th (ft)		m44	m0		m#760				m0			#1276
Internal Link Dist (ft)		739			410			234			560	
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1512		2671				1586			2148
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		547	0		0				174			0
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		1.12	0.89		1.03				0.88			1.03

Intersection Summary

Area Type: Other

Cycle Length: 174

Actuated Cycle Length: 174

Offset: 157 (90%), Referenced to phase 2: and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 54.0

Intersection LOS: D

Intersection Capacity Utilization 99.4%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

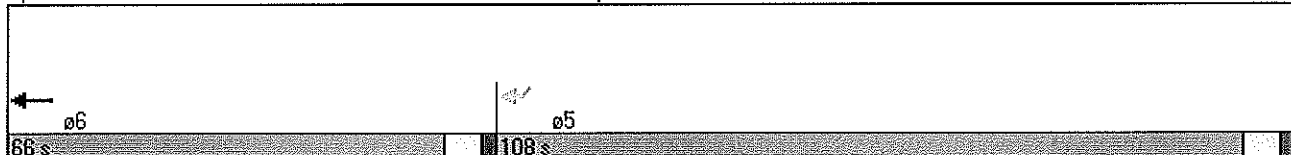
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

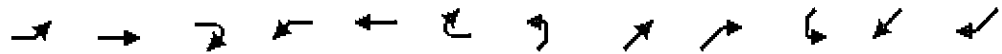


Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓	↑↑	↑			
Volume (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.94									
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.983				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3134	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1454	1832	5263	1639	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Shared Lane Traffic (%)							26%					
Lane Group Flow (vph)	0	3222	1096	100	1826	587	834	869	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	111.0	49.0	14.0	125.0	125.0	49.0	49.0	14.0	0.0	0.0	0.0
Total Split (%)	0.0%	63.8%	28.2%	8.0%	71.8%	71.8%	28.2%	28.2%	8.0%	0.0%	0.0%	0.0%
Maximum Green (s)		104.0	42.0	7.0	118.0	118.0	42.0	42.0	7.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		106.0	150.0	9.0	120.0	120.0	44.0	44.0	58.0			
Actuated g/C Ratio		0.61	0.86	0.05	0.69	0.69	0.25	0.25	0.33			
v/c Ratio		1.06	0.86	1.05	0.50	0.52	1.09	1.10	0.71			
Control Delay		64.4	7.9	181.2	13.4	15.1	118.2	119.8	59.6			

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		31.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		95.8	8.1	181.2	13.4	15.1	118.2	119.8	59.6			
LOS		F	A	F	B	B	F	F	E			
Approach Delay		73.5			20.5			108.3				
Approach LOS		E			C			F				
Queue Length 50th (ft)		~1475	334	~124	341	305	~619	~649	375			
Queue Length 95th (ft)		m#1492	m360	#261	372	399	#771	#802	507			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		3036	1278	95	3630	1130	766	793	525			
Starvation Cap Reductn		194	14	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.13	0.87	1.05	0.50	0.52	1.09	1.10	0.71			

Intersection Summary

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 173 (99%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 66.7
 Intersection LOS: E
 Intersection Capacity Utilization 104.9%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

02	01	03
111 s	14 s	49 s
06		08
125 s		49 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↔		↖	↕	↗	↖	↕↗↖	
Volume (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.95		1.00				0.94		1.00	
Frt			0.850		0.989				0.850		0.999	
Flt Protected		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1812	1599	1631	1620	0	1717	3433	1536	1823	5229	0
Flt Permitted		0.963		0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	1812	1525	1631	1620	0	1717	3433	1447	1823	5229	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	13	4	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	17	64	378	370	0	67	1422	282	69	2911	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	14.0	45.0	45.0	0.0	14.0	98.0	45.0	17.0	101.0	0.0
Total Split (%)	8.0%	8.0%	8.0%	25.9%	25.9%	0.0%	8.0%	56.3%	25.9%	9.8%	58.0%	0.0%
Maximum Green (s)	7.0	7.0	7.0	38.0	38.0		7.0	91.0	38.0	10.0	94.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)		9.0	14.4	44.0	44.0		9.0	95.6	139.6	11.0	97.6	
Actuated g/C Ratio		0.05	0.08	0.25	0.25		0.05	0.55	0.80	0.06	0.56	
v/c Ratio		0.18	0.49	0.92	0.90		0.75	0.75	0.24	0.59	0.99	
Control Delay		83.7	84.5	90.0	88.3		72.2	21.7	2.2	100.2	52.2	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	170.8	0.0	0.0		0.0	70.9	0.2	0.0	13.5	
Total Delay		83.7	255.3	90.0	88.3		72.2	92.5	2.4	100.2	65.7	
LOS		F	F	F	F		E	F	A	F	E	
Approach Delay		219.3			89.2			77.4			66.5	
Approach LOS		F			F			E			E	
Queue Length 50th (ft)		19	67	~465	448		79	455	48	78	~1227	
Queue Length 95th (ft)		49	121	#705	#688		m86	m429	m38	137	#1333	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		94	130	412	409		89	1887	1184	126	2934	
Starvation Cap Reductn		0	0	0	0		0	653	333	0	0	
Spillback Cap Reductn		0	81	0	0		0	0	0	0	127	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.18	1.31	0.92	0.90		0.75	1.15	0.33	0.55	1.04	

Intersection Summary:

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 173 (99%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 75.2
 Intersection LOS: E
 Intersection Capacity Utilization 98.5%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

φ1	φ2	φ3	φ4
17 s	98 s	14 s	45 s
φ6	φ5		
101 s	14 s		

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗	↖	↗		↖	↗	
Volume (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.97				0.96		1.00			1.00	
Frt		0.878				0.850		0.993			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1578	0	0	1837	2787	1805	5141	0	3416	3487	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1578	0	0	1837	2682	1805	5141	0	3416	3487	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			823			264	
Travel Time (s)		5.0			7.9			16.0			5.1	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	120	145	1005	0	93	2533	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	38.0	38.0		38.0	38.0	14.0	14.0	38.0		14.0	38.0	
Total Split (s)	38.0	38.0	0.0	38.0	38.0	14.0	16.0	84.0	0.0	14.0	82.0	0.0
Total Split (%)	21.8%	21.8%	0.0%	21.8%	21.8%	8.0%	9.2%	48.3%	0.0%	8.0%	47.1%	0.0%
Maximum Green (s)	31.0	31.0		31.0	31.0	7.0	9.0	77.0		7.0	75.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	12	12		12	12			12			12	
Act Effct Green (s)	20.3	20.3			16.2	26.8	11.0	107.9		12.4	109.3	
Actuated g/C Ratio	0.12	0.12			0.09	0.15	0.06	0.62		0.07	0.63	
v/c Ratio	0.52	0.60			0.20	0.29	1.27	0.32		0.38	1.16	
Control Delay	80.3	85.8			71.9	60.2	233.1	12.6		87.1	91.1	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	18.9	
Total Delay	80.3	85.8			71.9	60.2	233.1	12.6		87.1	110.0	
LOS	F	F			E	E	F	B		F	F	
Approach Delay		83.1			62.8			40.4			109.2	
Approach LOS		F			E			D			F	
Queue Length 50th (ft)	117	123			38	69	~213	323		53	~1735	
Queue Length 95th (ft)	181	189			72	93	#375	208		m49	m#1808	
Internal Link Dist (ft)		104			152			743			184	
Turn Bay Length (ft)										200		
Base Capacity (vph)	334	299			348	421	114	3189		244	2191	
Starvation Cap Reductn	0	0			0	0	0	0		0	78	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.32	0.37			0.10	0.29	1.27	0.32		0.38	1.20	

Intersection Summary

Area Type: Other

Cycle Length: 174

Actuated Cycle Length: 174

Offset: 54 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.27

Intersection Signal Delay: 87.0

Intersection LOS: F

Intersection Capacity Utilization 106.1%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

φ1	φ2	φ3	φ4
14 s	84 s	38 s	38 s
φ6	φ5		
82 s	16 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↔	↑↑	↔	↔↔	↑↑
Volume (vph)	650	192	958	375	544	1983
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1524	3539	1524	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		823	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	192	958	375	544	1983
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	192	958	375	544	1983
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	50.0	43.0	81.0	50.0	43.0	124.0
Total Split (%)	28.7%	24.7%	46.6%	28.7%	24.7%	71.3%
Maximum Green (s)	43.0	36.0	74.0	43.0	36.0	117.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	40.4	79.6	79.4	119.8	39.2	123.6
Actuated g/C Ratio	0.23	0.46	0.46	0.69	0.23	0.71
v/c Ratio	0.82	0.27	0.59	0.35	0.70	0.79
Control Delay	41.7	16.2	39.4	11.4	41.5	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	2.1



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	41.7	16.2	39.4	11.4	41.5	11.9
LOS	D	B	D	B	D	B
Approach Delay	35.9		31.5			18.3
Approach LOS	D		C			B
Queue Length 50th (ft)	134	62	422	144	276	230
Queue Length 95th (ft)	192	69	563	233	m218	m40
Internal Link Dist (ft)	443		1593			743
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	888	729	1704	1090	838	2514
Starvation Cap Reductn	0	0	0	0	0	371
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.26	0.56	0.34	0.65	0.93

Intersection Summary

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 20 (11%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.2
 Intersection LOS: C
 Intersection Capacity Utilization 82.2%
 ICU Level of Service E
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

ø2	ø1	ø3
81 s	43 s	50 s
ø6		
124 s		

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	176	184	324	572	1799	0	220	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor		0.96			1.00				
Frt		0.850			0.984				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	4994	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1770	1518	3502	3539	4994	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	176	184	324	572	1799	0	220	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	176	184	324	572	2019	0	0	0	0
Turn Type		custom	Prot						
Protected Phases			5	2	6				
Permitted Phases	4	4 5							
Detector Phase	4	4 5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	42.0	74.0	32.0	132.0	100.0	0.0	0.0	0.0	0.0
Total Split (%)	24.1%	42.5%	18.4%	75.9%	57.5%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	35.0		25.0	125.0	93.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	24.6	52.9	23.3	139.4	111.1				
Actuated g/C Ratio	0.14	0.30	0.13	0.80	0.64				
v/c Ratio	0.70	0.40	0.69	0.20	0.63				
Control Delay	99.5	51.1	71.4	1.9	6.4				
Queue Delay	0.0	0.0	0.0	0.0	0.0				
Total Delay	99.5	51.1	71.4	1.9	6.4				
LOS	F	D	E	A	A				

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	74.8			27.1	6.4				
Approach LOS	E			C	A				
Queue Length 50th (ft)	205	165	144	18	69				
Queue Length 95th (ft)	289	185	151	27	m137				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	376	496	549	2836	3189				
Starvation Cap Reductn	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.47	0.37	0.59	0.20	0.63				

Intersection Summary

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 167 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 19.6
 Intersection LOS: B
 Intersection Capacity Utilization 74.6%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.



Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

11: Crabtree Valley Ave & Mail Parking Deck

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕	↔	↔	↕		↔	↕	
Volume (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.91		0.98				0.97
Frt		0.999				0.850		0.908				0.904
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3533	0	1770	3539	1583	1770	1663	0	1770	1632	0
Fit Permitted	0.950			0.950			0.748			0.749		
Satd. Flow (perm)	1770	3533	0	1770	3539	1436	1393	1663	0	1395	1632	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				35
Link Distance (ft)		880			946			363				596
Travel Time (s)		13.3			14.3			5.5				11.6
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	896	0	24	823	103	10	13	0	34	14	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0		7.0
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0		41.0
Total Split (s)	22.0	110.0	0.0	19.0	107.0	107.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	12.6%	63.2%	0.0%	10.9%	61.5%	61.5%	25.9%	25.9%	0.0%	25.9%	25.9%	0.0%
Maximum Green (s)	15.0	103.0		12.0	100.0	100.0	38.0	38.0		38.0		38.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0		5.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0		2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0		3.0
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None		None
Walk Time (s)		7.0			7.0	7.0				7.0		7.0
Flash Dont Walk (s)		7.0			7.0	7.0				10.0		10.0
Pedestrian Calls (#/hr)		12			12	12				12		12
Act Effct Green (s)	10.7	142.7		11.7	141.2	141.2	13.4	13.4		13.7		13.7
Actuated g/C Ratio	0.06	0.82		0.07	0.81	0.81	0.08	0.08		0.08		0.08
v/c Ratio	0.28	0.31		0.20	0.29	0.09	0.09	0.10		0.31		0.11
Control Delay	110.8	2.4		88.5	1.6	1.4	73.3	73.3		81.2		73.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0		0.0

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/22/2010

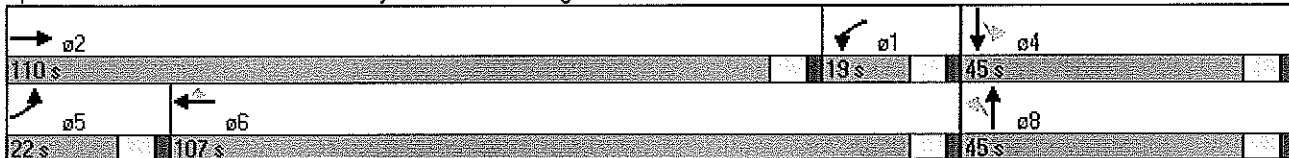


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	110.8	2.4		88.5	1.6	1.4	73.3	73.3		81.2	73.6	
LOS	F	A		F	A	A	E	E		F	E	
Approach Delay		5.9			3.8			73.3				79.0
Approach LOS		A			A			E				E
Queue Length 50th (ft)	33	58		27	39	9	11	14		38	15	
Queue Length 95th (ft)	m59	80		m55	46	15	33	38		76	40	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	173	2896		143	2872	1165	320	382		321	375	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.17	0.31		0.17	0.29	0.09	0.03	0.03		0.11	0.04	

Intersection Summary

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 44 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.31
 Intersection Signal Delay: 7.5
 Intersection LOS: A
 Intersection Capacity Utilization 43.7%
 ICU Level of Service A
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck



Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	69	475	387	523	797	218	88	69	390	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.91			0.95		0.96	
Frnt			0.850			0.850			0.850		0.889	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1597	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1495	3433	3539	1436	1770	1863	1507	3433	1597	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	475	387	523	797	218	88	69	390	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	475	387	523	797	218	88	69	390	27	88	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	19.0	48.0	40.0	44.0	73.0	18.0	40.0	64.0	44.0	18.0	42.0	0.0
Total Split (%)	10.9%	27.6%	23.0%	25.3%	42.0%	10.3%	23.0%	36.8%	25.3%	10.3%	24.1%	0.0%
Maximum Green (s)	12.0	41.0	33.0	37.0	66.0	11.0	33.0	57.0	37.0	11.0	35.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	26.5	69.0	99.9	37.2	79.6	93.0	30.9	34.5	71.7	13.4	16.9	
Actuated g/C Ratio	0.15	0.40	0.57	0.21	0.46	0.53	0.18	0.20	0.41	0.08	0.10	
v/c Ratio	0.26	0.34	0.44	0.71	0.49	0.28	0.28	0.19	0.61	0.10	0.57	
Control Delay	55.7	20.8	7.6	69.0	35.4	12.8	63.7	57.8	29.5	74.6	88.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	



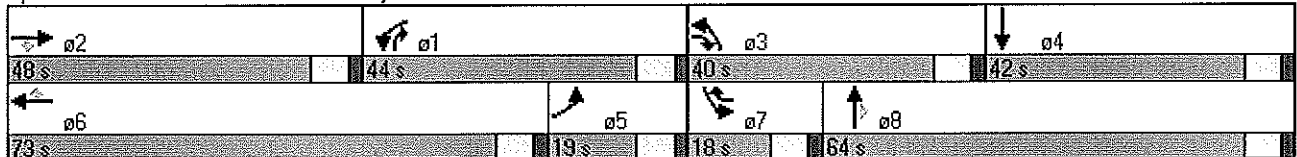
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	55.7	20.8	7.6	69.0	35.4	12.8	63.7	57.8	29.5	74.6	88.3	
LOS	E	C	A	E	D	B	E	E	C	E	F	
Approach Delay		17.9			43.6			38.6				85.1
Approach LOS		B			D			D				F
Queue Length 50th (ft)	78	83	81	286	344	71	87	66	251	14	98	
Queue Length 95th (ft)	130	118	138	345	423	109	146	113	296	32	157	
Internal Link Dist (ft)		866			568			211				73
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	270	1403	911	782	1620	784	356	632	659	276	340	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.34	0.42	0.67	0.49	0.28	0.25	0.11	0.59	0.10	0.26	

Intersection Summary

Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 139 (80%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 36.6
 Intersection Capacity Utilization 61.4%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service B

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance



Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Creedmoor Rd SPUI w CVA Extension to I-440 AM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations	↵	↶	↕	↷	↵↶	↕↷
Volume (vph)	153	266	630	55	536	617
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frnt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1495	3539	1495	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	266	630	55	536	617
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	266	630	55	536	617
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	51.0	57.0	66.0	51.0	57.0	123.0
Total Split (%)	29.3%	32.8%	37.9%	29.3%	32.8%	70.7%
Maximum Green (s)	44.0	50.0	59.0	44.0	50.0	116.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	22.4	57.7	101.3	123.8	35.2	141.6
Actuated g/C Ratio	0.13	0.33	0.58	0.71	0.20	0.81
v/c Ratio	0.67	0.52	0.31	0.05	0.77	0.21
Control Delay	86.1	45.3	20.3	7.1	44.9	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	86.1	45.3	20.3	7.1	44.9	2.9
LOS	F	D	C	A	D	A
Approach Delay	60.2		19.2			22.4
Approach LOS	E		B			C
Queue Length 50th (ft)	169	233	187	16	253	56
Queue Length 95th (ft)	243	283	274	34	282	30
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	468	571	2061	1130	1026	2879
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.47	0.31	0.05	0.52	0.21

Intersection Summary
 Area Type: Other
 Cycle Length: 174
 Actuated Cycle Length: 174
 Offset: 172 (99%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 28.5
 Intersection LOS: C
 Intersection Capacity Utilization 54.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

ø2	ø1	ø4
66 s	57 s	51 s
ø6		
123 s		

HCM Unsignalized Intersection Capacity Analysis Rd SPUI w CVA Extension to I-440 AM (2035)
 2: Glenwood Ave #1 & Marriott Dr 6/26/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗			↗			↗
Volume (veh/h)	0	2334	109	0	1469	128	0	0	117	0	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		2%			0%			-1%			-1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	2334	109	0	1469	128	0	0	117	0	0	40
Pedestrians		12			12			6			6	
Lane Width (ft)		14.7			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1603			2449			3126	3943	1185	2771	3924	752
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1603			2449			3126	3943	1185	2771	3924	752
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	34	100	100	88
cM capacity (veh/h)	402			187			4	3	178	3	3	346

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	1167	1167	109	734	734	128	117	40
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	109	0	0	128	117	40
cSH	1700	1700	1700	1700	1700	1700	178	346
Volume to Capacity	0.69	0.69	0.06	0.43	0.43	0.08	0.66	0.12
Queue Length 95th (ft)	0	0	0	0	0	0	95	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	57.0	16.8
Lane LOS							F	C
Approach Delay (s)	0.0			0.0			57.0	16.8
Approach LOS							F	C

Intersection Summary		
Average Delay		1.7
Intersection Capacity Utilization	80.1%	ICU Level of Service D
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis - City of Annapolis Rd SUI w CVA Extension to I-440 AM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/22/2010

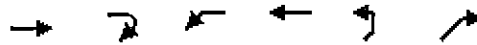


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↕	↕	↘
Volume (veh/h)	0	119	0	655	1900	228
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	119	0	655	1900	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.65	0.64	0.64			
vC, conflicting volume	2228	1900	1900			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2500	2122	2122			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	15	27	163			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	119	328	328	1900	114	114
Volume Left	0	0	0	0	0	0
Volume Right	119	0	0	0	114	114
cSH	27	1700	1700	1700	1700	1700
Volume to Capacity	4.49	0.19	0.19	1.12	0.07	0.07
Queue Length 95th (ft)	Err	0	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	Err	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay		410.0				
Intersection Capacity Utilization		114.0%		ICU Level of Service		H
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
 16: Crabtree Valley Ave & Edwards Mill Rd
 City of Annapolis
 SPUI w CVA Extension to I-440 AM (2035)
 6/22/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	856	63	0	842	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	856	63	0	842	0	70
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.94	
vC, conflicting volume			925		1314	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			925		1208	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			730		164	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	571	348	421	421	70
Volume Left	0	0	0	0	0
Volume Right	0	63	0	0	70
cSH	1700	1700	1700	1700	533
Volume to Capacity	0.34	0.20	0.25	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.8
Approach LOS					B

Intersection Summary					
Average Delay			0.5		
Intersection Capacity Utilization			38.9%		ICU Level of Service
Analysis Period (min)			15		A

Network Totals

Number of Intersections	46
Control Delay / Veh (s/v)	29
Queue Delay / Veh (s/v)	2
Total Delay / Veh (s/v)	31
Total Delay (hr)	2578
Stops / Veh	0.15
Stops (#)	45282
Average Speed (mph)	12
Total Travel Time (hr)	3427
Distance Traveled (mi)	41252
Fuel Consumed (gal)	3828
Fuel Economy (mpg)	10.8
CO Emissions (kg)	267.55
NOx Emissions (kg)	52.06
VOC Emissions (kg)	62.01
Unserved Vehicles (#)	6540
Vehicles in dilemma zone (#)	911
Performance Index	2704.0

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	13809.7	14618.0	14077.8	13631.4	13753.4	14517.9	14023.8
Delay / Veh (s)	2664.3	2978.4	2831.9	2587.7	2693.7	3294.3	2762.6
Stop Delay (hr)	13483.7	14344.4	13769.6	13292.4	13398.6	14310.1	13715.6
St Del/Veh (s)	2601.4	2922.6	2769.9	2523.3	2624.2	3247.2	2701.8
Total Stops	64756	56146	59113	65466	71470	43171	61479
Stop/Veh	3.47	3.18	3.30	3.45	3.89	2.72	3.36
Travel Dist (mi)	23088.0	21621.5	22342.2	23713.2	23174.0	18738.6	22567.8
Travel Time (hr)	14339.7	15111.1	14589.3	14177.1	14288.4	14948.4	14540.1
Avg Speed (mph)	8	8	8	9	8	7	8
Fuel Used (gal)	3996.6	4129.2	4035.3	3975.3	3981.8	4003.1	4027.4
Fuel Eff. (mpg)	5.8	5.2	5.5	6.0	5.8	4.7	5.6
HC Emissions (g)	20078	19922	21167	20590	22341	19087	21142
CO Emissions (g)	814389	809827	826763	824478	837806	751222	828676
NOx Emissions (g)	49488	47285	51112	50970	53792	43085	50697
Vehicles Entered	19253	18326	18344	19506	18928	16235	18905
Vehicles Exited	18067	17012	17449	18423	17834	15495	17645
Hourly Exit Rate	18067	17012	17449	18423	17834	15495	17645
Input Volume	412236	412236	412236	412236	412236	412236	412236
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	2226	2451	2315	2219	2288	2414	2309
Denied Entry After	21964	23372	22955	21655	22177	25257	22447

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	14150.2	14253.3	13674.4	14051.0
Delay / Veh (s)	2825.2	2881.9	2596.9	2802.6
Stop Delay (hr)	13837.1	13960.8	13335.2	13744.7
St Del/Veh (s)	2762.7	2822.7	2532.5	2741.5
Total Stops	59235	57434	64733	60306
Stop/Veh	3.29	3.23	3.41	3.34
Travel Dist (mi)	22308.7	21829.1	23759.4	22314.3
Travel Time (hr)	14658.0	14752.2	14219.5	14562.4
Avg Speed (mph)	8	8	9	8
Fuel Used (gal)	4040.2	4057.8	3988.1	4023.5
Fuel Eff. (mpg)	5.5	5.4	6.0	5.5
HC Emissions (g)	20727	20715	20470	20624
CO Emissions (g)	814979	818078	825313	815153
NOx Emissions (g)	49662	49029	50718	49584
Vehicles Entered	18834	18439	19471	18621
Vehicles Exited	17228	17172	18442	17475
Hourly Exit Rate	17228	17172	18442	17475
Input Volume	412236	412236	412236	412236
% of Volume	4	4	4	4
Denied Entry Before	2199	2273	2258	2293
Denied Entry After	22589	22854	21715	22696

Arterial Level of Service: EB Glenwood Ave #1

From Street	To Street	Flow (VPH)	Travel Time (s)	LOS	Arterial Speed	Plan 1 Speed	Plan 2 Speed
	64	1878.5	1938.3	0.4	3	3	1518.0
	61	218.5	225.8	0.2	3	3	118.0
	68	106.2	113.0	0.1	3	3	97.4
Glenwood Ave	85	350.2	373.5	0.3	3	3	331.9
	35	81.1	88.9	0.1	4	3	90.0
	65	48.9	52.9	0.0	3	3	53.2
Glenwood Ave	91	100.8	108.4	0.1	4	3	105.1
Crabtree Mall Entr	2	67.7	74.7	0.1	3	4	61.8
Blue Ridge Rd	3	346.4	371.5	0.3	3	3	359.3
Crabtree View Pl	81	12.5	17.9	0.1	13	12	14.0
I-440 WB On/Off Ramp	4	38.6	51.6	0.2	11	10	41.1
WB I-440 On Ramp fro	44	10.9	17.2	0.1	19	20	10.6
EB I-440 On Ramp fro	23	7.6	12.1	0.0	13	14	6.7
Ridge Rd Extension	5	52.9	58.3	0.1	4	4	51.1
Total		3316.8	3478.1	2.0	4	4	2948.7

Arterial Level of Service: EB Glenwood Ave #1

From Street	Plan 1 Speed	Plan 1 Delay	Plan 2 Speed	Plan 2 Delay	Plan 3 Speed	Plan 3 Delay	Plan 4 Speed
	3	2271.1	3	2385.7	3	1880.4	4
	2	255.0	2	235.8	3	203.9	3
	3	100.8	3	101.6	3	83.5	3
Glenwood Ave	4	264.0	3	284.9	4	212.6	2
	3	93.0	5	66.6	5	67.5	3
	3	56.6	4	41.0	4	41.8	3
Glenwood Ave	3	110.7	4	92.9	4	90.2	3
Crabtree Mall Entr	3	71.0	3	70.2	4	60.4	4
Blue Ridge Rd	3	387.8	3	344.1	3	315.5	3
Crabtree View Pl	11	16.6	14	11.4	16	9.4	15
I-440 WB On/Off Ramp	9	50.1	12	34.5	12	33.6	12
WB I-440 On Ramp fro	17	13.0	19	11.0	19	10.8	21
EB I-440 On Ramp fro	11	10.2	13	7.9	12	8.9	13
Ridge Rd Extension	4	60.3	4	55.4	4	51.1	4
Total	3	3810.3	4	3722.5	4	2989.6	4

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Run 4 Speed	Run 5 Delay	Run 6 Speed	Run 7 Delay	Run 8 Speed	Run 9 Delay
	1202.4	2	2274.9	3	1575.4	4
	174.5	2	244.3	3	197.7	3
	95.2	1	198.8	3	108.3	3
Glenwood Ave	403.0	1	733.6	2	467.3	3
	95.2	3	93.8	3	108.2	4
	54.1	3	52.2	3	61.0	3
Glenwood Ave	107.2	4	100.7	3	119.8	4
Crabtree Mall Entr	63.7	3	80.3	3	74.1	3
Blue Ridge Rd	318.8	3	391.4	3	367.9	3
Crabtree View Pl	11.2	11	16.1	12	14.1	15
I-440 WB On/Off Ramp	33.1	10	43.4	10	41.6	12
WB I-440 On Ramp fro	9.7	20	10.4	20	10.8	19
EB I-440 On Ramp fro	7.6	19	3.8	15	5.7	11
Ridge Rd Extension	55.4	4	52.1	5	45.9	4
Total	2721.0	2	5095.8	3	3198.1	4

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
	3	2323.1	3	1628.4
	2	269.6	3	193.0
	2	146.6	3	92.7
Glenwood Ave	2	409.4	3	299.6
	4	74.5	6	53.0
	3	46.5	4	35.8
Glenwood Ave	3	104.2	4	83.7
Crabtree Mall Entr	3	67.8	4	58.6
Blue Ridge Rd	3	350.7	3	308.2
Crabtree View Pl	13	13.6	16	10.0
I-440 WB On/Off Ramp	10	41.8	11	37.0
WB I-440 On Ramp fro	20	10.7	19	11.0
EB I-440 On Ramp fro	14	6.8	12	8.3
Ridge Rd Extension	4	51.8	4	51.3
Total	3	3917.0	4	2870.6

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Peak	Queue	Travel	Delay	Arterial	Peak 1	Peak 2
		Length	Time (s)	(s)	Speed	Speed	Speed
EB I-440 On Ramp fro	5	880.0	911.7	0.3	15	15	151.3
EB I-440 On Ramp fro	23	0.3	11.4	0.1	18	24	0.4
WB I-440 On Ramp fro	44	22.8	28.9	0.0	5	6	18.2
I-440 WB Off Ramp to	4	66.8	73.5	0.1	5	5	62.8
Crabtree View Pl	81	124.5	138.1	0.2	4	5	110.3
Lead Mine Rd	3	64.1	69.0	0.1	3	4	62.2
Marriott Dr	2	38.9	64.8	0.3	17	20	30.9
Glenwood Ave	91	2.1	7.9	0.1	33	33	2.1
	65	0.8	9.6	0.1	40	41	0.6
	35	0.3	4.4	0.0	40	41	0.3
Glenwood Ave	85	0.6	6.6	0.1	51	52	0.5
	68	1.8	27.1	0.3	38	39	1.6
	61	0.5	7.2	0.1	41	41	0.5
	64	1.0	14.2	0.2	41	41	0.9
Total		1214.1	1366.4	1.9	13	14	1180.5

Arterial Level of Service: WB Glenwood Ave #1

Cross Street	Run 10	Run 10	Run 2	Run 2	Run 3	Run 3	Run 4
	Speed	Delay	Speed	Delay	Speed	Delay	Speed
EB I-440 On Ramp fro	17	1115.0	18	798.0	19	876.9	15
EB I-440 On Ramp fro	18	9.9	19	9.0	25	5.9	18
WB I-440 On Ramp fro	5	27.8	6	20.1	7	18.1	5
I-440 WB Off Ramp to	4	72.2	5	63.4	5	57.0	4
Crabtree View Pl	4	132.1	4	117.3	4	119.0	4
Lead Mine Rd	3	66.5	4	61.6	4	61.5	4
Marriott Dr	12	65.4	22	24.2	32	9.3	33
Glenwood Ave	30	2.8	27	3.6	38	1.0	37
	40	0.7	40	0.8	39	1.0	40
	40	0.3	40	0.3	39	0.5	40
Glenwood Ave	52	0.5	51	0.6	49	0.9	51
	38	1.6	38	1.7	37	2.6	38
	41	0.4	41	0.5	40	0.6	41
	41	1.0	41	1.0	40	1.2	40
Total	12	1496.3	14	1102.1	14	1155.4	13

Arterial Level of Service: WB Glenwood Ave #1

Link Segment	Flow 4 Delay	Flow 5 Speed	Flow 6 Delay	Flow 7 Speed	Flow 8 Delay	Flow 9 Speed	Flow 10 Delay
EB I-440 On Ramp fro	774.7	3	1063.1	33	834.0	15	943.5
EB I-440 On Ramp fro	9.3	8	27.8	19	8.8	21	7.9
WB I-440 On Ramp fro	24.4	3	42.0	6	22.3	5	23.8
I-440 WB Off Ramp to	68.6	3	92.0	5	64.8	4	70.9
Crabtree View Pl	124.0	3	175.1	4	121.3	5	110.2
Lead Mine Rd	62.4	3	71.5	3	65.2	3	64.8
Marriott Dr	8.0	8	106.8	13	59.1	17	39.5
Glenwood Ave	1.2	33	1.9	33	2.0	29	3.1
	0.8	40	0.6	40	0.6	40	0.9
	0.4	40	0.3	41	0.3	40	0.4
Glenwood Ave	0.7	51	0.6	52	0.5	51	0.6
	2.1	38	1.7	38	1.7	38	1.8
	0.6	41	0.5	41	0.5	41	0.4
	1.2	41	1.0	41	1.0	41	0.9
Total	1078.2	9	1530.1	13	1232.3	13	1268.9

Arterial Level of Service: WB Glenwood Ave #1

Link Segment	Flow 4 Speed	Flow 5 Delay	Flow 6 Speed	Flow 7 Delay
EB I-440 On Ramp fro	17	815.0	18	753.4
EB I-440 On Ramp fro	19	8.8	22	7.3
WB I-440 On Ramp fro	7	16.6	6	18.9
I-440 WB Off Ramp to	5	62.1	5	59.7
Crabtree View Pl	4	134.6	4	112.9
Lead Mine Rd	3	65.7	4	61.5
Marriott Dr	13	60.2	33	8.5
Glenwood Ave	34	1.9	38	1.1
	40	0.6	40	0.9
	41	0.3	40	0.4
Glenwood Ave	52	0.5	51	0.7
	38	1.6	38	1.9
	41	0.4	41	0.5
	41	0.9	41	1.0
Total	12	1170.3	14	1028.5

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1279	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		0	275		310			450		
Storage Lanes	2	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	0.97	1.00	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor			0.98			0.98			0.95		0.99	
Frt			0.850			0.850			0.850		0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	3539	1583	3433	3539	1583	3467	3489	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1863	1549	3433	3539	1559	3433	3539	1506	3467	3489	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								654			1586	
Travel Time (s)								12.7			24.0	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1279	179
Shared Lane Traffic (%)												
Lane Group Flow (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1458	0
Turn Type	Prot	custom	custom	Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			3 2			Free			8 1			
Detector Phase	5	2	3 2	1	6		3	8	8.1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.3	33.0		14.3	31.0		14.4	25.5		14.4	25.5	
Total Split (s)	22.0	35.0	85.0	20.0	33.0	0.0	50.0	77.0	97.0	62.0	89.0	0.0
Total Split (%)	11.3%	18.0%	43.8%	10.3%	17.0%	0.0%	25.8%	39.7%	50.0%	32.0%	45.9%	0.0%
Maximum Green (s)	15.0	28.0		13.0	26.0		43.0	70.0		55.0	82.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	15.0	28.0	71.0	13.0	26.0	194.0	43.0	72.4	83.0	55.0	84.4	
Actuated g/C Ratio	0.08	0.14	0.37	0.07	0.13	1.00	0.22	0.37	0.43	0.28	0.44	
v/c Ratio	1.35	1.01	0.72	1.27	0.78	1.07	1.55	1.49	0.37	1.55	0.96	
Control Delay	241.2	136.7	47.1	176.4	57.0	77.0	300.5	257.7	16.2	297.1	68.2	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	6.7	
Total Delay	241.2	136.7	47.1	176.4	57.0	77.0	300.5	267.5	16.2	297.1	74.9	
LOS	F	F	D	F	E	E	F	F	B	F	E	
Approach Delay								261.2			188.6	
Approach LOS								F			F	
Queue Length 50th (ft)	~306	~363	345	~246	259	~1862	~1111	~1821	89	~1410	948	
Queue Length 95th (ft)	#422	#569	455	m89	m112	m0	m#1111	m#1730	m90	#1542	#1107	
Internal Link Dist (ft)								574			1506	
Turn Bay Length (ft)					275	275	310		175	450		
Base Capacity (vph)	265	269	567	230	474	1559	761	1321	644	983	1518	
Starvation Cap Reductn	0	0	0	0	0	0	0	19	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	61	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.35	1.01	0.72	1.27	0.78	1.07	1.55	1.51	0.37	1.55	1.00	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 37 (19%), Referenced to phase 2:EBR and 6:WBR, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.55
 Intersection Signal Delay: 184.0
 Intersection Capacity Utilization 142.6%
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.

ø2	ø1	ø3	ø4
35 s	20 s	50 s	89 s
ø5	ø6	ø7	ø8
22 s	33 s	62 s	77 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	676	4837	157	684	5661	1875	121	718	258	985	1128	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	825		0	0		0	90		0	250		0
Storage Lanes	2		0	2		1	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	0.97	0.91	1.00	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00				0.96					0.99	
Frt		0.995				0.850			0.850		0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3399	6305	0	3433	5085	1583	1752	3504	1567	5040	3464	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3399	6305	0	3433	5085	1524	1752	3504	1567	5040	3464	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1031			354			460			524	
Travel Time (s)		15.6			5.4			9.0			10.2	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	676	4837	157	684	5661	1875	121	718	258	985	1128	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	676	4994	0	684	5661	1875	121	718	258	985	1297	0
Turn Type	Prot			Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases						6			8			
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0		14.0	34.0	14.0	14.0	14.0	14.0	14.0	44.0	
Total Split (s)	26.0	94.0	0.0	26.0	94.0	33.0	18.0	41.0	26.0	33.0	56.0	0.0
Total Split (%)	13.4%	48.5%	0.0%	13.4%	48.5%	17.0%	9.3%	21.1%	13.4%	17.0%	28.9%	0.0%
Maximum Green (s)	19.0	87.0		19.0	87.0	26.0	11.0	34.0	19.0	26.0	49.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0						7.0	
Flash Dont Walk (s)		20.0			20.0						11.5	
Pedestrian Calls (#/hr)		12			12						24	
Act Effct Green (s)	21.0	89.0		21.0	89.0	117.0	13.0	36.0	57.0	28.0	51.0	
Actualized g/C Ratio	0.11	0.46		0.11	0.46	0.60	0.07	0.19	0.29	0.14	0.26	
v/c Ratio	1.84	1.73		1.84	2.43	2.02	1.03	1.10	0.56	1.35	1.42	
Control Delay	429.7	355.6		421.7	667.1	486.2	163.9	132.9	35.2	217.7	237.7	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	214.6	0.0	0.0	0.0	0.0	28.6	
Total Delay	429.7	355.6		421.7	667.1	700.8	163.9	132.9	35.2	217.7	266.2	
LOS	F	F		F	F	F	F	F	D	F	F	
Approach Delay		364.4			654.4			113.4			245.3	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~674	~2718		~684	~4392	~3763	~166	~550	194	~571	~1178	
Queue Length 95th (ft)	m#692	m#2365		m#305	m#2168	m#1445	#316	#678	175	m#660	m#1312	
Internal Link Dist (ft)		951			274			380			444	
Turn Bay Length (ft)	825						90			250		
Base Capacity (vph)	368	2893		372	2333	928	117	650	460	727	911	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	39	
Spillback Cap Reductn	0	0		0	0	384	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.84	1.73		1.84	2.43	3.45	1.03	1.10	0.56	1.35	1.49	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 102 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.43
 Intersection Signal Delay: 470.7
 Intersection Capacity Utilization 188.9%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

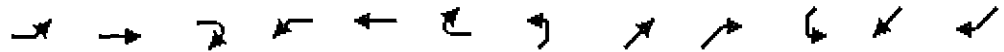
→ ø2	↗ ø1	↖ ø3	↓ ø4
94 s	26 s	18 s	56 s
↖ ø5	← ø6	↘ ø7	↑ ø8
26 s	94 s	33 s	41 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑		↓↓↓↓				↑			↑↑↑
Volume (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-2%			0%				-1%
Lane Util. Factor	1.00	0.91	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	0.76
Ped Bike Factor			0.97						0.98			
Frt			0.850						0.865			0.850
Flt Protected												
Satd. Flow (prot)	0	4984	1552	0	7620	0	0	0	1611	0	0	3628
Flt Permitted												
Satd. Flow (perm)	0	4984	1512	0	7620	0	0	0	1586	0	0	3628
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		819			490			314			640	
Travel Time (s)		12.4			7.4			4.8			17.5	
Confl. Peds. (#/hr)			12						12			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4539	1651	0	4612	0	0	0	1056	0	0	3608
Turn Type			Perm						Free			custom
Protected Phases		Free			6							
Permitted Phases			Free						Free			5
Detector Phase					6							5
Switch Phase												
Minimum Initial (s)					12.0							7.0
Minimum Split (s)					19.0							14.0
Total Split (s)	0.0	0.0	0.0	0.0	77.0	0.0	0.0	0.0	0.0	0.0	0.0	117.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	39.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	60.3%
Maximum Green (s)					70.0							110.0
Yellow Time (s)					5.0							5.0
All-Red Time (s)					2.0							2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0
Lead/Lag					Lag							Lead
Lead-Lag Optimize?					Yes							Yes
Vehicle Extension (s)					3.0							3.0
Recall Mode					C-Min							None
Act Effct Green (s)		194.0	194.0		72.0				194.0			112.0
Actuated g/C Ratio		1.00	1.00		0.37				1.00			0.58
v/c Ratio		0.91	1.09		1.63				0.67			1.72
Control Delay		25.9	75.1		319.1				2.2			355.5
Queue Delay		0.6	0.0		34.5				0.1			4.1
Total Delay		26.4	75.1		353.6				2.3			359.6
LOS		C	E		F				A			F
Approach Delay		39.4			353.6							
Approach LOS		D			F							
Queue Length 50th (ft)		1100	~1475		~2092				0			~2964

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Length 95th (ft)		m0	m189		m#1987				m0			#2991
Internal Link Dist (ft)		739			410			234			560	
Turn Bay Length (ft)												
Base Capacity (vph)		4984	1512		2828				1586			2095
Starvation Cap Reductn		0	0		0				0			0
Spillback Cap Reductn		152	0		127				48			11
Storage Cap Reductn		0	0		0				0			0
Reduced v/c Ratio		0.94	1.09		1.71				0.69			1.73

Intersection Summary

Area Type: Other

Cycle Length: 194

Actuated Cycle Length: 194

Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.72

Intersection Signal Delay: 205.3

Intersection LOS: F

Intersection Capacity Utilization 145.9%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

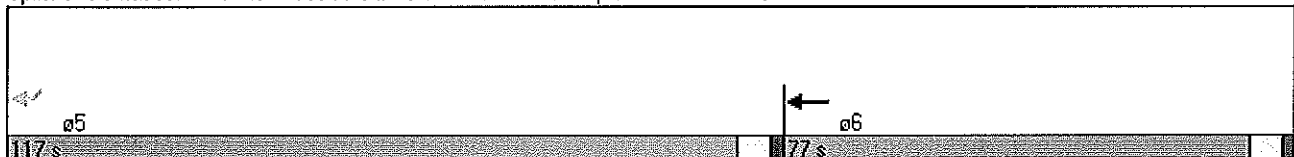
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave



Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



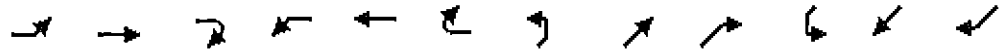
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓	↑↑	↑			
Volume (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93									
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.974				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3105	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1447	1832	5263	1639	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Shared Lane Traffic (%)							33%					
Lane Group Flow (vph)	0	2258	1145	100	2992	524	1267	1190	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	95.0	83.0	16.0	111.0	111.0	83.0	83.0	16.0	0.0	0.0	0.0
Total Split (%)	0.0%	49.0%	42.8%	8.2%	57.2%	57.2%	42.8%	42.8%	8.2%	0.0%	0.0%	0.0%
Maximum Green (s)		88.0	76.0	9.0	104.0	104.0	76.0	76.0	9.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	C-Min	C-Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		90.0	168.0	11.0	106.0	106.0	78.0	78.0	94.0			
Actuated g/C Ratio		0.46	0.87	0.06	0.55	0.55	0.40	0.40	0.48			
v/c Ratio		0.98	0.88	0.96	1.04	0.58	1.04	0.95	0.50			
Control Delay		56.1	10.8	164.9	71.0	32.7	91.9	72.3	36.8			

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		61.5	10.8	164.9	71.0	32.7	91.9	72.3	36.8			
LOS		E	B	F	E	C	F	E	D			
Approach Delay		44.4			68.0			76.3				
Approach LOS		D			E			E				
Queue Length 50th (ft)		1015	458	130	~1502	439	~1009	856	326			
Queue Length 95th (ft)		#1141	604	#269	#1550	564	#1163	#1023	431			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2312	1295	104	2876	896	1218	1248	763			
Starvation Cap Reductn		65	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.00	0.88	0.96	1.04	0.58	1.04	0.95	0.50			

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 144 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 62.2
 Intersection Capacity Utilization 102.1%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

ø2	ø1	ø3
85 s	16 s	83 s
ø6	ø8	
111 s	83 s	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↗	↖	↔		↖	↕	↗	↖	↕	↖
Volume (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.96		0.99				0.94		1.00	
Frt			0.850		0.957				0.850		0.999	
Fit Protected		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	1631	1570	0	1717	3433	1536	1823	5230	0
Fit Permitted		0.959		0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	1804	1541	1631	1570	0	1717	3433	1440	1823	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			524			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	35	6	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	41	61	242	237	0	101	2494	674	66	1819	0
Turn Type	Split		pm+ov	Split			Prot		pm+ov	Prot		
Protected Phases	3	3	5	4	4		5	2	4	1	6	
Permitted Phases			3						2			
Detector Phase	3	3	5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	14.0	14.0	24.0	34.0	34.0	0.0	24.0	132.0	34.0	14.0	122.0	0.0
Total Split (%)	7.2%	7.2%	12.4%	17.5%	17.5%	0.0%	12.4%	68.0%	17.5%	7.2%	62.9%	0.0%
Maximum Green (s)	7.0	7.0	17.0	27.0	27.0		17.0	125.0	27.0	7.0	115.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)		9.0	23.1	30.7	30.7		15.9	128.1	158.8	9.0	121.2	
Actuated g/C Ratio		0.05	0.12	0.16	0.16		0.08	0.66	0.82	0.05	0.62	
v/c Ratio		0.49	0.32	0.94	0.96		0.72	1.10	0.56	0.78	0.56	
Control Delay		109.9	55.7	120.4	124.6		86.9	75.2	2.7	138.6	22.2	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0	0.0	0.0		0.0	224.2	2.7	0.0	0.1	
Total Delay		109.9	55.7	120.4	124.6		86.9	299.4	5.4	138.6	22.2	
LOS		F	E	F	F		F	F	A	F	C	
Approach Delay		77.5			122.5			232.2			26.3	
Approach LOS		E			F			F			C	
Queue Length 50th (ft)		52	54	330	~328		128	~1874	98	85	487	
Queue Length 95th (ft)		100	93	#542	#537		m74	m455	m45	#184	543	
Internal Link Dist (ft)		140			1181			444			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)		84	214	258	248		168	2267	1194	85	3268	
Starvation Cap Reductn		0	0	0	0		0	710	387	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	210	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.49	0.29	0.94	0.96		0.60	1.60	0.84	0.78	0.59	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 182 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 152.6
 Intersection LOS: F
 Intersection Capacity Utilization 108.3%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

φ1	φ2	φ3	φ4
14 s	132 s	14 s	34 s
φ5	φ6		
24 s	122 s		

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.97				0.96		1.00			1.00	
Frt		0.892				0.850		0.991			0.993	
Fit Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1605	0	0	1788	2787	1805	5127	0	3416	3480	0
Fit Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1605	0	0	1788	2674	1805	5127	0	3416	3480	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			273	
Travel Time (s)		5.0			7.9			16.0			5.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	812	110	2587	0	422	1886	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	41.0	41.0		41.0	41.0	15.0	15.0	41.0		15.0	41.0	
Total Split (s)	41.0	41.0	0.0	41.0	41.0	25.0	15.0	87.0	0.0	25.0	97.0	0.0
Total Split (%)	21.1%	21.1%	0.0%	21.1%	21.1%	12.9%	7.7%	44.8%	0.0%	12.9%	50.0%	0.0%
Maximum Green (s)	34.0	34.0		34.0	34.0	18.0	8.0	80.0		18.0	90.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0			7.0	
Pedestrian Calls (#/hr)	12	12		12	12			12			12	
Act Effct Green (s)	21.1	21.1			22.9	42.9	10.0	110.0		20.0	120.0	
Actuated g/C Ratio	0.11	0.11			0.12	0.22	0.05	0.57		0.10	0.62	
v/c Ratio	0.72	0.57			0.72	1.35	1.18	0.89		1.20	0.88	
Control Delay	103.3	93.9			100.8	218.2	157.9	20.9		166.9	24.4	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	17.9		0.0	2.8	
Total Delay	103.3	93.9			100.8	218.2	157.9	38.8		166.9	27.3	
LOS	F	F			F	F	F	D		F	C	
Approach Delay		99.3			199.7			43.6			52.8	
Approach LOS		F			F			D			D	
Queue Length 50th (ft)	174	124			190	~765	~170	736		~336	513	
Queue Length 95th (ft)	250	190			268	#841	m#164	m#1096		m#374	m#1112	
Internal Link Dist (ft)		104			152			742			193	
Turn Bay Length (ft)										200		
Base Capacity (vph)	327	298			332	603	93	2906		352	2152	
Starvation Cap Reductn	0	0			0	0	0	398		0	173	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.42	0.34			0.46	1.35	1.18	1.03		1.20	0.95	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 130 (67%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.35
 Intersection Signal Delay: 73.4
 Intersection Capacity Utilization 104.3%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

↑ ø2	↘ ø1	↙ ø4	↗ ø3
87 s	25 s	41 s	41 s
↓ ø6	↖ ø5		
97 s	15 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↙	↑↑	↘	↙↙	↑↑
Volume (vph)	489	468	2229	685	494	1504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1519	3539	1519	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	489	468	2229	685	494	1504
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	468	2229	685	494	1504
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	31.0	122.0	41.0	31.0	153.0
Total Split (%)	21.1%	16.0%	62.9%	21.1%	16.0%	78.9%
Maximum Green (s)	34.0	24.0	115.0	34.0	24.0	146.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	34.1	60.1	118.9	153.0	26.0	149.9
Actuated g/C Ratio	0.18	0.31	0.61	0.79	0.13	0.77
v/c Ratio	0.81	0.98	1.03	0.57	1.07	0.55
Control Delay	75.1	85.4	63.3	8.1	107.2	2.3
Queue Delay	0.0	0.0	6.2	0.0	0.0	0.2



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	75.1	85.4	69.5	8.1	107.2	2.5
LOS	E	F	E	A	F	A
Approach Delay	80.2		55.1			28.4
Approach LOS	F		E			C
Queue Length 50th (ft)	317	578	~1614	252	~360	80
Queue Length 95th (ft)	287	#800	#1723	323	m#453	103
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	637	479	2168	1221	460	2734
Starvation Cap Reductn	0	0	0	0	0	472
Spillback Cap Reductn	0	0	35	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.98	1.05	0.56	1.07	0.66

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 83 (43%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 50.1
 Intersection LOS: D
 Intersection Capacity Utilization 104.2%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ρ2	↙ ρ1	↘ ρ3
122 s	31 s	41 s
↓ ρ6		
153 s		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations	↖	↗	↖↗	↑↑	↑↑↑				
Volume (vph)	257	412	601	950	1516	0	143	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor		0.96			1.00				
Frt		0.850			0.987				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	5010	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1770	1513	3502	3539	5010	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	257	412	601	950	1516	0	143	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	257	412	601	950	1659	0	0	0	0
Turn Type		custom	Prot						
Protected Phases			5	2	6				
Permitted Phases	4	4 5							
Detector Phase	4	4 5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	50.0	102.0	52.0	144.0	92.0	0.0	0.0	0.0	0.0
Total Split (%)	25.8%	52.6%	26.8%	74.2%	47.4%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	43.0		45.0	137.0	85.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	43.7	89.6	40.9	140.3	94.4				
Actuated g/C Ratio	0.23	0.46	0.21	0.72	0.49				
v/c Ratio	0.64	0.59	0.81	0.37	0.68				
Control Delay	65.8	41.7	68.9	5.1	22.5				
Queue Delay	0.0	0.0	0.0	0.0	0.0				
Total Delay	65.8	41.7	68.9	5.1	22.5				
LOS	E	D	E	A	C				

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	50.9			29.8	22.5				
Approach LOS	D			C	C				
Queue Length 50th (ft)	317	422	356	187	404				
Queue Length 95th (ft)	m401	m550	368	75	m298				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	421	743	848	2581	2453				
Starvation Cap Reductn	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.61	0.55	0.71	0.37	0.68				

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 23 (12%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 30.3
 Intersection LOS: C
 Intersection Capacity Utilization 77.5%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2 144 s	↘ ø4 60 s
↙ ø5 52 s	↓ ø6 92 s

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98				0.95
Frt		0.998				0.850		0.888				0.856
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3528	0	1770	3539	1583	1770	1622	0	1770	1514	0
Flt Permitted	0.950			0.950			0.447			0.744		
Satd. Flow (perm)	1770	3528	0	1770	3539	1423	833	1622	0	1386	1514	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				35
Link Distance (ft)		880			946			363				596
Travel Time (s)		13.3			14.3			5.5				11.6
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1101	12	30	818	221	16	5	15	115	5	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1113	0	30	818	221	16	20	0	115	128	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	32.0	120.0	0.0	19.0	107.0	107.0	55.0	55.0	0.0	55.0	55.0	0.0
Total Split (%)	16.5%	61.9%	0.0%	9.8%	55.2%	55.2%	28.4%	28.4%	0.0%	28.4%	28.4%	0.0%
Maximum Green (s)	25.0	113.0		12.0	100.0	100.0	48.0	48.0		48.0	48.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	16.5	146.9		10.8	138.7	138.7	23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.09	0.76		0.06	0.71	0.71	0.12	0.12		0.12	0.12	
v/c Ratio	0.56	0.42		0.30	0.32	0.22	0.16	0.10		0.68	0.69	
Control Delay	104.6	7.0		81.1	8.1	8.0	76.6	73.6		99.9	99.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

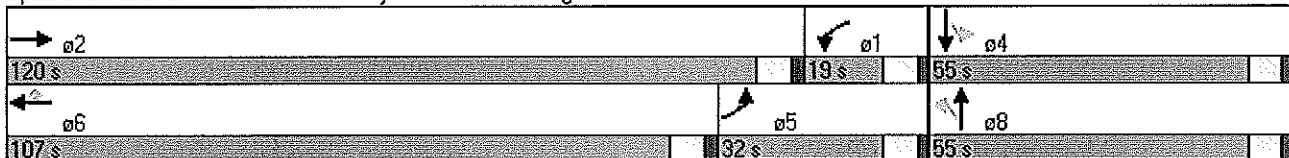


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	104.6	7.0		81.1	8.1	8.0	76.6	73.6		99.9	99.4	
LOS	F	A		F	A	A	E	E		F	F	
Approach Delay		13.9			10.1			74.9				99.6
Approach LOS		B			B			E				F
Queue Length 50th (ft)	108	131		39	136	64	19	23		143	160	
Queue Length 95th (ft)	m144	m482		m63	206	m114	46	53		213	231	
Internal Link Dist (ft)		800			866			283				516
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	246	2671		128	2530	1017	215	418		357	390	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.34	0.42		0.23	0.32	0.22	0.07	0.05		0.32	0.33	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 122 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 21.3
 Intersection Capacity Utilization 60.1%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck



Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	192	683	356	637	674	589	135	293	603	511	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.90			0.95		0.97	
Fr t			0.850			0.850			0.850		0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1640	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1487	3433	3539	1423	1770	1863	1501	3433	1640	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	683	356	637	674	589	135	293	603	511	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	683	356	637	674	589	135	293	603	511	429	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	37.0	52.0	25.0	53.0	68.0	43.0	25.0	46.0	53.0	43.0	64.0	0.0
Total Split (%)	19.1%	26.8%	12.9%	27.3%	35.1%	22.2%	12.9%	23.7%	27.3%	22.2%	33.0%	0.0%
Maximum Green (s)	30.0	45.0	18.0	46.0	61.0	36.0	18.0	39.0	46.0	36.0	57.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	27.3	47.2	67.2	51.4	71.3	110.5	20.0	36.2	87.6	39.1	55.4	
Actuated g/C Ratio	0.14	0.24	0.35	0.26	0.37	0.57	0.10	0.19	0.45	0.20	0.29	
v/c Ratio	0.77	0.79	0.68	0.70	0.52	0.70	0.74	0.84	0.86	0.74	0.92	
Control Delay	80.3	50.5	28.6	69.8	51.1	21.7	107.8	97.0	57.7	80.0	91.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	80.3	50.5	28.6	69.8	51.1	21.7	107.8	97.0	57.7	80.0	91.6	
LOS	F	D	C	E	D	C	F	F	E	F	F	
Approach Delay		48.8			48.3			75.4				85.3
Approach LOS		D			D			E				F
Queue Length 50th (ft)	242	431	329	386	368	271	170	363	646	315	521	
Queue Length 95th (ft)	285	451	250	468	451	378	#274	476	817	393	#709	
Internal Link Dist (ft)		866			568			211				73
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	292	872	525	909	1301	843	182	394	700	693	499	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.78	0.68	0.70	0.52	0.70	0.74	0.74	0.86	0.74	0.86	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 97 (50%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 60.7
 Intersection LOS: E
 Intersection Capacity Utilization 86.8%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
52 s	53 s	25 s	64 s
ø5	ø6	ø8	ø7
37 s	68 s	46 s	43 s

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	187	309	1242	20	514	638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1487	3539	1487	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	309	1242	20	514	638
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	309	1242	20	514	638
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	45.0	49.0	100.0	45.0	49.0	149.0
Total Split (%)	23.2%	25.3%	51.5%	23.2%	25.3%	76.8%
Maximum Green (s)	38.0	42.0	93.0	38.0	42.0	142.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	27.8	64.8	114.2	142.0	37.0	156.2
Actuated g/C Ratio	0.14	0.33	0.59	0.73	0.19	0.81
v/c Ratio	0.74	0.60	0.60	0.02	0.78	0.22
Control Delay	96.2	53.3	28.4	7.0	64.3	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

Creedmoor Rd SPUI w CVA Extension to I-440 PM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	96.2	53.3	28.4	7.0	64.3	4.4
LOS	F	D	C	A	E	A
Approach Delay	69.5		28.1			31.1
Approach LOS	E		C			C
Queue Length 50th (ft)	233	315	517	6	309	100
Queue Length 95th (ft)	316	367	714	17	356	59
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	365	548	2083	1145	783	2850
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.56	0.60	0.02	0.66	0.22

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 176 (91%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 36.4
 Intersection Capacity Utilization 72.3%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service C

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

ø2 100 s	ø1 49 s	ø4 45 s
ø5 149 s		

HCM Unsignalized Intersection Capacity Analysis Rd SPUI w CVA Extension to I-440 PM (2035)
 2: Glenwood Ave #1 & Marriott Dr 6/26/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑			↑			↑
Volume (veh/h)	0	1768	684	0	2680	112	0	0	698	0	0	59
Sign Control		Free			Free			Stop			Stop	
Grade		2%			0%			-1%			-1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1768	684	0	2680	112	0	0	698	0	0	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2792			2452			3167	4560	884	4262	5132	1340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2792			2452			3167	4560	884	4262	5132	1340
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	0	0	100	59
cM capacity (veh/h)	137			188			3	1	289	0	0	143

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	884	884	684	1340	1340	112	698	59
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	684	0	0	112	698	59
cSH	1700	1700	1700	1700	1700	1700	289	143
Volume to Capacity	0.52	0.52	0.40	0.79	0.79	0.07	2.42	0.41
Queue Length 95th (ft)	0	0	0	0	0	0	1397	45
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	676.6	46.9
Lane LOS							F	E
Approach Delay (s)	0.0			0.0			676.6	46.9
Approach LOS							F	E

Intersection Summary		
Average Delay	79.2	
Intersection Capacity Utilization	98.8%	ICU Level of Service F
Analysis Period (min)	15	

HCM Unsignalized Intersection Capacity Analysis Rd SPUI w CVA Extension to I-440 PM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/22/2010

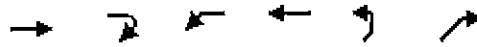


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↓	↘↘
Volume (veh/h)	0	475	0	1097	1184	785
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	475	0	1097	1184	785
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	460	
pX, platoon unblocked	0.78	0.73	0.73			
vC, conflicting volume	1732	1184	1184			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1336	1066	1066			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	112	159	473			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	475	548	548	1184	392	392
Volume Left	0	0	0	0	0	0
Volume Right	475	0	0	0	392	392
cSH	159	1700	1700	1700	1700	1700
Volume to Capacity	2.99	0.32	0.32	0.70	0.23	0.23
Queue Length 95th (ft)	1090	0	0	0	0	0
Control Delay (s)	956.4	0.0	0.0	0.0	0.0	0.0
Lane LOS	F					
Approach Delay (s)	956.4	0.0		0.0		
Approach LOS	F					

Intersection Summary						
Average Delay		128.3				
Intersection Capacity Utilization		98.4%		ICU Level of Service		F
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis Rd SPUI w CVA Extension to I-440 PM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/22/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1135	44	0	957	0	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1135	44	0	957	0	62
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.91	
vC, conflicting volume			1185		1642	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1185		1512	602
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	86
cM capacity (veh/h)			582		100	438

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	757	422	478	478	62
Volume Left	0	0	0	0	0
Volume Right	0	44	0	0	62
cSH	1700	1700	1700	1700	438
Volume to Capacity	0.45	0.25	0.28	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.6
Lane LOS					B
Approach Delay (s)	0.0		0.0		14.6
Approach LOS					B

Intersection Summary	
Average Delay	0.4
Intersection Capacity Utilization	45.5% ICU Level of Service A
Analysis Period (min)	15

Network Totals

Number of Intersections	46
Control Delay / Veh (s/v)	71
Queue Delay / Veh (s/v)	4
Total Delay / Veh (s/v)	75
Total Delay (hr)	6881
Stops / Veh	0.18
Stops (#)	59766
Average Speed (mph)	6
Total Travel Time (hr)	7849
Distance Traveled (mi)	45658
Fuel Consumed (gal)	7272
Fuel Economy (mpg)	6.3
CO Emissions (kg)	508.30
NOx Emissions (kg)	98.90
VOC Emissions (kg)	117.80
Unserved Vehicles (#)	13805
Vehicles in dilemma zone (#)	881
Performance Index	7047.0

Total Network Performance By Run

Run Number	1	12	2	3	4	5	6
Total Delay (hr)	14809.1	14802.6	15214.6	15588.0	15326.4	14999.1	15350.9
Delay / Veh (s)	2699.0	2682.4	2802.5	3029.1	3094.3	2749.5	2849.2
Stop Delay (hr)	14350.4	14331.3	14759.2	15167.1	14913.0	14545.1	14900.4
St Del/Veh (s)	2615.4	2597.0	2718.6	2947.3	3010.9	2666.3	2765.6
Total Stops	85619	86196	86222	80799	75671	85658	84363
Stop/Veh	4.33	4.34	4.41	4.36	4.24	4.36	4.35
Travel Dist (mi)	25203.8	25375.2	24873.0	23136.4	22586.5	24923.4	24553.7
Travel Time (hr)	15411.7	15409.6	15808.9	16141.1	15867.5	15594.8	15937.1
Avg Speed (mph)	8	8	8	7	7	8	8
Fuel Used (gal)	4287.0	4293.0	4368.7	4391.2	4316.0	4327.2	4391.9
Fuel Eff. (mpg)	5.9	5.9	5.7	5.3	5.2	5.8	5.6
HC Emissions (g)	21549	21154	20924	21798	20714	21493	21001
CO Emissions (g)	823890	821957	816469	810389	783233	830411	818379
NOx Emissions (g)	52877	52080	51410	50190	48689	53203	51245
Vehicles Entered	20430	20549	20356	19393	18537	20503	20140
Vehicles Exited	19077	19184	18733	17660	17126	18776	18653
Hourly Exit Rate	19077	19184	18733	17660	17126	18776	18653
Input Volume	477159	477159	477159	477159	477159	477159	477159
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	1232	1220	1267	1237	1255	1172	1242
Denied Entry After	25380	24890	25627	26535	27204	25399	25582

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	14995.1	15163.3	14924.2	15117.3
Delay / Veh (s)	2734.4	2788.2	2727.6	2812.2
Stop Delay (hr)	14524.1	14722.0	14483.3	14669.6
St Del/Veh (s)	2648.5	2707.1	2647.0	2728.9
Total Stops	87996	82715	85069	84028
Stop/Veh	4.46	4.22	4.32	4.34
Travel Dist (mi)	25102.7	24740.6	24620.0	24511.5
Travel Time (hr)	15594.5	15755.4	15513.4	15703.4
Avg Speed (mph)	8	8	8	8
Fuel Used (gal)	4328.2	4357.7	4293.4	4335.4
Fuel Eff. (mpg)	5.8	5.7	5.7	5.7
HC Emissions (g)	21492	21742	22102	21397
CO Emissions (g)	825660	831896	830496	819278
NOx Emissions (g)	52954	52609	52819	51808
Vehicles Entered	20588	20204	20574	20123
Vehicles Exited	18896	18953	18823	18587
Hourly Exit Rate	18896	18953	18823	18587
Input Volume	477159	477159	477159	477159
% of Volume	4	4	4	4
Denied Entry Before	1184	1267	1217	1226
Denied Entry After	25245	25573	25325	25673

Arterial Level of Service: SE Glenwood Ave #1

Links (Street)	Mode	Delay (Sec/veh)	Travel Time (min)	LOS	Approach (Lanes)	Queue (Lanes)	Wait (Lanes)
	PM	1101.1	1133.0	0.4	5	5	273.4
	61	103.8	117.1	0.2	5	5	98.6
	68	53.8	60.6	0.1	5	5	51.5
Glenwood Ave	85	243.3	266.7	0.3	4	4	247.7
	35	55.4	63.2	0.1	5	5	59.7
	65	31.5	35.7	0.1	5	5	33.2
Glenwood Ave	91	63.8	71.4	0.1	6	5	65.6
Crabtree Mall Entr	2	56.0	62.9	0.1	4	4	56.6
	82	115.8	125.0	0.1	3	3	110.7
Blue Ridge Rd	3	234.9	250.5	0.2	3	3	224.8
Crabtree View Pl	81	19.4	25.1	0.1	10	10	17.9
I-440 WB On/Off Ramp	4	46.4	59.3	0.2	9	10	45.6
WB I-440 On Ramp fro	44	10.7	17.0	0.1	20	19	10.9
EB I-440 On Ramp fro	23	2.0	6.5	0.0	24	24	2.0
Ridge Rd Extension	5	38.6	43.9	0.1	5	5	41.3
Total		2176.3	2337.9	2.0	5	5	2044.5

Arterial Level of Service: SE Glenwood Ave #1

Links (Street)	Run 12 Speed	Run 12 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 5 Speed
	5	93.4	5	97.1	5	113.0	5
	5	48.5	5	50.8	4	59.4	4
Glenwood Ave	4	229.0	4	233.6	4	265.1	4
	5	56.5	5	56.7	5	65.1	6
	5	32.0	5	30.7	5	36.3	6
Glenwood Ave	6	62.8	6	62.9	5	71.9	6
Crabtree Mall Entr	4	54.1	4	52.9	3	63.3	4
	3	108.3	3	110.2	3	125.6	3
Blue Ridge Rd	3	220.6	3	229.9	3	249.8	3
Crabtree View Pl	10	18.2	9	21.0	10	19.6	9
I-440 WB On/Off Ramp	11	39.9	9	50.0	11	39.1	10
WB I-440 On Ramp fro	20	10.0	19	11.0	21	9.6	21
EB I-440 On Ramp fro	23	2.4	24	2.1	25	1.8	25
Ridge Rd Extension	5	38.5	6	36.4	6	34.3	6
Total	5	1880.4	5	2057.1	5	2446.6	5

Arterial Level of Service: SE Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
	1245.0	6	1014.7	5	1194.6	6	1055.7
	115.8	5	98.9	5	107.9	5	102.6
	60.3	5	51.3	5	54.8	5	54.1
Glenwood Ave	251.6	4	236.7	4	253.5	4	243.6
	46.4	5	56.6	5	60.3	5	59.1
	26.6	5	32.4	5	33.5	5	34.3
Glenwood Ave	55.9	5	64.3	5	66.8	5	67.5
Crabtree Mall Entr	55.8	4	53.7	4	57.9	4	55.8
	115.8	3	116.8	3	120.2	3	112.3
Blue Ridge Rd	234.9	3	236.0	3	234.0	3	227.6
Crabtree View Pl	20.4	9	20.4	10	19.5	10	19.6
I-440 WB On/Off Ramp	45.2	9	51.7	9	49.4	9	49.1
WB I-440 On Ramp fro	9.5	19	11.5	19	11.3	19	11.2
EB I-440 On Ramp fro	1.9	24	2.2	24	2.0	25	1.7
Ridge Rd Extension	37.7	5	44.5	5	39.7	6	33.5
Total	2322.9	5	2091.7	5	2305.3	5	2127.8

Arterial Level of Service: SE Glenwood Ave #1

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
	5	1248.9	6	1155.0
	5	111.3	5	101.9
	5	55.5	5	53.0
Glenwood Ave	4	229.4	4	244.1
	8	31.8	5	60.6
	7	20.8	5	34.7
Glenwood Ave	7	51.3	5	68.3
Crabtree Mall Entr	4	51.5	4	59.3
	3	116.5	3	122.6
Blue Ridge Rd	3	239.0	3	255.1
Crabtree View Pl	10	18.3	10	19.3
I-440 WB On/Off Ramp	10	43.6	9	50.2
WB I-440 On Ramp fro	20	10.6	19	11.3
EB I-440 On Ramp fro	24	2.2	24	2.0
Ridge Rd Extension	5	40.7	5	39.1
Total	5	2271.5	5	2276.6

Arterial Level of Service: NW Glenwood Ave #1

From Street	Node	Flow (Veh/Hr)	Travel Time (Sec)	Vol (Veh)	Arterial Speed (MPH)	Port 1 Speed (MPH)	Port 2 Speed (MPH)
EB I-440 On Ramp fro	5	153.4	7074.7	0.1	2	2	0118.4
EB I-440 On Ramp fro	23	30.3	42.5	0.1	5	5	14.3
WB I-440 On Ramp fro	44	27.7	33.8	0.0	5	5	25.8
I-440 WB Off Ramp to	4	72.8	79.5	0.1	4	4	71.0
Crabtree View Pl	81	84.2	97.8	0.2	6	6	79.1
Lead Mine Rd	3	47.4	52.4	0.1	5	5	45.7
	82	15.6	32.2	0.2	22	29	7.3
Marriott Dr	2	17.3	26.6	0.1	15	34	2.7
Glenwood Ave	91	2.0	7.5	0.1	32	38	0.9
	65	0.6	9.7	0.1	40	40	0.6
	35	0.3	4.5	0.1	41	40	0.3
Glenwood Ave	85	0.5	7.1	0.1	47	47	0.5
	68	1.4	26.0	0.3	40	40	1.4
	61	0.4	7.1	0.1	42	41	0.4
	64	0.9	14.1	0.2	41	41	1.0
Total		7363.2	7515.8	1.9	8	8	6589.5

Arterial Level of Service: NW Glenwood Ave #1

From Street	Port 12 Speed	Port 12 Delay	Port 2 Speed	Port 2 Delay	Port 3 Speed	Port 3 Delay	Port 4 Speed
EB I-440 On Ramp fro	2	1182.0	2	7730.5	2	7106.1	2
EB I-440 On Ramp fro	6	34.5	5	42.5	5	46.3	4
WB I-440 On Ramp fro	5	24.9	5	28.1	4	32.5	4
I-440 WB Off Ramp to	4	70.0	4	73.4	4	82.1	4
Crabtree View Pl	6	86.7	6	76.3	4	113.3	4
Lead Mine Rd	5	45.9	5	44.8	5	48.7	4
	29	7.8	25	12.0	19	21.3	9
Marriott Dr	31	3.9	11	27.7	12	25.8	6
Glenwood Ave	39	0.8	37	1.2	25	4.3	28
	40	0.7	41	0.6	41	0.6	40
	40	0.3	41	0.2	41	0.2	41
Glenwood Ave	47	0.6	47	0.5	47	0.4	47
	40	1.5	40	1.3	40	1.3	40
	42	0.4	41	0.4	42	0.4	41
	41	0.9	41	0.9	41	0.8	41
Total	8	6871.5	7	8049.5	7	8304.2	6

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	8311.4	2	7483.1	2	6221.3	2	7068.7
EB I-440 On Ramp fro	54.1	5	40.2	6	37.3	6	37.3
WB I-440 On Ramp fro	34.9	5	26.5	5	26.0	5	27.7
I-440 WB Off Ramp to	82.5	4	71.9	4	70.1	4	70.1
Crabtree View Pl	113.9	7	68.0	6	73.0	6	76.5
Lead Mine Rd	60.7	5	44.1	5	44.5	5	47.0
	62.6	29	7.5	27	9.2	29	7.6
Marriott Dr	58.0	25	7.0	14	20.3	38	1.5
Glenwood Ave	3.1	34	1.8	32	2.2	40	0.6
	0.8	40	0.7	41	0.6	40	0.7
	0.3	40	0.3	41	0.2	40	0.3
Glenwood Ave	0.5	47	0.5	48	0.4	46	0.6
	1.5	39	1.5	40	1.2	40	1.5
	0.5	41	0.4	42	0.4	42	0.4
	1.0	41	1.0	42	0.9	41	0.9
Total	8785.7	8	7754.4	8	6507.4	8	7341.5

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 5 Speed	Run 6 Delay	Run 7 Speed	Run 8 Delay
EB I-440 On Ramp fro	2	6742.7	2	6914.7
EB I-440 On Ramp fro	6	34.4	6	37.2
WB I-440 On Ramp fro	5	24.4	5	28.6
I-440 WB Off Ramp to	4	68.7	4	71.7
Crabtree View Pl	6	73.8	5	91.4
Lead Mine Rd	5	44.2	4	51.8
	25	11.5	20	17.8
Marriott Dr	20	11.3	13	22.8
Glenwood Ave	35	1.6	25	4.5
	41	0.5	40	0.8
	41	0.2	41	0.3
Glenwood Ave	47	0.5	47	0.6
	40	1.3	40	1.5
	41	0.5	42	0.4
	41	0.9	41	0.9
Total	8	7016.5	8	6954.9

**2035 CVA Extension to I-440 and
WB Glenwood Ave Overpass**

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	2771	423	306	2791	854	384	673	129	1969	1820	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor		0.99				0.98			0.95		1.00	
Frt		0.980				0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6246	0	3433	5085	1583	3433	3539	1583	3467	3504	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6246	0	3433	5085	1559	3433	3539	1506	3467	3504	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	134	2771	423	306	2791	854	384	673	129	1969	1820	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	3194	0	306	2791	854	384	673	129	1969	2015	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	17.0	75.0	0.0	17.0	75.0	0.0	20.0	33.0	17.0	69.0	82.0	0.0
Total Split (%)	8.8%	38.7%	0.0%	8.8%	38.7%	0.0%	10.3%	17.0%	8.8%	35.6%	42.3%	0.0%
Maximum Green (s)	10.0	68.0		10.0	68.0		13.0	26.0	10.0	62.0	75.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	12.0	70.0		12.0	70.0	194.0	15.0	28.0	40.0	64.0	77.0	
Actuated g/C Ratio	0.06	0.36		0.06	0.36	1.00	0.08	0.14	0.21	0.33	0.40	
v/c Ratio	1.23	1.42		1.44	1.52	0.55	1.45	1.32	0.41	1.72	1.45	
Control Delay	227.8	233.7		270.8	273.8	0.8	273.2	211.3	70.3	364.8	246.7	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		82.2	0.0	0.0	0.0	0.0	0.0	0.0	2.8	
Total Delay	227.8	233.7		353.0	273.8	0.8	273.2	211.3	70.3	364.8	249.5	
LOS	F	F		F	F	A	F	F	E	F	F	
Approach Delay		233.4			220.9			216.0			306.5	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~209	~1586		~275	~1822	0	~335	~572	84	~1901	~1833	
Queue Length 95th (ft)	#368	#1617		m#382	#1873	0	m#454	m#722	m222	#2018	#1951	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	109	2254		212	1835	1559	265	511	315	1144	1391	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		24	0	0	0	0	0	0	6	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.23	1.42		1.63	1.52	0.55	1.45	1.32	0.41	1.72	1.45	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 75 (39%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.72
 Intersection Signal Delay: 251.2
 Intersection Capacity Utilization 152.8%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd

→ ø2	↖ ø1	↗ ø3	↓ ø4
75 s	17 s	20 s	82 s
← ø6	↘ ø5	↑ ø8	↙ ø7
75 s	17 s	33 s	69 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↔↔	↑↑↑				↔↔			↔
Volume (vph)	0	4826	43	116	3911	128	0	0	117	0	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%				-1%			-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	0		0	2		0	0		2	0		1
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	0.91	1.00	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00				0.94			0.98
Frt		0.999			0.995				0.850			0.865
Fit Protected				0.950								
Satd. Flow (prot)	0	6334	0	3433	5056	0	0	0	2801	0	0	1619
Fit Permitted				0.950								
Satd. Flow (perm)	0	6334	0	3433	5056	0	0	0	2630	0	0	1594
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1076			597			201				281
Travel Time (s)		16.3			9.0			5.5				5.5
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4826	43	116	3911	128	0	0	117	0	0	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4869	0	116	4039	0	0	0	117	0	0	40
Turn Type				Prot					custom			custom
Protected Phases		2		1	Free				1			
Permitted Phases									1			6
Detector Phase		2		1					1			6
Switch Phase												
Minimum Initial (s)		15.0		7.0					7.0			15.0
Minimum Split (s)		41.0		15.3					15.3			38.0
Total Split (s)	0.0	175.0	0.0	19.0	0.0	0.0	0.0	0.0	19.0	0.0	0.0	194.0
Total Split (%)	0.0%	90.2%	0.0%	9.8%	0.0%	0.0%	0.0%	0.0%	9.8%	0.0%	0.0%	100.0%
Maximum Green (s)		168.0		12.0					12.0			187.0
Yellow Time (s)		5.0		5.0					5.0			5.0
All-Red Time (s)		2.0		2.0					2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag		Lag		Lead					Lead			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		2.0		3.0					3.0			2.0
Recall Mode		C-Min		None					None			C-Min
Walk Time (s)		7.0										
Flash Dont Walk (s)		7.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		170.6		13.4	194.0				13.4			194.0
Actuated g/C Ratio		0.88		0.07	1.00				0.07			1.00
v/c Ratio		0.87		0.49	0.80				0.60			0.03
Control Delay		7.6		96.2	3.1				101.1			0.0

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		3.1		0.0	0.0				0.0			0.0
Total Delay		10.7		96.2	3.1				101.1			0.0
LOS		B		F	A				F			A
Approach Delay		10.7			5.7							
Approach LOS		B			A							
Queue Length 50th (ft)		235		72	330				84			0
Queue Length 95th (ft)		m20		m104	m9				128			0
Internal Link Dist (ft)		996			517			121			201	
Turn Bay Length (ft)				475								
Base Capacity (vph)		5569		248	5056				202			1594
Starvation Cap Reductn		601		0	0				0			0
Spillback Cap Reductn		0		0	0				0			0
Storage Cap Reductn		0		0	0				0			0
Reduced v/c Ratio		0.98		0.47	0.80				0.58			0.03

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 185 (95%), Referenced to phase 2:EBT and 6:SBR, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 9.5
 Intersection Capacity Utilization 98.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

φ1	φ2
19 s	175 s
φ6	
194 s	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	555	4204	184	0	0	870	91	346	218	1804	1650	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	14	12	12	12	12	12	12
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	0		0	0		0	90		0	250		0
Storage Lanes	2		0	0		2	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	1.00	1.00	0.88	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00									0.98	
Frt		0.994				0.850			0.850		0.983	
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3399	6296	0	0	0	2972	1752	3504	1567	5040	3456	0
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3399	6296	0	0	0	2972	1752	3504	1567	5040	3456	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		180			354			458			520	
Travel Time (s)		2.7			5.4			8.9			10.1	
Confl. Peds. (#/hr)			12	6		12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	555	4204	184	0	0	870	91	346	218	1804	1650	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	4388	0	0	0	870	91	346	218	1804	1863	0
Turn Type	Prot					custom	Prot		Perm	Prot		
Protected Phases	5	2				6 7	3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2				6 7	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	7.0	75.0					7.0	7.0	7.0	45.0	7.0	
Minimum Split (s)	14.0	97.0					14.0	14.0	14.0	52.0	44.0	
Total Split (s)	49.0	112.0	0.0	0.0	0.0	122.0	15.0	23.0	23.0	59.0	67.0	0.0
Total Split (%)	25.3%	57.7%	0.0%	0.0%	0.0%	62.9%	7.7%	11.9%	11.9%	30.4%	34.5%	0.0%
Maximum Green (s)	42.0	105.0					8.0	16.0	16.0	52.0	60.0	
Yellow Time (s)	5.0	5.0					5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0					2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	2.0	4.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lag						Lag	Lag	Lag	Lead	Lead	
Lead-Lag Optimize?	Yes						Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.0					3.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min					None	None	None	None	None	
Walk Time (s)		7.0									7.0	
Flash Dont Walk (s)		20.0									11.5	
Pedestrian Calls (#/hr)		12									24	
Act Effct Green (s)	80.4	107.0				75.6	10.0	18.0	18.0	54.0	62.0	
Actuated g/C Ratio	0.41	0.55				0.39	0.05	0.09	0.09	0.28	0.32	
v/c Ratio	0.39	1.26				0.75	1.01	1.06	1.50	1.29	1.69	

Lane Group	06
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	41.0
Total Split (s)	63.0
Total Split (%)	32%
Maximum Green (s)	56.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	20.0
Pedestrian Calls (#/hr)	12
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	30.1	148.1				43.1	184.7	150.6	312.8	177.9	344.6	
Queue Delay	0.0	0.0				0.0	0.0	0.0	0.0	109.0	83.2	
Total Delay	30.1	148.1				43.1	184.7	150.6	312.8	286.8	427.8	
LOS	C	F				D	F	F	F	F	F	
Approach Delay		134.8						209.3			358.4	
Approach LOS		F						F			F	
Queue Length 50th (ft)	215	~2032				532	~122	~257	~388	~1028	~1821	
Queue Length 95th (ft)	m294	#2023				575	#262	#375	#583	#1114	#1945	
Internal Link Dist (ft)		100			274			378			440	
Turn Bay Length (ft)							90			250		
Base Capacity (vph)	1409	3473				1716	90	325	145	1403	1104	
Starvation Cap Reductn	0	0				0	0	0	0	223	109	
Spillback Cap Reductn	0	0				40	0	0	0	0	0	
Storage Cap Reductn	0	0				0	0	0	0	0	0	
Reduced v/c Ratio	0.39	1.26				0.52	1.01	1.06	1.50	1.53	1.87	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 76 (39%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 165
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.69
 Intersection Signal Delay: 212.7
 Intersection Capacity Utilization 135.0%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

n Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ø2	↓ ø4	↖ ø3
112 s	67 s	15 s
↖ ø6	↗ ø5	↘ ø7
63 s	49 s	59 s
		↑ ø8
		23 s

Lane Group	d6
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



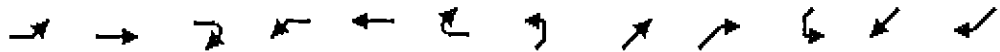
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓↓	↑↑	↑			
Volume (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93			0.98						
Frnt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.983				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3134	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1447	1832	5263	1611	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12			12						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Shared Lane Traffic (%)							26%					
Lane Group Flow (vph)	0	3222	1096	100	1826	587	834	869	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	124.0	55.0	15.0	139.0	139.0	55.0	55.0	15.0	0.0	0.0	0.0
Total Split (%)	0.0%	63.9%	28.4%	7.7%	71.6%	71.6%	28.4%	28.4%	7.7%	0.0%	0.0%	0.0%
Maximum Green (s)		117.0	48.0	8.0	132.0	132.0	48.0	48.0	8.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	Min	Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		119.0	169.0	10.0	134.0	134.0	50.0	50.0	65.0			
Actuated g/C Ratio		0.61	0.87	0.05	0.69	0.69	0.26	0.26	0.34			
v/c Ratio		1.05	0.85	1.06	0.50	0.53	1.07	1.08	0.71			
Control Delay		70.3	11.6	191.5	14.8	16.7	117.7	119.4	64.9			

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		70.3	11.6	191.5	14.8	16.7	117.7	119.4	64.9			
LOS		E	B	F	B	B	F	F	E			
Approach Delay		55.4			22.3			108.9				
Approach LOS		E			C			F				
Queue Length 50th (ft)		~1632	742	~139	384	346	~680	~713	419			
Queue Length 95th (ft)		m1180	m361	#282	413	445	#836	#868	555			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		3057	1288	94	3635	1113	781	808	528			
Starvation Cap Reductn		0	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.05	0.85	1.06	0.50	0.53	1.07	1.08	0.71			

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 0 (0%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay: 58.5
 Intersection LOS: E
 Intersection Capacity Utilization 104.9%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

φ2	φ1	φ3
124 s	15 s	55 s
φ6		φ8
139 s		55 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↗	↔		↖	↗	↖	↗	↖↗	
Volume (vph)	0	0	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.93		1.00				0.94		1.00	
Frt			0.865		0.989				0.850		0.999	
Fit Protected				0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	0	1627	1631	1620	0	1717	3433	1536	1823	5229	0
Fit Permitted				0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	0	1507	1631	1620	0	1717	3433	1440	1823	5229	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			520			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	0	64	378	370	0	67	1422	282	69	2911	0
Turn Type			custom	Split			Prot		pm+ov	Prot		
Protected Phases			5	4	4		5	2	4	1	6	
Permitted Phases			5						2			
Detector Phase			5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)			7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)			14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	0.0	0.0	16.0	57.0	57.0	0.0	16.0	118.0	57.0	19.0	121.0	0.0
Total Split (%)	0.0%	0.0%	8.2%	29.4%	29.4%	0.0%	8.2%	60.8%	29.4%	9.8%	62.4%	0.0%
Maximum Green (s)			9.0	50.0	50.0		9.0	111.0	50.0	12.0	114.0	
Yellow Time (s)			5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)			2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag			Lag				Lag	Lag		Lead	Lead	
Lead-Lag Optimize?			Yes				Yes	Yes		Yes	Yes	
Vehicle Extension (s)			1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode			None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)			10.6	49.2	49.2		10.6	117.7	166.9	12.1	119.2	
Actuated g/C Ratio			0.05	0.25	0.25		0.05	0.61	0.86	0.06	0.61	
v/c Ratio			0.72	0.91	0.90		0.71	0.68	0.22	0.61	0.91	
Control Delay			128.9	96.6	94.7		107.7	18.9	1.0	110.1	38.3	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay			0.0	105.6	98.6		0.0	2.7	0.2	0.0	1.5	
Total Delay			128.9	202.2	193.2		107.7	21.6	1.2	110.1	39.8	
LOS			F	F	F		F	C	A	F	D	
Approach Delay					197.8			21.6				41.5
Approach LOS					F			C				D
Queue Length 50th (ft)			82	489	476		86	325	14	87	1202	
Queue Length 95th (ft)			#166	#682	#661		m#143	m382	m17	148	1253	
Internal Link Dist (ft)		140			1181			440			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)			92	437	434		97	2083	1285	132	3212	
Starvation Cap Reductn			0	0	0		0	522	436	0	0	
Spillback Cap Reductn			0	130	129		0	0	0	0	157	
Storage Cap Reductn			0	0	0		0	0	0	0	0	
Reduced v/c Ratio			0.70	1.23	1.21		0.69	0.91	0.33	0.52	0.95	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 175 (90%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 57.2
 Intersection LOS: E
 Intersection Capacity Utilization 98.5%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø4
19 s	118 s	57 s
ø6	ø5	
121 s	16 s	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.95				0.96		1.00			1.00	
Frt		0.878				0.850		0.993			0.994	
Fit Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1542	0	0	1837	2787	1805	5138	0	3416	3496	0
Fit Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1542	0	0	1837	2674	1805	5138	0	3416	3496	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	120	145	1005	0	93	2533	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		41.0	41.0	15.0	15.0	41.0		15.0	18.0	
Total Split (s)	18.0	18.0	0.0	42.0	42.0	16.0	20.0	118.0	0.0	16.0	114.0	0.0
Total Split (%)	9.3%	9.3%	0.0%	21.6%	21.6%	8.2%	10.3%	60.8%	0.0%	8.2%	58.8%	0.0%
Maximum Green (s)	11.0	11.0		35.0	35.0	9.0	13.0	111.0		9.0	107.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				7.0	7.0			7.0				
Flash Dont Walk (s)				17.0	17.0			10.0				
Pedestrian Calls (#/hr)				12	12			12				
Act Effct Green (s)	13.0	13.0			16.0	25.3	24.7	136.7		11.1	123.1	
Actuated g/C Ratio	0.07	0.07			0.08	0.13	0.13	0.70		0.06	0.63	
v/c Ratio	0.91	1.08			0.23	0.34	0.63	0.28		0.48	1.14	
Control Delay	147.1	189.3			83.2	72.7	113.4	4.5		91.0	85.2	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	25.4	
Total Delay	147.1	189.3			83.2	72.7	113.4	4.5		91.0	110.6	
LOS	F	F			F	E	F	A		F	F	
Approach Delay		168.6			75.0			18.2			109.9	
Approach LOS		F			E			B			F	
Queue Length 50th (ft)	139	~157			43	80	178	52		62	~1911	
Queue Length 95th (ft)	#272	#304			80	107	271	35		m44	m374	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)										200		
Base Capacity (vph)	118	103			350	364	230	3621		207	2219	
Starvation Cap Reductn	0	0			0	0	0	0		0	106	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.91	1.08			0.10	0.33	0.63	0.28		0.45	1.20	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 172 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.14
 Intersection Signal Delay: 86.2
 Intersection Capacity Utilization 103.9%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

φ1	φ2	φ3	φ4
16 s	118 s	18 s	42 s
φ5	φ6		
20 s	114 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	650	192	958	375	544	1983
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Fit Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1519	3539	1519	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	192	958	375	544	1983
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	192	958	375	544	1983
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	54.0	47.0	93.0	54.0	47.0	140.0
Total Split (%)	27.8%	24.2%	47.9%	27.8%	24.2%	72.2%
Maximum Green (s)	47.0	40.0	86.0	47.0	40.0	133.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	44.2	86.4	92.6	136.7	42.3	139.8
Actuated g/C Ratio	0.23	0.45	0.48	0.70	0.22	0.72
v/c Ratio	0.83	0.28	0.57	0.35	0.73	0.78
Control Delay	46.0	15.8	40.9	11.9	49.6	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	2.3



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	46.0	15.8	40.9	11.9	49.6	12.3
LOS	D	B	D	B	D	B
Approach Delay	39.1		32.7			20.3
Approach LOS	D		C			C
Queue Length 50th (ft)	177	82	401	116	~375	336
Queue Length 95th (ft)	220	69	625	268	m239	m28
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	867	716	1806	1110	859	2551
Starvation Cap Reductn	0	0	0	0	0	415
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.27	0.53	0.34	0.63	0.93

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 170 (88%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 27.2
 Intersection LOS: C
 Intersection Capacity Utilization 82.2%
 ICU Level of Service E
 Analysis Period (min) 15
 n Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

ø2	ø1	ø3
93 s	47 s	54 s
ø6		
140 s		

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations	↔↔↔		↔↔	↑↑	↑↑↑				
Volume (vph)	176	184	324	572	1599	0	175	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	0.95	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor	0.98				1.00				
Frt	0.923				0.985				
Fit Protected	0.976		0.950						
Satd. Flow (prot)	3181	0	3502	3539	4999	0	0	0	0
Fit Permitted	0.976		0.950						
Satd. Flow (perm)	3181	0	3502	3539	4999	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	176	184	324	572	1599	0	175	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	360	0	324	572	1774	0	0	0	0
Turn Type			Prot						
Protected Phases			5	2	6				
Permitted Phases	4								
Detector Phase	4		5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	46.0	0.0	38.0	148.0	110.0	0.0	0.0	0.0	0.0
Total Split (%)	23.7%	0.0%	19.6%	76.3%	56.7%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	39.0		31.0	141.0	103.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lag		Lead				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	29.3		25.2	154.7	124.5				
Actuated g/C Ratio	0.15		0.13	0.80	0.64				
v/c Ratio	0.75		0.71	0.20	0.55				
Control Delay	80.0		90.4	3.1	6.7				
Queue Delay	0.0		0.0	0.0	0.0				
Total Delay	80.0		90.4	3.1	6.7				
LOS	E		F	A	A				

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	80.0			34.6	6.7				
Approach LOS	E			C	A				
Queue Length 50th (ft)	238		207	18	57				
Queue Length 95th (ft)	272		276	210	m54				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	672		596	2823	3209				
Starvation Cap Reductn	0		0	0	0				
Spillback Cap Reductn	0		0	0	0				
Storage Cap Reductn	0		0	0	0				
Reduced v/c Ratio	0.54		0.54	0.20	0.55				

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 16 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 23.7
 Intersection LOS: C
 Intersection Capacity Utilization 70.9%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ρ2	148 s	↗ ρ4	46 s
↓ ρ6	110 s	↑ ρ5	38 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕	↔	↔	↕		↔	↕	
Volume (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.97	
Fr		0.999				0.850		0.908			0.904	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3533	0	1770	3539	1583	1770	1662	0	1770	1627	0
Fit Permitted	0.950			0.950			0.748			0.749		
Satd. Flow (perm)	1770	3533	0	1770	3539	1423	1393	1662	0	1395	1627	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	896	0	24	823	103	10	13	0	34	14	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	25.0	127.0	0.0	21.0	123.0	123.0	46.0	46.0	0.0	46.0	46.0	0.0
Total Split (%)	12.9%	65.5%	0.0%	10.8%	63.4%	63.4%	23.7%	23.7%	0.0%	23.7%	23.7%	0.0%
Maximum Green (s)	18.0	120.0		14.0	116.0	116.0	39.0	39.0		39.0	39.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	11.0	161.2		13.0	160.7	160.7	13.6	13.6		13.9	13.9	
Actuated g/C Ratio	0.06	0.83		0.07	0.83	0.83	0.07	0.07		0.07	0.07	
v/c Ratio	0.30	0.31		0.20	0.28	0.09	0.10	0.11		0.34	0.12	
Control Delay	85.8	3.6		50.8	2.8	3.0	83.7	83.7		93.1	84.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	85.8	3.6		50.8	2.8	3.0	83.7	83.7		93.1	84.1	
LOS	F	A		D	A	A	F	F		F	F	
Approach Delay		6.2			4.1			83.7				90.5
Approach LOS		A			A			F				F
Queue Length 50th (ft)	39	62		30	45	11	12	16		43	17	
Queue Length 95th (ft)	m70	162		m48	82	27	35	42		84	44	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	182	2936		148	2932	1179	294	351		295	344	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.16	0.31		0.16	0.28	0.09	0.03	0.04		0.12	0.04	

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 112 (58%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.34
 Intersection Signal Delay: 8.2
 Intersection Capacity Utilization 43.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

127 s	21 s	46 s
25 s	123 s	46 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	475	387	723	797	218	88	69	390	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.90			0.95		0.96	
Frt			0.850			0.850			0.850		0.889	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1592	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1487	3433	3539	1423	1770	1863	1501	3433	1592	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	475	387	723	797	218	88	69	390	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	475	387	723	797	218	88	69	390	27	88	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	21.0	46.0	44.0	62.0	87.0	15.0	44.0	71.0	62.0	15.0	42.0	0.0
Total Split (%)	10.8%	23.7%	22.7%	32.0%	44.8%	7.7%	22.7%	36.6%	32.0%	7.7%	21.6%	0.0%
Maximum Green (s)	14.0	39.0	37.0	55.0	80.0	8.0	37.0	64.0	55.0	8.0	35.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	35.5	73.3	106.3	49.6	87.4	101.1	33.0	37.5	87.0	13.6	18.1	
Actuated g/C Ratio	0.18	0.38	0.55	0.26	0.45	0.52	0.17	0.19	0.45	0.07	0.09	
v/c Ratio	0.21	0.36	0.47	0.82	0.50	0.29	0.29	0.19	0.56	0.11	0.59	
Control Delay	62.8	25.7	8.2	76.3	40.6	15.2	72.1	64.6	28.1	85.4	99.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	62.8	25.7	8.2	76.3	40.6	15.2	72.1	64.6	28.1	85.4	99.8	
LOS	E	C	A	E	D	B	E	E	C	F	F	
Approach Delay		21.2			52.3			39.7				96.4
Approach LOS		C			D			D				F
Queue Length 50th (ft)	79	111	99	454	382	72	100	75	276	17	110	
Queue Length 95th (ft)	116	200	200	504	503	136	157	117	269	37	173	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	324	1337	880	1014	1625	752	356	634	757	241	304	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.36	0.44	0.71	0.49	0.29	0.25	0.11	0.52	0.11	0.29	

Intersection Summary

Area Type: Other

Cycle Length: 194

Actuated Cycle Length: 194

Offset: 100 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 43.1

Intersection LOS: D

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
46 s	62 s	44 s	42 s
ø6	ø5	ø7	ø8
87 s	21 s	15 s	71 s

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	153	266	630	110	481	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1487	3539	1487	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	266	630	110	481	472
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	266	630	110	481	472
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	55.0	62.0	77.0	55.0	62.0	139.0
Total Split (%)	28.4%	32.0%	39.7%	28.4%	32.0%	71.6%
Maximum Green (s)	48.0	55.0	70.0	48.0	55.0	132.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	24.2	59.3	119.7	143.9	35.1	159.8
Actuated g/C Ratio	0.12	0.31	0.62	0.74	0.18	0.82
v/c Ratio	0.69	0.56	0.29	0.10	0.77	0.16
Control Delay	97.0	55.7	19.0	6.5	55.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	97.0	55.7	19.0	6.5	55.3	0.1
LOS	F	E	B	A	E	A
Approach Delay	70.7		17.1			28.0
Approach LOS	E		B			C
Queue Length 50th (ft)	190	275	190	32	265	0
Queue Length 95th (ft)	268	332	278	60	376	1
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	456	533	2183	1166	1009	2915
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.50	0.29	0.09	0.48	0.16

Intersection Summary

Area Type: Other
 Cycle Length: 194
 Actuated Cycle Length: 194
 Offset: 28 (14%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 32.7
 Intersection Capacity Utilization 53.2%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

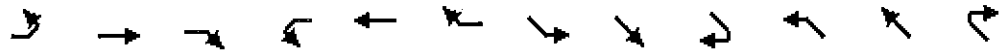
ø2	ø1	ø4
77 s	62 s	55 s
ø6		
139 s		

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



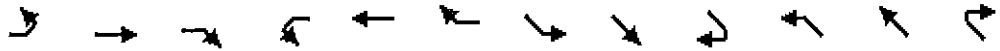
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↑↑	↑					↑↑	
Volume (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	14	12
Grade (%)		0%			-1%			0%			0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	*1.00	1.00
Frt						0.850						
Fit Protected												
Satd. Flow (prot)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Fit Permitted												
Satd. Flow (perm)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Right Turn on Red			No			No			No	No		No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			45			45	
Link Distance (ft)		331			584			383			483	
Travel Time (s)		5.0			15.9			5.8			7.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Turn Type						Perm						
Protected Phases					8						6	
Permitted Phases						8						
Detector Phase					8	8					6	
Switch Phase												
Minimum Initial (s)					7.0	7.0					12.0	
Minimum Split (s)					20.0	20.0					20.0	
Total Split (s)	0.0	0.0	0.0	0.0	72.0	72.0	0.0	0.0	0.0	0.0	25.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	74.2%	74.2%	0.0%	0.0%	0.0%	0.0%	25.8%	0.0%
Maximum Green (s)					65.0	65.0					18.0	
Yellow Time (s)					5.0	5.0					5.0	
All-Red Time (s)					2.0	2.0					2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0					3.0	
Recall Mode					None	None					C-Min	
Act Effct Green (s)					67.2	67.2					19.8	
Actuated g/C Ratio					0.69	0.69					0.20	
v/c Ratio					0.73	0.37					0.57	
Control Delay					11.5	7.2					38.9	
Queue Delay					0.0	0.0					0.0	
Total Delay					11.5	7.2					38.9	
LOS					B	A					D	
Approach Delay					10.7						38.9	
Approach LOS					B						D	
Queue Length 50th (ft)					299	85					141	
Queue Length 95th (ft)					405	140					m151	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 AM (2035)

109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Internal Link Dist (ft)		251			504			303			403	
Turn Bay Length (ft)												
Base Capacity (vph)					2492	1115						851
Starvation Cap Reductn					0	0						0
Spillback Cap Reductn					0	0						0
Storage Cap Reductn					0	0						0
Reduced v/c Ratio					0.72	0.37						0.54

Intersection Summary

Area Type: Other
 Cycle Length: 97
 Actuated Cycle Length: 97
 Offset: 95 (98%), Referenced to phase 2: and 6:NWT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 15.6
 Intersection Capacity Utilization 71.0%
 Analysis Period (min) 15
 * User Entered Value
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

 25 s	 72 s
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HCM Unsignalized Intersection Capacity Analysis Overpass & CVA Extension to I-440 AM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/22/2010

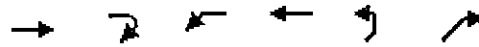


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Volume (veh/h)	0	119	0	655	1655	179
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	119	0	655	1655	179
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (ft)				634	458	
pX, platoon unblocked	0.70	0.69	0.69			
vC, conflicting volume	1982	828	1655			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1388	0	1039			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	100			
cM capacity (veh/h)	93	744	456			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	119	328	328	828	828	179
Volume Left	0	0	0	0	0	0
Volume Right	119	0	0	0	0	179
cSH	744	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.19	0.19	0.49	0.49	0.11
Queue Length 95th (ft)	14	0	0	0	0	0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.8	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		59.8%	ICU Level of Service B
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis Overpass & CVA Extension to I-440 AM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/22/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	856	63	0	842	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	856	63	0	842	0	70
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.95	
vC, conflicting volume			925		1314	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			925		1217	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			730		163	533

Direction/Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	571	348	421	421	70
Volume Left	0	0	0	0	0
Volume Right	0	63	0	0	70
cSH	1700	1700	1700	1700	533
Volume to Capacity	0.34	0.20	0.25	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.8
Approach LOS					B

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		38.9%	ICU Level of Service A
Analysis Period (min)		15	

Network Totals

Number of Intersections	45
Control Delay / Veh (s/v)	23
Queue Delay / Veh (s/v)	2
Total Delay / Veh (s/v)	25
Total Delay (hr)	2074
Stops / Veh	0.14
Stops (#)	40480
Average Speed (mph)	14
Total Travel Time (hr)	2910
Distance Traveled (mi)	40754
Fuel Consumed (gal)	3392
Fuel Economy (mpg)	12.0
CO Emissions (kg)	237.11
NOx Emissions (kg)	46.13
VOC Emissions (kg)	54.95
Unserved Vehicles (#)	6522
Vehicles in dilemma zone (#)	990
Performance Index	2186.2

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	13532.2	12872.2	13305.6	13232.1	13222.4	13016.3	13053.6
Delay / Veh (s)	2493.3	2273.8	2424.3	2403.3	2480.5	2397.7	2335.1
Stop Delay (hr)	13137.2	12462.7	12936.8	12855.0	12860.2	12647.8	12682.2
St Del/Veh (s)	2420.5	2201.5	2357.1	2334.8	2412.5	2329.8	2268.6
Total Stops	65647	65291	61902	63065	59554	61240	59773
Stop/Veh	3.36	3.20	3.13	3.18	3.10	3.13	2.97
Travel Dist (mi)	25943.5	26852.1	25903.6	25981.8	25252.5	25766.8	26556.6
Travel Time (hr)	14125.6	13490.7	13900.8	13829.9	13797.5	13608.3	13664.2
Avg Speed (mph)	10	10	10	10	10	10	11
Fuel Used (gal)	4013.1	3898.0	3969.2	3951.7	3920.8	3899.7	3928.1
Fuel Eff. (mpg)	6.5	6.9	6.5	6.6	6.4	6.6	6.8
HC Emissions (g)	21028	21944	21311	21350	21330	20498	22200
CO Emissions (g)	841777	857937	848738	849004	838394	837400	865493
NOx Emissions (g)	53220	55944	54636	54296	52879	52912	55997
Vehicles Entered	20216	21005	20337	20484	19808	19981	20699
Vehicles Exited	18863	19755	19180	19158	18573	19106	19552
Hourly Exit Rate	18863	19755	19180	19158	18573	19106	19552
Input Volume	424566	424566	424566	424566	424566	424566	424566
% of Volume	4	5	5	5	4	5	5
Denied Entry Before	2426	2350	2359	2479	2457	2315	2472
Denied Entry After	21316	20216	21212	20853	21483	21082	20828

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	13274.9	13287.9	12931.6	13172.9
Delay / Veh (s)	2567.0	2375.3	2314.7	2404.2
Stop Delay (hr)	12957.7	12852.7	12539.7	12793.2
St Del/Veh (s)	2505.6	2297.5	2244.6	2334.9
Total Stops	53433	71513	65987	62738
Stop/Veh	2.87	3.55	3.28	3.18
Travel Dist (mi)	23540.3	26669.4	26376.5	25884.3
Travel Time (hr)	13811.3	13900.4	13535.9	13766.5
Avg Speed (mph)	9	10	10	10
Fuel Used (gal)	3881.9	3985.5	3891.1	3933.9
Fuel Eff. (mpg)	6.1	6.7	6.8	6.6
HC Emissions (g)	19852	22520	22173	21421
CO Emissions (g)	811392	865113	859893	847514
NOx Emissions (g)	49377	56608	56337	54221
Vehicles Entered	19295	20865	20920	20360
Vehicles Exited	17940	19414	19304	19084
Hourly Exit Rate	17940	19414	19304	19084
Input Volume	424566	424566	424566	424566
% of Volume	4	5	5	4
Denied Entry Before	2401	2379	2300	2394
Denied Entry After	21790	20588	20372	20971

Arterial Level of Service: EB #1

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	65	562.4	594.4	0.4	6	6	590.6
	64	104.2	117.5	0.2	5	5	100.3
	68	56.9	63.7	0.1	5	5	55.9
Creedmoor Rd	1	405.7	438.0	0.4	3	3	431.9
Crabtree Mall Entr	2	85.3	102.4	0.2	7	6	111.1
Glenwood Ave #2	82	65.5	74.8	0.1	5	5	72.6
Glenwood Ave	89	126.7	140.2	0.2	4	4	131.9
Blue Ridge Rd	3	22.8	25.1	0.0	5	5	21.7
Crabtree View Pl	81	17.7	23.5	0.1	10	10	18.8
Glenwood Ave #1	87	23.7	31.7	0.1	11	10	25.3
I-440 WB On/Off Ramp	4	14.6	19.4	0.1	11	11	14.5
WB I-440 On Ramp fro	44	7.6	13.7	0.1	24	25	7.3
EB I-440 On Ramp fro	23	5.9	10.6	0.0	15	16	5.0
Ridge Rd Extension	5	40.1	45.4	0.1	5	5	40.5
Total		1539.1	1700.7	2.0	5	5	1627.4

Arterial Level of Service: EB #1

Cross Street	Run 10 Speed	Run 10 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed
	6	587.2	6	599.8	6	503.0	7
	5	100.3	5	104.0	5	100.6	5
	5	55.9	5	58.0	5	56.7	5
Creedmoor Rd	3	410.2	3	433.8	3	420.7	4
Crabtree Mall Entr	6	96.3	6	106.4	6	108.2	10
Glenwood Ave #2	5	72.2	5	67.4	5	77.6	6
Glenwood Ave	4	125.2	4	129.6	4	136.6	4
Blue Ridge Rd	5	22.7	5	24.9	5	23.0	5
Crabtree View Pl	11	17.0	9	19.7	10	17.6	11
Glenwood Ave #1	11	22.6	10	24.8	11	23.9	11
I-440 WB On/Off Ramp	12	13.7	10	16.4	11	14.9	11
WB I-440 On Ramp fro	25	7.2	20	10.2	25	7.4	24
EB I-440 On Ramp fro	14	6.2	11	9.6	17	4.7	14
Ridge Rd Extension	5	39.1	5	43.7	5	42.1	5
Total	5	1575.8	5	1648.4	5	1537.0	6

Arterial Level of Service: EB #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
	444.2	5	659.6	6	507.6	4	1007.5
	97.7	4	116.6	5	96.2	3	159.8
	54.3	4	62.5	5	52.2	3	79.9
Creedmoor Rd	373.4	4	370.4	3	407.9	3	410.8
Crabtree Mall Entr	55.9	8	80.1	6	97.5	6	95.9
Glenwood Ave #2	57.9	6	61.9	6	61.8	5	68.9
Glenwood Ave	125.7	4	123.4	4	122.3	4	136.8
Blue Ridge Rd	22.1	5	22.9	5	21.7	4	26.9
Crabtree View Pl	17.2	11	17.2	10	18.3	10	17.7
Glenwood Ave #1	22.9	11	23.8	11	22.7	10	24.5
I-440 WB On/Off Ramp	14.1	11	14.8	12	13.7	11	15.2
WB I-440 On Ramp fro	7.6	25	7.5	24	7.6	25	7.3
EB I-440 On Ramp fro	6.6	16	4.8	14	6.4	18	4.2
Ridge Rd Extension	44.3	6	37.8	5	38.8	5	38.0
Total	1343.9	5	1603.1	5	1474.7	5	2093.7

Arterial Level of Service: EB #1

Cross Street	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
	7	388.5	7	401.0
	6	88.5	5	93.7
	5	49.0	5	51.3
Creedmoor Rd	3	386.3	3	412.1
Crabtree Mall Entr	12	43.5	9	63.2
Glenwood Ave #2	6	55.2	6	61.2
Glenwood Ave	5	114.0	4	124.4
Blue Ridge Rd	5	20.8	5	22.4
Crabtree View Pl	10	18.0	11	16.1
Glenwood Ave #1	11	23.0	11	23.4
I-440 WB On/Off Ramp	11	14.1	11	14.3
WB I-440 On Ramp fro	25	7.2	25	7.2
EB I-440 On Ramp fro	15	5.5	15	5.7
Ridge Rd Extension	5	38.1	5	39.1
Total	6	1222.1	6	1415.1

Arterial Level of Service: WB Glenwood Ave #2

Cross Street	Nodes	Delay (s/veh)	Travel Time (s)	Del (h)	Speed (mph)	Run 1 Speed	Run 1 Delay
EB I-440 On Ramp fro	1	344.7	418.0	0.3	17	18	271.9
EB I-440 On Ramp to	21	3.1	8.8	0.1	35	38	2.8
WB I-440 On Ramp fro	44	3.8	9.8	0.0	16	18	2.6
I-440 WB On/Off Ramp	4	6.6	14.2	0.1	24	28	4.3
Total		408.1	447.2	0.5	19	21	341.4

Arterial Level of Service: WB Glenwood Ave #2

Cross Street	Run 10 Speed	Run 10 Delay	Run 1 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed
EB I-440 On Ramp fro	17	401.0	14	514.3	18	372.3	18
EB I-440 On Ramp to	37	2.8	38	2.7	39	2.6	38
WB I-440 On Ramp fro	18	2.5	18	2.6	19	2.1	15
I-440 WB On/Off Ramp	29	3.8	30	3.6	32	3.0	22
Total	20	415.1	18	613.2	20	380.0	19

Arterial Level of Service: WB Glenwood Ave #2

Cross Street	Run 4 Delay	Run 5 Speed	Run 6 Delay	Run 8 Speed	Run 9 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	310.2	18	428.3	18	388.8	18	422.0
EB I-440 On Ramp to	2.7	35	2.8	38	2.5	38	5.1
WB I-440 On Ramp fro	4.3	18	2.5	18	2.7	9	11.4
I-440 WB On/Off Ramp	7.3	30	3.6	30	3.6	13	18.0
Total	324.4	22	445.7	22	408.8	15	457.5

Arterial Level of Service: WB Glenwood Ave #2

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On Ramp fro	16	271.9	17	423.0
EB I-440 On Ramp to	35	3.2	37	2.8
WB I-440 On Ramp fro	14	5.2	19	2.4
I-440 WB On/Off Ramp	14	15.8	30	3.7
Total	17	296.0	21	431.8

Arterial Level of Service: NW Glenwood Ave #3

Links Street	Nodes	Delay (s/veh)	Travel Time (s)	LOS	Arterial Speed (mph)	Post-1 Speed (mph)	Post-1 Delay (s)
Glenwood Ave	67	3.1	5.8	0.1	33	45	2.5
	82	9.4	17.2	0.1	14	14	1.0
	83	5.3	9.6	0.1	19	19	5.7
	94	14.5	23.3	0.1	17	13	21.6
Glenwood Ave	100	4.2	6.1	0.0	22	14	7.2
	28	12.4	17.6	0.0	10	7	22.1
Glenwood Ave #3	82	12.4	16.5	0.0	10	6	23.0
Marriott Dr	2	31.6	40.3	0.1	10	7	53.4
Creedmoor Rd	1	118.8	135.3	0.2	5	5	134.0
	68	11.5	45.3	0.4	32	33	11.0
	64	0.9	7.6	0.1	39	39	0.9
	65	1.7	14.9	0.2	39	39	1.7
Total		225.9	339.3	1.4	15	12	291.7

Arterial Level of Service: NW Glenwood Ave #3

Links Street	Run 10 Speed	Run 10 Delay	Run 11 Speed	Run 11 Delay	Run 12 Speed	Run 12 Delay	Run 13 Speed	Run 13 Delay
Glenwood Ave	63	1.7	67	1.5	63	1.4	34	3.4
	19	4.5	29	4.3	29	4.1	13	1.3
	33	1.3	35	1.0	34	1.1	16	1.6
	32	3.3	37	1.8	36	2.1	12	1.2
Glenwood Ave	42	1.2	57	0.4	55	0.5	15	1.5
	17	5.1	27	1.4	26	1.7	7	7
Glenwood Ave #3	15	7.0	33	1.1	31	1.4	7	7
Marriott Dr	11	28.9	32	3.8	25	7.8	8	8
Creedmoor Rd	5	132.6	7	87.9	6	96.5	5	5
	32	12.0	32	11.5	32	11.5	32	32
	38	1.0	39	0.9	39	0.9	39	39
	39	1.9	39	1.7	39	1.6	39	39
Total	16	200.7	22	117.2	20	130.6	13	13

Arterial Level of Service: NW Glenwood Ave #3

Cross Street	Run 4 Delay	Run 5 Delay	Run 6 Delay	Run 8 Delay	Run 9 Delay	Run 7 Delay	Run 1 Delay
Glenwood Ave	4.0	53	1.8	53	1.8	22	7.4
	10.9	19	4.8	19	4.9	10	15.2
	7.0	31	1.6	35	1.1	12	11.5
	24.4	22	8.9	37	1.8	11	26.5
Glenwood Ave	6.7	25	3.4	59	0.4	12	8.8
	20.1	11	11.1	28	1.2	6	25.2
Glenwood Ave #3	19.0	10	13.1	33	1.0	6	24.6
Marriott Dr	45.2	8	41.4	31	4.3	7	47.9
Creedmoor Rd	123.1	5	127.2	7	96.2	5	127.0
	11.4	32	11.5	32	11.8	32	11.1
	0.8	38	1.0	39	0.9	39	0.9
	1.6	39	1.8	39	1.7	39	1.8
Total	274.3	15	227.4	21	126.9	12	308.0

Arterial Level of Service: NW Glenwood Ave #3

Cross Street	Run 8 Delay	Run 9 Delay	Run 6 Delay	Run 5 Delay
Glenwood Ave	11	1.2	51	1.0
	6	30.1	19	4.9
	7	21.5	34	1.2
	6	52.3	31	3.8
Glenwood Ave	9	12.2	38	1.6
	5	33.0	17	5.2
Glenwood Ave #3	5	29.0	15	7.2
Marriott Dr	6	56.9	11	30.0
Creedmoor Rd	5	133.1	5	130.8
	32	12.0	32	11.4
	39	1.0	40	0.8
	39	1.8	40	1.5
Total	10	392.0	16	200.2

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	358	3476	407	293	3528	1665	1182	1965	240	1528	1279	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			0%			0%				-2%
Storage Length (ft)	230		0	400		260	310		175	450		0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	300		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor		1.00				0.98			0.95		0.99	
Frt		0.984				0.850			0.850		0.983	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	6280	0	3433	5085	1583	3433	3539	1583	3467	3495	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	6280	0	3433	5085	1559	3433	3539	1511	3467	3495	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			45	
Link Distance (ft)		2137			1076			608			1603	
Travel Time (s)		32.4			16.3			11.8			24.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	358	3476	407	293	3528	1665	1182	1965	240	1528	1279	166
Shared Lane Traffic (%)												
Lane Group Flow (vph)	358	3883	0	293	3528	1665	1182	1965	240	1528	1445	0
Turn Type	Prot			Prot		Free	Prot		pm+ov	Prot		
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases						Free			8			
Detector Phase	5	2		1	6		3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.0	31.0		14.0	31.0		14.0	25.5	14.0	14.0	25.5	
Total Split (s)	22.0	73.0	0.0	15.0	66.0	0.0	31.0	51.0	15.0	37.0	57.0	0.0
Total Split (%)	12.5%	41.5%	0.0%	8.5%	37.5%	0.0%	17.6%	29.0%	8.5%	21.0%	32.4%	0.0%
Maximum Green (s)	15.0	66.0		8.0	59.0		24.0	44.0	8.0	30.0	50.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			11.5			11.5	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	17.0	68.0		10.0	61.0	176.0	26.0	46.0	56.0	32.0	52.0	
Actuated g/C Ratio	0.10	0.39		0.06	0.35	1.00	0.15	0.26	0.32	0.18	0.30	
v/c Ratio	2.09	1.60		1.50	2.00	1.07	2.33	2.12	0.49	2.43	1.40	
Control Delay	544.6	307.4		278.7	480.5	36.6	630.9	536.2	50.6	673.0	229.3	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

1: Glenwood Ave #1 & Creedmoor Rd

6/22/2010

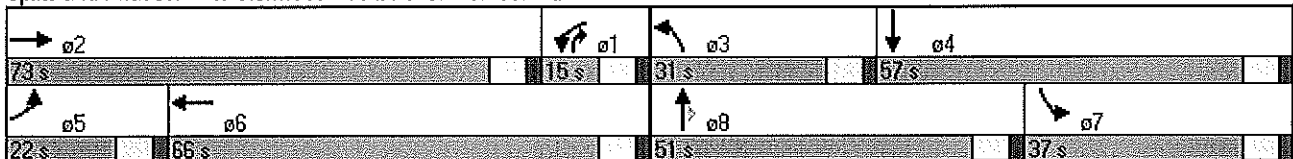


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	544.6	307.4		278.7	480.5	36.6	630.9	536.2	50.6	673.0	229.3	
LOS	F	F		F	F	D	F	F	D	F	F	
Approach Delay		327.4			335.0			534.9			457.4	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~651	~1854		~242	~2334	~966	~1145	~1892	194	~1493	~1167	
Queue Length 95th (ft)	#869	#1874		m#212	m#2071	m0	m#1177	m#1869	m218	#1628	#1306	
Internal Link Dist (ft)		2057			996			528			1523	
Turn Bay Length (ft)	230			400		260	310		175	450		
Base Capacity (vph)	171	2426		195	1762	1559	507	925	485	630	1033	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	2.09	1.60		1.50	2.00	1.07	2.33	2.12	0.49	2.43	1.40	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 63 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.43
 Intersection Signal Delay: 397.7
 Intersection LOS: F
 Intersection Capacity Utilization 202.6%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd



Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑		↖↖	↑↑↑↑				↗↗			↗
Volume (vph)	0	4972	272	625	5427	112	0	0	698	0	0	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			0%			-1%				-1%
Storage Length (ft)	200		0	475		0	0		0	0		0
Storage Lanes	0		0	2		0	0		2	0		1
Taper Length (ft)	100		100	200		100	100		100	100		100
Lane Util. Factor	1.00	0.86	0.86	0.97	0.91	0.91	1.00	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00							0.98
Frt		0.992			0.997				0.850			0.865
Fit Protected				0.950								
Satd. Flow (prot)	0	6275	0	3433	5067	0	0	0	2801	0	0	1619
Fit Permitted				0.950								
Satd. Flow (perm)	0	6275	0	3433	5067	0	0	0	2801	0	0	1594
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25				35
Link Distance (ft)		1076			597			201				281
Travel Time (s)		16.3			9.0			5.5				5.5
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4972	272	625	5427	112	0	0	698	0	0	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5244	0	625	5539	0	0	0	698	0	0	59
Turn Type				Prot					Over			custom
Protected Phases		2		1	Free				1			
Permitted Phases												6
Detector Phase		2		1					1			6
Switch Phase												
Minimum Initial (s)		15.0		7.0					7.0			15.0
Minimum Split (s)		41.0		15.3					15.3			38.0
Total Split (s)	0.0	133.0	0.0	43.0	0.0	0.0	0.0	0.0	43.0	0.0	0.0	176.0
Total Split (%)	0.0%	75.6%	0.0%	24.4%	0.0%	0.0%	0.0%	0.0%	24.4%	0.0%	0.0%	100.0%
Maximum Green (s)		126.0		36.0					36.0			169.0
Yellow Time (s)		5.0		5.0					5.0			5.0
All-Red Time (s)		2.0		2.0					2.0			2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	2.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0	2.0	5.0
Lead/Lag		Lag		Lead					Lead			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		2.0		3.0					3.0			2.0
Recall Mode		C-Min		None					None			C-Min
Walk Time (s)		7.0										
Flash Dont Walk (s)		7.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		128.0		38.0	176.0				38.0			176.0
Actuated g/C Ratio		0.73		0.22	1.00				0.22			1.00
v/c Ratio		1.15		0.84	1.09				1.15			0.04
Control Delay		84.9		73.8	57.9				145.3			0.1

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		23.7		0.0	0.0				0.0			0.0
Total Delay		108.6		73.8	57.9				145.3			0.1
LOS		F		E	E				F			A
Approach Delay		108.6			59.5							
Approach LOS		F			E							
Queue Length 50th (ft)		~2065		355	~2532				~536			0
Queue Length 95th (ft)		m42		m378	m#2328				#684			0
Internal Link Dist (ft)		996			517			121			201	
Turn Bay Length (ft)				475								
Base Capacity (vph)		4564		741	5067				605			1594
Starvation Cap Reductn		201		0	0				0			0
Spillback Cap Reductn		0		0	0				0			0
Storage Cap Reductn		0		0	0				0			0
Reduced v/c Ratio		1.20		0.84	1.09				1.15			0.04

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 175 (99%), Referenced to phase 2:EBT and 6:SBR, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 85.3
 Intersection LOS: F
 Intersection Capacity Utilization 127.6%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

ø1	ø2
43 s	133 s
ø6	
176 s	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

3: Glenwood Ave #1 & Lead Mine Rd

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	676	4837	157	0	0	1875	121	718	258	985	1128	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	14	12	12	12	12	12	12
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	0		0	0		0	90		0	250		0
Storage Lanes	2		0	0		2	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	1.00	1.00	0.88	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00										0.98
Frt		0.995				0.850			0.850			0.980
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3399	6305	0	0	0	2972	1752	3504	1567	5040	3443	0
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3399	6305	0	0	0	2972	1752	3504	1567	5040	3443	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		180			354			458			520	
Travel Time (s)		2.7			5.4			8.9			10.1	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	676	4837	157	0	0	1875	121	718	258	985	1128	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	676	4994	0	0	0	1875	121	718	258	985	1297	0
Turn Type	Prot					custom	Prot		Perm	Prot		
Protected Phases	5	2				6 7	3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2				6 7	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0					7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0					14.0	14.0	14.0	14.0	44.0	
Total Split (s)	29.0	102.0	0.0	0.0	0.0	102.0	16.0	45.0	45.0	29.0	58.0	0.0
Total Split (%)	16.5%	58.0%	0.0%	0.0%	0.0%	58.0%	9.1%	25.6%	25.6%	16.5%	33.0%	0.0%
Maximum Green (s)	22.0	95.0					9.0	38.0	38.0	22.0	51.0	
Yellow Time (s)	5.0	5.0					5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0					2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	2.0	4.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lag						Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes						Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.0					3.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min					None	None	None	None	None	
Walk Time (s)		7.0									7.0	
Flash Dont Walk (s)		20.0									11.5	
Pedestrian Calls (#/hr)		12									24	
Act Effct Green (s)	24.0	97.0				97.7	11.0	39.3	39.3	24.7	53.0	
Actuated g/C Ratio	0.14	0.55				0.56	0.06	0.22	0.22	0.14	0.30	
v/c Ratio	1.46	1.44				1.14	1.10	0.92	0.74	1.39	1.25	

Lane Group	06
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	41.0
Total Split (s)	73.0
Total Split (%)	41%
Maximum Green (s)	66.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	20.0
Pedestrian Calls (#/hr)	12
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	249.3	222.4				96.3	181.6	85.1	78.6	218.6	157.4	
Queue Delay	0.0	0.0				0.0	0.0	0.0	0.0	0.0	25.3	
Total Delay	249.3	222.4				96.3	181.6	85.1	78.6	218.6	182.7	
LOS	F	F				F	F	F	E	F	F	
Approach Delay		225.6						94.2			198.2	
Approach LOS		F						F			F	
Queue Length 50th (ft)	~548	~2265				~1442	~162	370	235	~546	~958	
Queue Length 95th (ft)	m#439	m#1810				m#1436	m#300	#547	413	m#629	#1104	
Internal Link Dist (ft)		100			274			378			440	
Turn Bay Length (ft)							90			250		
Base Capacity (vph)	464	3475				1650	110	796	356	708	1037	
Starvation Cap Reductn	0	0				0	0	0	0	0	45	
Spillback Cap Reductn	0	0				0	0	0	0	0	0	
Storage Cap Reductn	0	0				0	0	0	0	0	0	
Reduced v/c Ratio	1.46	1.44				1.14	1.10	0.90	0.72	1.39	1.31	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 54 (31%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.46
 Intersection Signal Delay: 184.5
 Intersection Capacity Utilization 128.8%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

→ ø2	↓ ø4	↖ ø3
102 s	58 s	16 s
↖ ø6	↗ ø5	↘ ø7
73 s	29 s	45 s
	↑ ø8	
		29 s

Lane Group	a6
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓↓	↑↑	↑			
Volume (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.94									
Frt			0.850			0.850			0.850			
Fit Protected				0.950			0.950	0.974				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3105	1575	0	0	0
Fit Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1454	1832	5263	1639	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Shared Lane Traffic (%)							33%					
Lane Group Flow (vph)	0	2258	1145	100	2992	524	1267	1190	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	86.0	75.0	15.0	101.0	101.0	75.0	75.0	15.0	0.0	0.0	0.0
Total Split (%)	0.0%	48.9%	42.6%	8.5%	57.4%	57.4%	42.6%	42.6%	8.5%	0.0%	0.0%	0.0%
Maximum Green (s)		79.0	68.0	8.0	94.0	94.0	68.0	68.0	8.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	Min	Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		81.0	151.0	10.0	96.0	96.0	70.0	70.0	85.0			
Actuated g/C Ratio		0.46	0.86	0.06	0.55	0.55	0.40	0.40	0.48			
v/c Ratio		0.98	0.89	0.96	1.04	0.59	1.05	0.96	0.50			
Control Delay		60.3	15.5	157.4	67.9	30.1	90.7	69.6	33.8			

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		60.3	15.5	157.4	67.9	30.1	90.7	69.6	33.8			
LOS		E	B	F	E	C	F	E	C			
Approach Delay		45.3			64.9			74.3				
Approach LOS		D			E			E				
Queue Length 50th (ft)		909	1100	118	~1362	396	~923	779	295			
Queue Length 95th (ft)		m657	m387	#251	#1421	519	#1079	#951	398			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2294	1286	104	2871	894	1205	1235	761			
Starvation Cap Reductn		0	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		0.98	0.89	0.96	1.04	0.59	1.05	0.96	0.50			

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 0 (0%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 60.8
 Intersection LOS: E
 Intersection Capacity Utilization 102.1%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

φ2	φ1	φ3
86 s	15 s	75 s
φ6		φ8
101 s		75 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↖	↕		↖	↗	↗	↖	↗↖	
Volume (vph)	0	0	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-2%			6%			6%			-6%	
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.95		0.99				0.94		1.00	
Frt			0.865		0.957				0.850		0.999	
Fit Protected				0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	0	1627	1631	1571	0	1717	3433	1536	1823	5230	0
Fit Permitted				0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	0	1552	1631	1571	0	1717	3433	1446	1823	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			520			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	0	61	242	237	0	101	2494	674	66	1819	0
Turn Type			custom	Split			Prot		pm+ov	Prot		
Protected Phases			5	4	4		5	2	4	1	6	
Permitted Phases			5						2			
Detector Phase			5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)			7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)			14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	0.0	0.0	23.0	34.0	34.0	0.0	23.0	128.0	34.0	14.0	119.0	0.0
Total Split (%)	0.0%	0.0%	13.1%	19.3%	19.3%	0.0%	13.1%	72.7%	19.3%	8.0%	67.6%	0.0%
Maximum Green (s)			16.0	27.0	27.0		16.0	121.0	27.0	7.0	112.0	
Yellow Time (s)			5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)			2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag			Lag				Lag	Lag		Lead	Lead	
Lead-Lag Optimize?			Yes				Yes	Yes		Yes	Yes	
Vehicle Extension (s)			1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode			None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)			49.0	28.6	28.6		49.0	123.4	152.0	9.0	83.4	
Actuated g/C Ratio			0.28	0.16	0.16		0.28	0.70	0.86	0.05	0.47	
v/c Ratio			0.13	0.91	0.93		0.21	1.04	0.53	0.71	0.73	
Control Delay			52.2	107.9	111.5		52.2	44.2	1.7	118.1	38.9	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay			0.0	0.0	0.0		0.0	145.7	1.3	0.0	0.0	
Total Delay			52.2	107.9	111.5		52.2	189.9	3.1	118.1	38.9	
LOS			D	F	F		D	F	A	F	D	
Approach Delay					109.7			147.2				41.7
Approach LOS					F			F				D
Queue Length 50th (ft)			53	292	288		89	~1627	82	77	615	
Queue Length 95th (ft)			106	#471	#471		m87	m981	m59	#159	580	
Internal Link Dist (ft)		140			1181			440			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)			453	269	259		478	2406	1267	93	3388	
Starvation Cap Reductn			0	0	0		0	584	374	0	0	
Spillback Cap Reductn			0	0	0		0	0	0	0	0	
Storage Cap Reductn			0	0	0		0	0	0	0	0	
Reduced v/c Ratio			0.13	0.90	0.92		0.21	1.37	0.75	0.71	0.54	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 108.1
 Intersection LOS: F
 Intersection Capacity Utilization 108.3%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø4
14 s	128 s	34 s
ø6	ø5	
119 s	23 s	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%				1%
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.96				0.96		1.00			1.00	
Frt		0.892				0.850		0.991			0.993	
Fit Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1582	0	0	1788	2787	1805	5126	0	3416	3492	0
Fit Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1582	0	0	1788	2681	1805	5126	0	3416	3492	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			282	
Travel Time (s)		5.0			7.9			16.0			5.5	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	812	110	2587	0	422	1886	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		41.0	41.0	15.0	15.0	41.0		15.0	18.0	
Total Split (s)	18.0	18.0	0.0	41.0	41.0	26.0	16.0	91.0	0.0	26.0	101.0	0.0
Total Split (%)	10.2%	10.2%	0.0%	23.3%	23.3%	14.8%	9.1%	51.7%	0.0%	14.8%	57.4%	0.0%
Maximum Green (s)	11.0	11.0		34.0	34.0	19.0	9.0	84.0		19.0	94.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Min		None	C-Min	
Walk Time (s)				7.0	7.0			7.0				
Flash Dont Walk (s)				17.0	17.0			10.0				
Pedestrian Calls (#/hr)				12	12			12				
Act Effct Green (s)	13.0	13.0			21.7	42.7	13.5	100.3		21.0	107.8	
Actuated g/C Ratio	0.07	0.07			0.12	0.24	0.08	0.57		0.12	0.61	
v/c Ratio	1.06	0.85			0.69	1.22	0.79	0.89		1.03	0.88	
Control Delay	169.1	129.5			89.3	159.2	74.4	17.4		83.1	19.2	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

7: Office Center Entrance & Creedmoor Rd.

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	11.8		0.0	6.2	
Total Delay	169.1	129.5			89.3	159.2	74.4	29.1		83.1	25.4	
LOS	F	F			F	F	E	C		F	C	
Approach Delay		152.5			148.2			31.0			36.0	
Approach LOS		F			F			C			D	
Queue Length 50th (ft)	~174	116			171	~430	132	591		~271	479	
Queue Length 95th (ft)	#330	#236			247	#686	m127	m699		m196	m340	
Internal Link Dist (ft)		104			152			742			202	
Turn Bay Length (ft)										200		
Base Capacity (vph)	130	117			366	664	139	2921		408	2138	
Starvation Cap Reductn	0	0			0	0	0	367		0	220	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	1.06	0.85			0.42	1.22	0.79	1.01		1.03	0.98	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 137 (78%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.22
 Intersection Signal Delay: 55.7
 Intersection LOS: E
 Intersection Capacity Utilization 102.1%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

a2	a1	a3	a4
91 s	26 s	18 s	41 s
a6	a5		
101 s	16 s		



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↙	↗	↑↑	↗	↙↙	↑↑
Volume (vph)	489	468	2229	685	494	1504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Fit Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1523	3539	1523	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	489	468	2229	685	494	1504
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	468	2229	685	494	1504
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	28.0	107.0	41.0	28.0	135.0
Total Split (%)	23.3%	15.9%	60.8%	23.3%	15.9%	76.7%
Maximum Green (s)	34.0	21.0	100.0	34.0	21.0	128.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	32.9	55.9	105.1	138.0	23.0	133.1
Actuated g/C Ratio	0.19	0.32	0.60	0.78	0.13	0.76
v/c Ratio	0.76	0.95	1.05	0.57	1.10	0.56
Control Delay	35.3	46.7	70.3	7.7	107.4	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	35.3	46.7	70.3	7.7	107.4	2.9
LOS	D	D	E	A	F	A
Approach Delay	40.9		55.6			28.8
Approach LOS	D		E			C
Queue Length 50th (ft)	204	266	~1495	227	~327	98
Queue Length 95th (ft)	285	#717	#1630	298	m#412	103
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	702	491	2113	1226	449	2676
Starvation Cap Reductn	0	0	0	0	0	429
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.95	1.05	0.56	1.10	0.67

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 111 (63%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 44.0
 Intersection LOS: D
 Intersection Capacity Utilization 104.2%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

ø2	ø1	ø3
107 s	28 s	41 s
ø6		
135 s		

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

10: Crabtree Valley Ave & Blue Ridge Rd.

6/22/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations	↔↔↔		↔↔	↑↑	↑↑↑				
Volume (vph)	257	412	601	950	1299	0	101	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	0.95	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor	0.97				1.00				
Frt	0.908				0.989				
Fit Protected	0.981		0.950						
Satd. Flow (prot)	3137	0	3502	3539	5023	0	0	0	0
Fit Permitted	0.981		0.950						
Satd. Flow (perm)	3137	0	3502	3539	5023	0	0	0	0
Right Turn on Red		No					No		
Satd. Flow (RTOR)									
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	257	412	601	950	1299	0	101	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	669	0	601	950	1400	0	0	0	0
Turn Type			Prot						
Protected Phases			5	2	6				
Permitted Phases	4								
Detector Phase	4		5	2	6				
Switch Phase									
Minimum Initial (s)	7.0		12.0	7.0	12.0				
Minimum Split (s)	38.0		20.0	41.0	41.0				
Total Split (s)	58.0	0.0	47.0	118.0	71.0	0.0	0.0	0.0	0.0
Total Split (%)	33.0%	0.0%	26.7%	67.0%	40.3%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	51.0		40.0	111.0	64.0				
Yellow Time (s)	5.0		5.0	5.0	5.0				
All-Red Time (s)	2.0		2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	2.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag			Lag		Lead				
Lead-Lag Optimize?			Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0				
Recall Mode	None		Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	44.9		36.9	121.1	79.2				
Actuated g/C Ratio	0.26		0.21	0.69	0.45				
v/c Ratio	1.03dr		0.82	0.39	0.62				
Control Delay	64.0		62.2	10.0	19.5				
Queue Delay	0.0		0.0	0.0	0.0				
Total Delay	64.0		62.2	10.0	19.5				
LOS	E		E	B	B				



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	64.0			30.2	19.5				
Approach LOS	E			C	B				
Queue Length 50th (ft)	404		352	173	172				
Queue Length 95th (ft)	m440		341	251	m324				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	945		836	2434	2260				
Starvation Cap Reductn	0		0	0	0				
Spillback Cap Reductn	0		0	0	0				
Storage Cap Reductn	0		0	0	0				
Reduced v/c Ratio	0.71		0.72	0.39	0.62				

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 5 (3%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 32.3
 Intersection LOS: C
 Intersection Capacity Utilization 78.2%
 ICU Level of Service D
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.
 dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2	↑ ø4
118 s	58 s
↓ ø6	↖ ø5
71 s	47 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

11: Crabtree Valley Ave & Mall Parking Deck

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	1101	12	30	818	306	16	5	15	115	5	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.91		0.98				0.95
Frt		0.998				0.850		0.888				0.856
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3529	0	1770	3539	1583	1770	1623	0	1770	1520	0
Flt Permitted	0.950			0.950			0.469			0.744		
Satd. Flow (perm)	1770	3529	0	1770	3539	1435	874	1623	0	1386	1520	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45				35
Link Distance (ft)		880			946			363				596
Travel Time (s)		13.3			14.3			5.5				11.6
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1101	12	30	818	306	16	5	15	115	5	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1113	0	30	818	306	16	20	0	115	128	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	28.0	108.0	0.0	16.0	96.0	96.0	52.0	52.0	0.0	52.0	52.0	0.0
Total Split (%)	15.9%	61.4%	0.0%	9.1%	54.5%	54.5%	29.5%	29.5%	0.0%	29.5%	29.5%	0.0%
Maximum Green (s)	21.0	101.0		9.0	89.0	89.0	45.0	45.0		45.0	45.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	15.9	130.8		10.4	122.8	122.8	22.2	22.2		22.2	22.2	
Actuated g/C Ratio	0.09	0.74		0.06	0.70	0.70	0.13	0.13		0.13	0.13	
v/c Ratio	0.52	0.42		0.29	0.33	0.31	0.15	0.10		0.66	0.67	
Control Delay	79.5	5.9		106.5	7.9	8.4	68.5	66.0		90.0	89.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	79.5	5.9		106.5	7.9	8.4	68.5	66.0		90.0	89.3	
LOS	E	A		F	A	A	E	E		F	F	
Approach Delay		11.0			10.6			67.1				89.6
Approach LOS		B			B			E				F
Queue Length 50th (ft)	97	126		36	117	83	17	21		129	144	
Queue Length 95th (ft)	m130	m156		m46	187	m149	42	48		196	212	
Internal Link Dist (ft)		800			866			283				516
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	231	2623		117	2470	1001	233	433		370	406	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.36	0.42		0.26	0.33	0.31	0.07	0.05		0.31	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 122 (69%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 18.9
 Intersection LOS: B
 Intersection Capacity Utilization 60.1%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

ø1 16 s	ø2 108 s	ø4 52 s
ø6 96 s	ø5 28 s	ø8 52 s

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

12: Crabtree Valley Ave & Mall Entrance

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	683	356	854	759	716	135	293	603	511	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.91			0.95		0.97	
Frt			0.850			0.850			0.850		0.909	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1643	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1494	3433	3539	1435	1770	1863	1507	3433	1643	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	683	356	854	759	716	135	293	603	511	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	683	356	854	759	716	135	293	603	511	429	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	34.0	43.0	22.0	50.0	59.0	42.0	22.0	41.0	50.0	42.0	61.0	0.0
Total Split (%)	19.3%	24.4%	12.5%	28.4%	33.5%	23.9%	12.5%	23.3%	28.4%	23.9%	34.7%	0.0%
Maximum Green (s)	27.0	36.0	15.0	43.0	52.0	35.0	15.0	34.0	43.0	35.0	54.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	36.1	37.3	59.8	45.0	46.2	87.1	22.5	32.8	77.8	40.9	51.2	
Actuated g/C Ratio	0.21	0.21	0.34	0.26	0.26	0.49	0.13	0.19	0.44	0.23	0.29	
v/c Ratio	0.53	0.91	0.69	0.97	0.82	0.96	0.60	0.84	0.88	0.64	0.90	
Control Delay	50.9	65.7	27.1	88.4	68.5	64.2	85.2	90.3	39.0	66.1	81.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	50.9	65.7	27.1	88.4	68.5	64.2	85.2	90.3	39.0	66.1	81.6	
LOS	D	E	C	F	E	E	F	F	D	E	F	
Approach Delay		52.2			74.5			59.6			73.2	
Approach LOS		D			E			E			E	
Queue Length 50th (ft)	182	400	249	509	436	731	153	326	284	284	469	
Queue Length 95th (ft)	300	#513	252	#649	490	#1020	#271	441	420	353	#615	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	363	764	519	878	1086	744	226	381	686	798	523	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.53	0.89	0.69	0.97	0.70	0.96	0.60	0.77	0.88	0.64	0.82	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 82 (47%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 66.5
 Intersection LOS: E
 Intersection Capacity Utilization 93.0%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø1 50 s	ø2 43 s	ø4 61 s	ø3 22 s
ø6 53 s	ø5 34 s	ø8 41 s	ø7 42 s

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	187	309	1242	76	458	477
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1494	3539	1494	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	309	1242	76	458	477
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	309	1242	76	458	477
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	44.0	41.0	91.0	44.0	41.0	132.0
Total Split (%)	25.0%	23.3%	51.7%	25.0%	23.3%	75.0%
Maximum Green (s)	37.0	34.0	84.0	37.0	34.0	125.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	25.9	56.6	104.4	130.3	30.7	140.1
Actuated g/C Ratio	0.15	0.32	0.59	0.74	0.17	0.80
v/c Ratio	0.72	0.62	0.59	0.07	0.76	0.17
Control Delay	86.5	52.0	25.5	5.8	64.8	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings
13: Arrow Dr & Blue Ridge Rd.

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

6/22/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	86.5	52.0	25.5	5.8	64.8	9.2
LOS	F	D	C	A	E	A
Approach Delay	65.0		24.3			36.4
Approach LOS	E		C			D
Queue Length 50th (ft)	209	289	460	19	241	130
Queue Length 95th (ft)	289	344	643	40	279	152
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	392	546	2099	1237	708	2817
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.57	0.59	0.06	0.65	0.17

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 61 (35%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 35.8
 Intersection Capacity Utilization 70.7%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service C

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

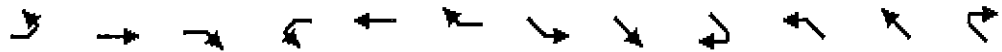
ø1	ø2	ø4
41 s	91 s	44 s
ø6		
132 s		

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



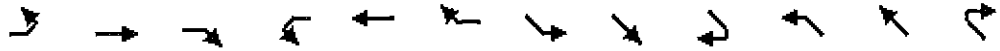
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↑↑	↑					↑↑	
Volume (vph)	0	0	0	0	2665	852	0	0	0	0	1023	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	14	12
Grade (%)		0%			-1%			0%			0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	*1.00	1.00
Fr						0.850						
Fit Protected												
Satd. Flow (prot)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Fit Permitted												
Satd. Flow (perm)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Right Turn on Red			No			No			No	No		No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			45			45	
Link Distance (ft)		331			584			383			483	
Travel Time (s)		5.0			15.9			5.8			7.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2665	852	0	0	0	0	1023	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2665	852	0	0	0	0	1023	0
Turn Type						Perm						
Protected Phases					8						6	
Permitted Phases						8						
Detector Phase					8	8					6	
Switch Phase												
Minimum Initial (s)					7.0	7.0					12.0	
Minimum Split (s)					20.0	20.0					20.0	
Total Split (s)	0.0	0.0	0.0	0.0	128.0	128.0	0.0	0.0	0.0	0.0	48.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	72.7%	72.7%	0.0%	0.0%	0.0%	0.0%	27.3%	0.0%
Maximum Green (s)					121.0	121.0					41.0	
Yellow Time (s)					5.0	5.0					5.0	
All-Red Time (s)					2.0	2.0					2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0					3.0	
Recall Mode					None	None					C-Min	
Act Effct Green (s)					123.0	123.0					43.0	
Actuated g/C Ratio					0.70	0.70					0.24	
v/c Ratio					1.07	0.77					1.05	
Control Delay					67.6	23.1					92.1	
Queue Delay					0.0	0.0					0.0	
Total Delay					67.6	23.1					92.1	
LOS					E	C					F	
Approach Delay					56.8						92.1	
Approach LOS					E						F	
Queue Length 50th (ft)					~1788	599					~641	
Queue Length 95th (ft)					#1887	795					m#600	

Lanes, Volumes, Timings

WB Glenwood Overpass & CVA Extension to I-440 PM (2035)

109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

6/22/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Internal Link Dist (ft)		251			504			303			403	
Turn Bay Length (ft)												
Base Capacity (vph)					2486	1112					971	
Starvation Cap Reductn					0	0					0	
Spillback Cap Reductn					0	0					0	
Storage Cap Reductn					0	0					0	
Reduced v/c Ratio					1.07	0.77					1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 176
 Actuated Cycle Length: 176
 Offset: 173 (98%), Referenced to phase 2: and 6:NWT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 64.8
 Intersection Capacity Utilization 110.3%
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

← ø6	← ø8
48 s	128 s

HCM Unsignalized Intersection Capacity Analysis Overpass & CVA Extension to I-440 PM (2035)
 8: Crabtree Mall Entrance & Blue Ridge Rd 6/22/2010

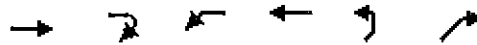


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Volume (veh/h)	0	475	0	1097	925	360
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	475	0	1097	925	360
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	458	
pX, platoon unblocked	0.77	0.72	0.72			
vC, conflicting volume	1474	462	925			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	397	0	116			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	39	100			
cM capacity (veh/h)	449	780	1058			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	475	548	548	462	462	360
Volume Left	0	0	0	0	0	0
Volume Right	475	0	0	0	0	360
cSH	780	1700	1700	1700	1700	1700
Volume to Capacity	0.61	0.32	0.32	0.27	0.27	0.21
Queue Length 95th (ft)	105	0	0	0	0	0
Control Delay (s)	16.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	16.5	0.0		0.0		
Approach LOS	C					

Intersection Summary	
Average Delay	2.7
Intersection Capacity Utilization	61.6% ICU Level of Service B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis Overpass & CVA Extension to I-440 PM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/22/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1135	44	0	957	0	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1135	44	0	957	0	62
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.91	
vC, conflicting volume			1185		1642	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1185		1504	602
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	86
cM capacity (veh/h)			582		101	438

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	757	422	478	478	62
Volume Left	0	0	0	0	0
Volume Right	0	44	0	0	62
cSH	1700	1700	1700	1700	438
Volume to Capacity	0.45	0.25	0.28	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.6
Lane LOS					B
Approach Delay (s)	0.0		0.0		14.6
Approach LOS					B

Intersection Summary		
Average Delay	0.4	
Intersection Capacity Utilization	45.5%	ICU Level of Service A
Analysis Period (min)	15	

Network Totals

Number of Intersections	45
Control Delay / Veh (s/v)	61
Queue Delay / Veh (s/v)	2
Total Delay / Veh (s/v)	63
Total Delay (hr)	5769
Stops / Veh	0.19
Stops (#)	62260
Average Speed (mph)	7
Total Travel Time (hr)	6719
Distance Traveled (mi)	44951
Fuel Consumed (gal)	6464
Fuel Economy (mpg)	7.0
CO Emissions (kg)	451.87
NOx Emissions (kg)	87.92
VOC Emissions (kg)	104.72
Unserved Vehicles (#)	11221
Vehicles in dilemma zone (#)	1153
Performance Index	5941.9

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	14296.5	14928.0	14809.3	14897.4	15360.6	15545.2	14972.4
Delay / Veh (s)	2505.5	2716.1	2702.6	2697.0	2904.3	3104.4	2810.4
Stop Delay (hr)	13803.7	14430.2	14314.8	14406.1	14871.6	15088.9	14489.2
St Del/Veh (s)	2419.1	2625.5	2612.3	2608.1	2811.9	3013.3	2719.7
Total Stops	91264	89928	89486	91430	89439	82481	91137
Stop/Veh	4.44	4.55	4.54	4.60	4.70	4.58	4.75
Travel Dist (mi)	25964.1	25728.4	25569.2	25685.3	24910.1	23892.6	24916.5
Travel Time (hr)	14918.3	15543.8	15418.1	15512.2	15950.7	16112.3	15562.9
Avg Speed (mph)	9	8	8	8	8	8	8
Fuel Used (gal)	4199.2	4325.4	4294.3	4324.4	4390.6	4398.4	4307.8
Fuel Eff. (mpg)	6.2	5.9	6.0	5.9	5.7	5.4	5.8
HC Emissions (g)	22119	21937	21563	23538	22323	20314	21532
CO Emissions (g)	842382	827480	821179	858425	827040	784857	815336
NOx Emissions (g)	54627	53623	52372	56373	53537	50065	51840
Vehicles Entered	21305	20639	20642	20629	19902	18802	20017
Vehicles Exited	19780	18933	18813	19142	18179	17252	18341
Hourly Exit Rate	19780	18933	18813	19142	18179	17252	18341
Input Volume	482528	482528	482528	482528	482528	482528	482528
% of Volume	4	4	4	4	4	4	4
Denied Entry Before	1232	1319	1335	1341	1264	1254	1235
Denied Entry After	24278	25143	25058	25197	26138	27263	25758

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	14547.7	15030.2	14829.7	14921.7
Delay / Veh (s)	2551.4	2839.2	2778.0	2754.9
Stop Delay (hr)	14051.5	14548.6	14355.1	14436.0
St Del/Veh (s)	2464.3	2748.2	2689.1	2665.2
Total Stops	92323	88135	90251	89583
Stop/Veh	4.50	4.62	4.70	4.59
Travel Dist (mi)	26147.5	24877.7	25007.5	25269.9
Travel Time (hr)	15174.2	15623.1	15422.7	15523.8
Avg Speed (mph)	9	8	8	8
Fuel Used (gal)	4260.9	4320.3	4276.6	4309.8
Fuel Eff. (mpg)	6.1	5.8	5.8	5.9
HC Emissions (g)	22122	20966	20896	21731
CO Emissions (g)	843983	803522	805213	822942
NOx Emissions (g)	54639	51535	51059	52967
Vehicles Entered	21368	19984	19995	20323
Vehicles Exited	19687	18132	18441	18671
Hourly Exit Rate	19687	18132	18441	18671
Input Volume	482528	482528	482528	482528
% of Volume	4	4	4	4
Denied Entry Before	1219	1328	1173	1268
Denied Entry After	24529	25910	25816	25506

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	65	1030.9	1063.0	0.4	6	6	991.6
	64	100.8	114.1	0.2	5	5	101.7
	68	49.3	56.1	0.1	5	5	50.4
Creedmoor Rd	1	365.6	398.2	0.4	4	4	373.1
Crabtree Mall Entr	2	118.4	135.5	0.2	5	5	139.6
Glenwood Ave #2	82	72.3	81.7	0.1	5	5	76.5
	89	128.9	142.4	0.2	4	4	129.2
Blue Ridge Rd	3	22.6	24.8	0.0	5	5	23.4
Crabtree View Pl	81	15.7	21.4	0.1	11	11	16.6
Glenwood Ave #1	87	19.2	27.2	0.1	13	12	21.4
I-440 WB On/Off Ramp	4	13.1	18.0	0.1	12	11	15.0
WB I-440 On Ramp fro	44	7.8	13.9	0.1	24	23	8.1
EB I-440 On Ramp fro	23	3.2	7.9	0.0	20	19	3.4
Ridge Rd Extension	5	52.2	57.5	0.1	4	4	58.4
Total		1999.9	2161.7	2.0	5	5	2008.4

Arterial Level of Service: EB Glenwood Ave #1

Gross Street	Run 10 Speed	Run 10 Delay	Run 11 Speed	Run 11 Delay	Run 12 Speed	Run 12 Delay	Run 13 Speed	Run 13 Delay
	5	95.9	5	102.1	5	98.3	5	5
	5	48.6	5	52.8	5	51.2	5	5
Creedmoor Rd	4	354.5	3	391.1	3	394.3	4	4
Crabtree Mall Entr	6	109.9	5	122.2	6	116.1	6	6
Glenwood Ave #2	5	65.6	5	72.1	5	74.6	5	5
	4	122.3	4	122.3	4	134.0	4	4
Blue Ridge Rd	5	21.4	5	21.7	5	23.5	5	5
Crabtree View Pl	13	12.8	10	17.7	12	15.2	11	11
Glenwood Ave #1	14	16.2	12	20.2	13	19.1	12	12
I-440 WB On/Off Ramp	12	12.5	12	13.4	12	13.0	12	12
WB I-440 On Ramp fro	24	8.0	24	8.0	25	7.4	23	23
EB I-440 On Ramp fro	16	5.0	19	3.4	19	3.4	21	21
Ridge Rd Extension	4	56.9	4	54.5	4	52.5	4	4
Total	6	1798.6	5	2042.9	5	2060.9	5	5

Arterial Level of Service: EB Glenwood Ave #1

Link	Flow	Level of Service	Flow	Level of Service	Flow	Level of Service	Flow	Level of Service
Creedmoor Rd	49.9	6	45.0	5	47.6	5	50.0	6
Crabtree Mall Entr	364.2	4	329.9	4	352.0	4	370.5	4
Glenwood Ave #2	105.5	7	90.6	5	133.1	5	138.1	5
Blue Ridge Rd	65.8	5	69.2	5	78.9	5	74.8	5
Crabtree View Pl	120.6	4	128.0	4	131.7	4	124.9	4
Glenwood Ave #1	22.2	5	22.2	5	23.4	5	22.6	5
I-440 WB On/Off Ramp	15.9	12	14.6	11	17.2	12	14.6	12
WB I-440 On Ramp fro	20.0	14	16.5	12	20.9	13	18.2	12
EB I-440 On Ramp fro	13.2	13	11.7	11	13.9	12	12.6	12
Ridge Rd Extension	8.1	25	7.1	24	8.0	25	7.4	25
Total	2.7	20	3.0	21	2.6	21	2.9	21
Total	48.9	4	50.4	4	53.3	5	45.2	5
Total	2039.6	6	1939.0	5	1923.6	5	2087.1	5

Arterial Level of Service: EB Glenwood Ave #1

Link	Flow	Level of Service	Flow	Level of Service
Creedmoor Rd	5	102.9	5	106.5
Crabtree Mall Entr	5	50.6	6	46.3
Glenwood Ave #2	4	365.6	4	362.8
Blue Ridge Rd	6	108.3	5	124.6
Crabtree View Pl	5	76.5	5	70.3
Glenwood Ave #1	4	149.9	4	127.0
I-440 WB On/Off Ramp	5	22.7	5	22.7
WB I-440 On Ramp fro	11	15.6	11	17.0
EB I-440 On Ramp fro	13	19.1	12	20.2
Ridge Rd Extension	12	13.1	12	13.2
Total	24	7.7	24	8.0
Total	20	3.3	23	2.2
Total	4	51.8	4	50.5
Total	5	2028.2	5	2089.4

Arterial Level of Service: WB Glenwood Ave #2

Gross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB I-440 On Ramp fro	5	982.7	1004.9	0.3	8	8	821.7
EB I-440 On Ramp fro	23	12.7	16.3	0.1	15	15	12.5
WB I-440 On Ramp fro	44	27.1	33.1	0.0	5	4	32.1
I-440 WB On/Off Ramp	4	33.7	41.3	0.1	8	7	37.9
Glenwood Ave	87	13.8	16.1	0.1	13	13	14.8
Total		1070.1	1111.7	0.5	8	8	919.1

Arterial Level of Service: WB Glenwood Ave #2

Gross Street	Run 10 Speed	Run 10 Delay	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed
EB I-440 On Ramp fro	10	947.1	9	995.6	8	1101.5	8
EB I-440 On Ramp fro	18	9.7	16	11.2	15	12.8	16
WB I-440 On Ramp fro	6	18.2	5	24.3	4	34.0	5
I-440 WB On/Off Ramp	9	30.2	8	33.2	7	37.6	8
Glenwood Ave	14	13.0	13	14.0	13	14.8	13
Total	10	1018.5	9	968.3	7	1200.6	8

Arterial Level of Service: WB Glenwood Ave #2

Gross Street	Run 4 Delay	Run 5 Speed	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	1012.9	7	989.1	8	855.0	9	1108.4
EB I-440 On Ramp fro	11.2	12	16.8	14	13.7	17	10.5
WB I-440 On Ramp fro	28.5	5	28.9	4	31.1	5	28.4
I-440 WB On/Off Ramp	34.5	9	29.9	8	36.7	8	34.9
Glenwood Ave	14.4	15	11.9	13	14.2	13	13.7
Total	1101.5	8	1076.6	8	950.9	9	1195.9

Arterial Level of Service: WB Glenwood Ave #2

Gross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On Ramp fro	8	1055.2	8	1157.6
EB I-440 On Ramp fro	12	15.7	14	13.4
WB I-440 On Ramp fro	5	23.7	5	22.7
I-440 WB On/Off Ramp	8	32.0	9	30.6
Glenwood Ave	13	13.8	14	12.9
Total	8	1154.4	9	1137.2

Arterial Level of Service: NW Glenwood Ave #3

Cross Street	Arterial	Delay (sec)	Travel Time (min)	LOS	Arterial Speed (mph)	Peak 1 Speed (mph)	Peak 2 Speed (mph)
	83	23.5	27.3	0.1	8	8	33.0
	83	11.8	16.1	0.1	12	10	13.8
	94	29.2	38.0	0.1	10	9	34.6
Glenwood Ave	100	7.5	9.4	0.0	14	12	8.9
	28	19.9	25.1	0.0	7	6	23.4
Glenwood Ave #3	82	17.3	21.4	0.0	8	7	20.5
Marriott Dr	2	43.0	51.7	0.1	8	7	48.1
Creedmoor Rd	1	127.9	144.4	0.2	5	5	136.5
	68	11.1	44.6	0.4	33	32	11.4
	64	0.9	7.6	0.1	39	38	1.0
	65	1.8	15.0	0.2	39	39	1.9
Total		299.7	410.6	1.3	12	11	333.2

Arterial Level of Service: NW Glenwood Ave #3

Cross Street	Peak 1 Delay (sec)	Peak 1 Travel Time (min)	Peak 2 Delay (sec)	Peak 2 Travel Time (min)	Peak 3 Delay (sec)	Peak 3 Travel Time (min)	Peak 4 Delay (sec)	Peak 4 Travel Time (min)
	7	27.8	7	21.1	8	20.1	8	25.5
	12	11.4	12	11.2	11	12.5	11	11.1
	10	31.0	11	25.8	10	31.3	10	10.0
Glenwood Ave	13	8.1	15	6.6	13	8.1	14	14.0
	7	20.1	7	18.8	7	20.6	7	7.0
Glenwood Ave #3	8	17.1	8	17.0	8	17.8	8	8.0
Marriott Dr	8	41.7	8	43.3	8	42.8	8	8.0
Creedmoor Rd	5	126.9	5	128.2	5	126.0	5	5.0
	33	11.1	33	11.1	33	10.9	33	33.0
	39	0.9	39	0.9	39	0.8	39	39.0
	39	1.9	39	1.9	39	1.7	39	39.0
Total	12	298.1	12	293.4	12	302.6	11	11.0

Arterial Level of Service: NW Glenwood Ave #3

Cross Street	Peak 4 Delay (sec)	Peak 4 Speed (mph)	Peak 5 Delay (sec)	Peak 5 Speed (mph)	Peak 6 Delay (sec)	Peak 6 Speed (mph)	Peak 7 Delay (sec)	Peak 7 Speed (mph)
	11.9	7	25.3	8	31.4	7	26.5	7.0
	11.9	13	9.7	11	13.0	12	11.7	11.0
	30.7	12	24.4	9	32.5	10	28.4	10.0
Glenwood Ave	7.8	17	6.0	13	8.5	14	7.4	7.0
	20.9	9	15.2	6	22.6	7	20.2	7.0
Glenwood Ave #3	18.3	10	12.6	8	18.4	8	17.7	8.0
Marriott Dr	45.0	10	31.8	7	46.0	8	43.9	8.0
Creedmoor Rd	129.9	6	113.9	5	132.2	5	127.0	5.0
	11.0	33	10.9	33	11.0	33	10.7	10.0
	1.0	39	0.8	39	0.8	39	0.9	0.0
	1.9	39	1.7	39	1.8	39	1.8	1.0
Total	308.5	13	252.3	11	318.4	12	298.3	12.0

Arterial Level of Service: NW Glenwood Ave #3

Link Name	Vol	Vol/Cap	Vol	Vol/Cap
	6	11.2	7	13.5
	11	12.2	13	10.3
	11	27.9	12	25.0
Glenwood Ave	15	7.0	16	6.2
	7	19.6	8	17.7
Glenwood Ave #3	8	17.0	8	16.4
Marriott Dr	8	44.5	8	42.6
Creedmoor Rd	5	129.7	5	128.7
	33	11.1	33	11.3
	39	0.9	38	1.0
	39	1.7	38	2.0
Total	12	302.8	12	289.7

**2035 CVA Extension to I-440,
WB Glenwood Ave Overpass and
Creedmoor Road SPUI**

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 1: Glenwood Ave #1 & Creedmoor Rd. 6/24/2010

Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	134	279	423	306	283	854	384	673	129	1969	1820	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		0	275		310			450		
Storage Lanes	2	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	0.97	1.00	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor			0.98			0.98			0.92		0.99	
Frt			0.850			0.850			0.850		0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	3539	1583	3433	3539	1583	3467	3495	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1863	1545	3433	3539	1559	3433	3539	1464	3467	3495	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								654			1586	
Travel Time (s)								12.7			24.0	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	134	279	423	306	283	854	384	673	129	1969	1820	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	279	423	306	283	854	384	673	129	1969	2015	0
Turn Type	Prot	custom	custom	Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			3 2			Free			8 1			
Detector Phase	5	2	3 2	1	6		3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.3	33.0		14.3	31.0		14.4	18.0		14.4	18.0	
Total Split (s)	20.1	35.0	63.2	22.0	36.9	0.0	28.2	38.0	60.0	103.0	112.8	0.0
Total Split (%)	10.2%	17.7%	31.9%	11.1%	18.6%	0.0%	14.2%	19.2%	30.3%	52.0%	57.0%	0.0%
Maximum Green (s)	13.1	28.0		15.0	29.9		21.2	31.0		96.0	105.8	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	C-Min		None	C-Min	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			4.0			4.0	
Pedestrian Calls (#/hr)		12			12			24			24	
Act Effct Green (s)	11.5	28.0	56.2	15.0	31.5	198.0	21.2	33.4	53.0	96.0	108.2	
Actuated g/C Ratio	0.06	0.14	0.28	0.08	0.16	1.00	0.11	0.17	0.27	0.48	0.55	
v/c Ratio	0.67	1.06	0.96	1.18	0.50	0.55	1.04	1.13	0.33	1.17	1.05	
Control Delay	108.0	148.9	103.1	184.9	80.0	1.4	155.6	119.8	43.6	128.5	79.8	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 1: Glenwood Ave #1 & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.0	148.9	103.1	184.9	80.0	1.4	155.6	119.8	43.6	128.5	79.8	
LOS	F	F	F	F	E	A	F	F	D	F	E	
Approach Delay								123.1			103.9	
Approach LOS								F			F	
Queue Length 50th (ft)	89	~397	550	~244	181	0	~282	~517	57	~1568	~1503	
Queue Length 95th (ft)	131	#604	#784	#355	237	0	m#394	m#638	m143	#1682	#1620	
Internal Link Dist (ft)								574			1506	
Turn Bay Length (ft)					275	275	310		175	450		
Base Capacity (vph)	227	263	439	260	563	1559	368	597	392	1681	1910	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	1.06	0.96	1.18	0.50	0.55	1.04	1.13	0.33	1.17	1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 164 (83%), Referenced to phase 4:SBT and 8:NBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.18
 Intersection Signal Delay: 99.3 Intersection LOS: F
 Intersection Capacity Utilization 120.5% ICU Level of Service H
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.

ø2	ø1	ø4	ø3
35 s	22 s	112.9 s	28.2 s
ø5	ø6	ø8	ø7
20.1 s	36.9 s	38 s	103 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑				↔↔	↔	↑↑	↔	↔↔↔	↑↑	
Volume (vph)	555	4204	184	0	0	870	91	346	311	1804	1650	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	14	12	12	12	12	12	12
Grade (%)		2%			0%			2%			-2%	
Storage Length (ft)	0		0	0		0	90		0	250		0
Storage Lanes	2		0	0		2	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	1.00	1.00	0.88	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00									0.98	
Frt		0.994				0.850			0.850		0.983	
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3399	6296	0	0	0	2972	1752	3504	1567	5040	3455	0
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3399	6296	0	0	0	2972	1752	3504	1567	5040	3455	0
Right Turn on Red			No			No			Yes			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		180			354			458			520	
Travel Time (s)		2.7			5.4			8.9			10.1	
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	555	4204	184	0	0	870	91	346	311	1804	1650	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	4388	0	0	0	870	91	346	311	1804	1863	0
Turn Type	Prot					custom	Prot		Perm	Prot		
Protected Phases	5	2				67	3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2				67	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0					7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	34.0					14.0	14.0	14.0	14.0	25.5	
Total Split (s)	49.0	111.0	0.0	0.0	0.0	114.0	15.0	35.0	35.0	52.0	72.0	0.0
Total Split (%)	24.7%	56.1%	0.0%	0.0%	0.0%	57.6%	7.6%	17.7%	17.7%	26.3%	36.4%	0.0%
Maximum Green (s)	42.0	104.0					8.0	28.0	28.0	45.0	65.0	
Yellow Time (s)	5.0	5.0					5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0					2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	2.0	4.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lead						Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes						Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.0					3.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min					None	None	None	None	None	
Walk Time (s)		7.0									7.0	
Flash Dont Walk (s)		20.0									11.5	
Pedestrian Calls (#/hr)		12									24	
Act Effct Green (s)	38.9	106.0				109.1	10.0	30.0	30.0	47.0	67.0	
Actuated g/C Ratio	0.20	0.54				0.55	0.05	0.15	0.15	0.24	0.34	
v/c Ratio	0.83	1.30				0.53	1.03	0.65	1.31	1.51	1.59	

Lane Group	ø6
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	41.0
Total Split (s)	62.0
Total Split (%)	31%
Maximum Green (s)	55.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	20.0
Pedestrian Calls (#/hr)	12
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	90.1	168.4				14.3	174.9	69.5	217.8	271.8	303.9	
Quaava Delay	0.0	0.0				0.8	0.0	10.2	0.0	84.1	86.6	
Total Delay	90.1	168.4				15.1	174.9	79.7	217.8	355.9	390.4	
LOS	F	F				B	F	E	F	F	F	
Approach Delay		159.6						148.7			373.5	
Approach LOS		F						F			F	
Queue Length 50th (ft)	349	~2141				148	~127	238	~524	~1150	~1811	
Queue Length 95th (ft)	m349	m#1920				198	#258	258	#744	#1237	#1936	
Internal Link Dist (ft)		100			274			378			440	
Turn Bay Length (ft)							90			250		
Base Capacity (vph)	755	3371				1638	88	531	237	1196	1169	
Starvation Cap Reductn	0	0				0	0	0	0	132	126	
Spillback Cap Reductn	0	0				446	0	154	0	0	0	
Storage Cap Reductn	0	0				0	0	0	0	0	0	
Reduced v/c Ratio	0.74	1.30				0.73	1.03	0.92	1.31	1.70	1.79	

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 62 (31%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.59
 Intersection Signal Delay: 223.2
 Intersection Capacity Utilization 135.0%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø2	ø3	ø4
111 s	15 s	72 s
ø5	ø6	ø7
49 s	62 s	35 s
		52 s

Lane Group	ø6
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓	↑↑	↑↑	↑		
Volume (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.93									
Frt			0.850			0.850			0.850			
Flt Protected				0.950			0.950	0.983				
Satd. Flow (prot)	0	4984	1552	1832	5263	1639	3029	3134	1575	0	0	0
Flt Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1445	1832	5263	1639	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	3222	1096	100	1826	587	1127	576	374	0	0	0
Shared Lane Traffic (%)							26%					
Lane Group Flow (vph)	0	3222	1096	100	1826	587	834	869	374	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	119.0	65.0	14.0	133.0	133.0	65.0	65.0	14.0	0.0	0.0	0.0
Total Split (%)	0.0%	60.1%	32.8%	7.1%	67.2%	67.2%	32.8%	32.8%	7.1%	0.0%	0.0%	0.0%
Maximum Green (s)		112.0	58.0	7.0	126.0	126.0	58.0	58.0	7.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	Min	Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		114.0	174.0	9.0	128.0	128.0	60.0	60.0	74.0			
Actuated g/C Ratio		0.58	0.88	0.05	0.65	0.65	0.30	0.30	0.37			
w/c Ratio		1.12	0.84	1.20	0.54	0.55	0.91	0.91	0.63			
Control Delay		86.3	2.9	234.8	19.7	21.8	80.6	81.0	56.8			

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		86.3	2.9	234.8	19.7	21.8	80.6	81.0	56.8			
LOS		F	A	F	B	C	F	F	E			
Approach Delay		65.1			28.7			76.5				
Approach LOS		E			C			E				
Queue Length 50th (ft)		~1763	56	~157	455	407	613	640	402			
Queue Length 95th (ft)		m958	m41	#300	489	518	#743	#772	531			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2870	1302	83	3402	1060	918	950	589			
Starvation Cap Reductn		0	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		1.12	0.84	1.20	0.54	0.55	0.91	0.91	0.63			

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 58 (29%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.20
 Intersection Signal Delay: 57.5
 Intersection LOS: E
 Intersection Capacity Utilization 104.9%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

02	01	03
119 s	14 s	65 s
06	08	
133 s	65 s	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↗	↔		↖	↗	↖	↗	↗	↖
Volume (vph)	0	0	64	713	7	28	67	1422	282	69	2890	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12	12	12	12
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.92		1.00				0.94		1.00	
Frt			0.865		0.989				0.850		0.999	
Flt Protected				0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	0	1627	1631	1620	0	1717	3662	1536	1823	5229	0
Flt Permitted				0.950	0.957		0.950			0.950		
Satd. Flow (perm)	0	0	1505	1631	1620	0	1717	3662	1439	1823	5229	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			520			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	64	713	7	28	67	1422	282	69	2890	21
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	0	64	378	370	0	67	1422	282	69	2911	0
Turn Type			custom	Split			Prot		pm+ov	Prot		
Protected Phases			5	4	4		5	2	4	1	6	
Permitted Phases			5						2			
Detector Phase			5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)			7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)			14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	0.0	0.0	16.0	58.0	58.0	0.0	16.0	121.0	58.0	19.0	124.0	0.0
Total Split (%)	0.0%	0.0%	8.1%	29.3%	29.3%	0.0%	8.1%	61.1%	29.3%	9.6%	62.6%	0.0%
Maximum Green (s)			9.0	51.0	51.0		9.0	114.0	51.0	12.0	117.0	
Yellow Time (s)			5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)			2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag			Lag				Lag	Lead		Lag	Lead	
Lead-Lag Optimize?			Yes				Yes	Yes		Yes	Yes	
Vehicle Extension (s)			1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode			None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)			10.6	50.1	50.1		10.6	111.5	161.6	21.4	122.3	
Actuated g/C Ratio			0.05	0.25	0.25		0.05	0.56	0.82	0.11	0.62	
v/c Ratio			0.74	0.92	0.90		0.73	0.69	0.24	0.35	0.90	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			133.4	98.3	96.3		122.0	29.5	3.8	90.4	38.2	
Queue Delay			1.2	58.4	53.8		0.0	2.3	0.3	0.0	1.2	
Total Delay			134.6	156.8	150.1		122.0	31.8	4.1	90.4	39.5	
LOS			F	F	F		F	C	A	F	D	
Approach Delay					153.5			30.8			40.6	
Approach LOS					F			C			D	
Queue Length 50th (ft)			84	500	487		89	370	18	89	1219	
Queue Length 95th (ft)			#169	#694	#675		m#172	540	34	150	1266	
Internal Link Dist (ft)		140			1181			440			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)			90	437	434		95	2148	1212	197	3229	
Starvation Cap Reductn			0	0	0		0	565	429	0	0	
Spillback Cap Reductn			2	99	99		0	0	0	0	147	
Storage Cap Reductn			0	0	0		0	0	0	0	0	
Reduced v/c Ratio			0.73	1.12	1.10		0.71	0.90	0.36	0.35	0.94	

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 131 (66%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 53.8
 Intersection LOS: D
 Intersection Capacity Utilization 98.5%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

↑ σ2	↘ σ1	↙ σ4
121 s	19 s	58 s
↓ σ6	↗ σ5	
124 s	16 s	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.95				0.96		1.00			1.00	
Frt		0.878				0.850		0.993			0.994	
Flt Protected	0.950				0.986		0.950			0.950		
Satd. Flow (prot)	1761	1541	0	0	1837	2787	1805	5138	0	3416	3496	0
Flt Permitted	0.950				0.986		0.950			0.950		
Satd. Flow (perm)	1761	1541	0	0	1837	2672	1805	5138	0	3416	3496	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			273	
Travel Time (s)		5.0			7.9			16.0			5.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	21	90	10	24	120	145	959	46	93	2427	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	111	0	0	34	120	145	1005	0	93	2533	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		41.0	41.0	15.0	15.0	41.0		15.0	18.0	
Total Split (s)	18.0	18.0	0.0	42.0	42.0	17.0	20.0	121.0	0.0	17.0	118.0	0.0
Total Split (%)	9.1%	9.1%	0.0%	21.2%	21.2%	8.6%	10.1%	61.1%	0.0%	8.6%	59.6%	0.0%
Maximum Green (s)	11.0	11.0		35.0	35.0	10.0	13.0	114.0		10.0	111.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	C-Max	None	Min		C-Max	C-Min	
Walk Time (s)				7.0	7.0			7.0				
Flash Dont Walk (s)				17.0	17.0			10.0				
Pedestrian Calls (#/hr)				12	12			12				
Act Effct Green (s)	13.0	13.0			16.0	115.5	15.0	50.5		101.2	136.8	
Actuated g/C Ratio	0.07	0.07			0.08	0.58	0.08	0.26		0.51	0.69	
v/c Ratio	0.92	1.10			0.23	0.07	1.06	0.77		0.05	1.05	
Control Delay	152.7	196.5			85.3	12.4	183.0	39.3		19.6	42.5	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	24.9	
Total Delay	152.7	196.5			85.3	12.4	183.0	39.3		19.6	67.4	
LOS	F	F			F	B	F	D		B	E	
Approach Delay		175.0			28.5			57.4			65.7	
Approach LOS		F			C			E			E	
Queue Length 50th (ft)	142	~163			44	26	~208	184		21	~1831	
Queue Length 95th (ft)	#281	#314			81	47	#379	200		m31	m#1857	
Internal Link Dist (ft)		104			152			742			193	
Turn Bay Length (ft)										200		
Base Capacity (vph)	116	101			343	1617	137	3010		1747	2415	
Starvation Cap Reductn	0	0			0	0	0	0		0	129	
Spillback Cap Reductn	0	0			0	0	0	0		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	0.92	1.10			0.10	0.07	1.06	0.33		0.05	1.11	

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 87 (44%), Referenced to phase 1:SBL and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 67.8
 Intersection Capacity Utilization 103.9%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

↑ ø2	↘ ø1	↖ ø3	↙ ø4
121 s	17 s	18 s	42 s
↓ ø6	↗ ø5		
118 s	20 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↗	↑↑	↖	↔↔	↑↑
Volume (vph)	650	192	958	375	544	1983
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1518	3539	1518	3433	3539
Right Turn on Red		Yes		No		
Satd. Flow (RTOR)		59				
Link Speed (mph)	45		45		45	
Link Distance (ft)	523		1673		822	
Travel Time (s)	7.9		25.3		12.5	
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	650	192	958	375	544	1983
Shared Lane Traffic (%)						
Lane Group Flow (vph)	650	192	958	375	544	1983
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	55.0	49.0	94.0	55.0	49.0	143.0
Total Split (%)	27.8%	24.7%	47.5%	27.8%	24.7%	72.2%
Maximum Green (s)	48.0	42.0	87.0	48.0	42.0	136.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	Min	None	C-Max	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	44.9	117.2	65.8	110.7	72.3	143.1
Actuated g/C Ratio	0.23	0.59	0.33	0.56	0.37	0.72
v/c Ratio	0.83	0.20	0.81	0.43	0.43	0.78
Control Delay	52.2	3.4	66.3	23.3	28.2	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	1.7

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	52.2	3.4	66.3	23.3	28.2	8.9
LOS	D	A	E	C	C	A
Approach Delay	41.1		54.2			13.0
Approach LOS	D		D			B
Queue Length 50th (ft)	429	7	604	258	221	218
Queue Length 95th (ft)	222	29	640	275	m238	m226
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	867	947	1591	889	1253	2557
Starvation Cap Reductn	0	0	0	0	0	380
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.20	0.60	0.42	0.43	0.91

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 32 (16%), Referenced to phase 1:SBL and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 29.7 Intersection LOS: C
 Intersection Capacity Utilization 83.1% ICU Level of Service E
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ø2	↙ ø1	↘ ø3
94 s	49 s	55 s
↓ ø6		
143 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	176	184	324	572	1599	0	175	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor		0.95			1.00				
Frt		0.850			0.985				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	4998	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1770	1512	3502	3539	4998	0	0	0	0
Right Turn on Red		Yes					No		
Satd. Flow (RTOR)		19							
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	176	184	324	572	1599	0	175	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	176	184	324	572	1774	0	0	0	0
Turn Type		custom	Prot						
Protected Phases		5	5	2	6				
Permitted Phases	4	4							
Detector Phase	4	5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0	12.0	12.0	7.0	12.0				
Minimum Split (s)	38.0	20.0	20.0	41.0	41.0				
Total Split (s)	47.0	39.0	39.0	151.0	112.0	0.0	0.0	0.0	0.0
Total Split (%)	23.7%	19.7%	19.7%	76.3%	56.6%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	40.0	32.0	32.0	144.0	105.0				
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0				
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag		Lead	Lead		Lag				
Lead-Lag Optimize?		Yes	Yes		Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				
Recall Mode	None	Min	Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	27.0	52.6	25.6	161.0	130.4				
Actuated g/C Ratio	0.14	0.27	0.13	0.81	0.66				
v/c Ratio	0.73	0.43	0.72	0.20	0.54				
Control Delay	90.4	44.9	71.1	1.4	4.0				
Queue Delay	0.0	0.0	0.0	0.0	0.0				
Total Delay	90.4	44.9	71.1	1.4	4.0				
LOS	F	D	E	A	A				

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	67.1			26.6	4.0				
Approach LOS	E			C	A				
Queue Length 50th (ft)	235	185	170	20	71				
Queue Length 95th (ft)	319	240	234	26	m48				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	375	491	601	2877	3292				
Starvation Cap Reductn	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.47	0.37	0.54	0.20	0.54				

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 8 (4%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 18.2 Intersection LOS: B
 Intersection Capacity Utilization 69.7% ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2 151 s	↘ ø4 47 s
↙ ø5 39 s	↓ ø6 112 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 11: Crabtree Valley Ave & Mall Parking Deck 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕↕		↔	↕↕	↔	↔	↕	↕	↔	↕	↕
Volume (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.97	
Frt		0.999				0.850		0.908			0.904	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3533	0	1770	3539	1583	1770	1661	0	1770	1626	0
Fit Permitted	0.950			0.950			0.748			0.749		
Satd. Flow (perm)	1770	3533	0	1770	3539	1420	1393	1661	0	1395	1626	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	30	889	7	24	823	103	10	5	8	34	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	896	0	24	823	103	10	13	0	34	14	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	26.0	130.0	0.0	22.0	126.0	126.0	46.0	46.0	0.0	46.0	46.0	0.0
Total Split (%)	13.1%	65.7%	0.0%	11.1%	63.6%	63.6%	23.2%	23.2%	0.0%	23.2%	23.2%	0.0%
Maximum Green (s)	19.0	123.0		15.0	119.0	119.0	39.0	39.0		39.0	39.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	11.2	164.4		11.0	164.5	164.5	13.6	13.6		13.9	13.9	
Actuated g/C Ratio	0.06	0.83		0.06	0.83	0.83	0.07	0.07		0.07	0.07	
v/c Ratio	0.30	0.31		0.24	0.28	0.09	0.10	0.11		0.35	0.12	
Control Delay	88.0	2.3		83.5	0.4	0.3	85.7	85.8		95.6	86.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 11: Crabtree Valley Ave & Mall Parking Deck 6/24/2010

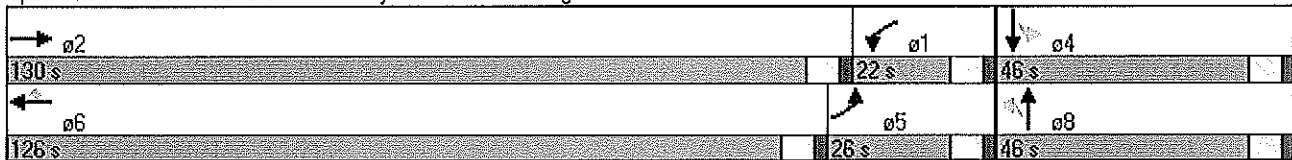


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	88.0	2.3		83.5	0.4	0.3	85.7	85.8		95.6	86.1	
LOS	F	A		F	A	A	F	F		F	F	
Approach Delay		5.0			2.5			85.7				92.9
Approach LOS		A			A			F				F
Queue Length 50th (ft)	39	52		33	0	0	13	16		44	18	
Queue Length 95th (ft)	82	77		m69	4	2	36	42		86	44	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	188	2933		152	2940	1179	288	344		289	337	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.16	0.31		0.16	0.28	0.09	0.03	0.04		0.12	0.04	

Intersection Summary

Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 108 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 6.9
 Intersection Capacity Utilization 43.7%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck



Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	69	475	387	723	797	218	88	69	390	27	23	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.90			0.95		0.96	
Frt			0.850			0.850			0.850		0.889	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1591	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1485	3433	3539	1420	1770	1863	1499	3433	1591	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	69	475	387	723	797	218	88	69	390	27	23	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	475	387	723	797	218	88	69	390	27	88	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	21.0	47.0	46.0	63.0	89.0	15.0	46.0	73.0	63.0	15.0	42.0	0.0
Total Split (%)	10.6%	23.7%	23.2%	31.8%	44.9%	7.6%	23.2%	36.9%	31.8%	7.6%	21.2%	0.0%
Maximum Green (s)	14.0	40.0	39.0	56.0	82.0	8.0	39.0	66.0	56.0	8.0	35.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	None
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	36.2	75.4	109.3	50.4	89.6	103.5	33.9	38.4	88.8	13.9	18.3	
Actuated g/C Ratio	0.18	0.38	0.55	0.25	0.45	0.52	0.17	0.19	0.45	0.07	0.09	
v/c Ratio	0.21	0.35	0.46	0.83	0.50	0.29	0.29	0.19	0.56	0.11	0.60	
Control Delay	61.4	37.5	15.1	78.1	41.1	15.3	73.3	66.0	28.7	87.0	102.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	61.4	37.5	15.1	78.1	41.1	15.3	73.3	66.0	28.7	87.0	102.2	
LOS	E	D	B	E	D	B	E	E	C	F	F	
Approach Delay		30.0			53.3			40.6			98.6	
Approach LOS		C			D			D			F	
Queue Length 50th (ft)	75	172	156	463	390	74	101	77	282	17	112	
Queue Length 95th (ft)	145	250	171	514	507	134	160	119	281	37	177	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	323	1347	893	1010	1627	753	367	640	756	240	297	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.21	0.35	0.43	0.72	0.49	0.29	0.24	0.11	0.52	0.11	0.30	

Intersection Summary

Area Type: Other

Cycle Length: 198

Actuated Cycle Length: 198

Offset: 68 (34%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 46.2

Intersection LOS: D

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø2	ø1	ø3	ø4
47 s	63 s	46 s	42 s
ø6	ø5	ø7	ø8
89 s	21 s	15 s	73 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	153	266	630	110	481	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1485	3539	1485	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	153	266	630	110	481	472
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	266	630	110	481	472
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	55.0	64.0	79.0	55.0	64.0	143.0
Total Split (%)	27.8%	32.3%	39.9%	27.8%	32.3%	72.2%
Maximum Green (s)	48.0	57.0	72.0	48.0	57.0	136.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	24.5	60.3	122.7	147.3	35.7	163.5
Actuated g/C Ratio	0.12	0.30	0.62	0.74	0.18	0.83
v/c Ratio	0.70	0.57	0.29	0.10	0.78	0.16
Control Delay	99.2	57.1	19.0	6.5	56.0	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	99.2	57.1	19.0	6.5	56.0	1.7
LOS	F	E	B	A	E	A
Approach Delay	72.5		17.2			29.1
Approach LOS	E		B			C
Queue Length 50th (ft)	195	282	193	32	263	8
Queue Length 95th (ft)	273	338	281	61	359	16
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	447	532	2193	1167	1023	2922
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.50	0.29	0.09	0.47	0.16

Intersection Summary

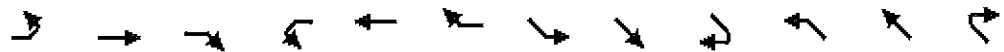
Area Type: Other
 Cycle Length: 198
 Actuated Cycle Length: 198
 Offset: 191 (96%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 33.5
 Intersection Capacity Utilization 53.2%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

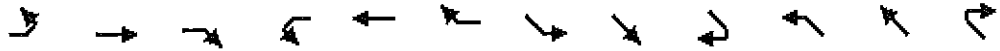
ø2	ø1	ø4
79 s	64 s	55 s
ø6		
143 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 109: Glenwood Ave & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↑↑	↑					↑↑	
Volume (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	14	12
Grade (%)		0%			-1%			0%			0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	*1.00	1.00
Frt						0.850						
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Right Turn on Red			No			No			No	No		No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			45			45	
Link Distance (ft)		331			584			383			483	
Travel Time (s)		5.0			15.9			5.8			7.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1803	407	0	0	0	0	463	0
Turn Type						Perm						
Protected Phases					8						6	
Permitted Phases						8						
Detector Phase					8	8					6	
Switch Phase												
Minimum Initial (s)					7.0	7.0					12.0	
Minimum Split (s)					20.0	20.0					20.0	
Total Split (s)	0.0	0.0	0.0	0.0	74.0	74.0	0.0	0.0	0.0	0.0	25.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	74.7%	74.7%	0.0%	0.0%	0.0%	0.0%	25.3%	0.0%
Maximum Green (s)					67.0	67.0					18.0	
Yellow Time (s)					5.0	5.0					5.0	
All-Red Time (s)					2.0	2.0					2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0					3.0	
Recall Mode					None	None					C-Min	
Act Effct Green (s)					68.8	68.8					20.2	
Actuated g/C Ratio					0.69	0.69					0.20	
v/c Ratio					0.73	0.37					0.57	
Control Delay					11.5	7.2					36.6	
Queue Delay					0.0	0.0					0.0	
Total Delay					11.5	7.2					36.6	
LOS					B	A					D	
Approach Delay					10.7						36.6	
Approach LOS					B						D	
Queue Length 50th (ft)					304	86					187	
Queue Length 95th (ft)					402	139					m221	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 109: Glenwood Ave & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Internal Link Dist (ft)		251			504			303			403	
Turn Bay Length (ft)												
Base Capacity (vph)					2503	1120					838	
Starvation Cap Reductn					0	0					0	
Spillback Cap Reductn					0	0					0	
Storage Cap Reductn					0	0					0	
Reduced v/c Ratio					0.72	0.36					0.55	

Intersection Summary

Area Type: Other
 Cycle Length: 99
 Actuated Cycle Length: 99
 Offset: 12 (12%), Referenced to phase 6:NWT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 15.2
 Intersection Capacity Utilization 71.0%
 Analysis Period (min) 15
 * User Entered Value
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 109: Glenwood Ave & I-440 WB Off Ramp to WB Glenwood Ave

 ø6	 ø8
25 s	74 s

HCM Unsignalized Intersection Capacity Analysis
 2: Glenwood Ave #1 & Marriott Dr
 Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 6/26/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗			↗			↗
Volume (veh/h)	0	2334	158	0	1518	128	0	0	117	0	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		2%			0%			-1%			-1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	2334	158	0	1518	128	0	0	117	0	0	40
Pedestrians		12			12			12			12	
Lane Width (ft)		14.7			12.0			12.0			12.0	
Walking Speed (ft/s)		3.5			3.5			3.5			3.5	
Percent Blockage		1			1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1658			2504			3157	4004	1191	2826	4034	783
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1658			2504			3157	4004	1191	2826	4034	783
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	33	100	100	88
cM capacity (veh/h)	380			177			4	3	176	3	3	328

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	1167	1167	158	759	759	128	117	40
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	158	0	0	128	117	40
cSH	1700	1700	1700	1700	1700	1700	176	328
Volume to Capacity	0.69	0.69	0.09	0.45	0.45	0.08	0.67	0.12
Queue Length 95th (ft)	0	0	0	0	0	0	97	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	58.8	17.5
Lane LOS							F	C
Approach Delay (s)	0.0			0.0			58.8	17.5
Approach LOS							F	C

Intersection Summary	
Average Delay	1.8
Intersection Capacity Utilization	81.3%
ICU Level of Service	D
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd
 Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 6/24/2010

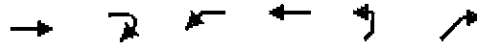


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↘
Volume (veh/h)	0	119	0	748	1655	179
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	119	0	748	1655	179
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	458	
pX, platoon unblocked	0.71	0.70	0.70			
vC, conflicting volume	2029	828	1655			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1454	0	1072			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	84	100			
cM capacity (veh/h)	86	756	451			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	119	374	374	828	828	179
Volume Left	0	0	0	0	0	0
Volume Right	119	0	0	0	0	179
cSH	756	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.22	0.22	0.49	0.49	0.11
Queue Length 95th (ft)	14	0	0	0	0	0
Control Delay (s)	10.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.6	0.0		0.0		
Approach LOS	B					

Intersection Summary		
Average Delay		0.5
Intersection Capacity Utilization	59.8%	ICU Level of Service B
Analysis Period (min)		15

HCM Unsignalized Intersection Capacity Analysis
 16: Crabtree Valley Ave & Edwards Mill Rd
 Creedmoor SPUI_CVA Ext to I-440 AM (2035)
 6/24/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	856	63	0	842	0	70
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	856	63	0	842	0	70
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.95	
vC, conflicting volume			925		1314	472
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			925		1219	472
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	87
cM capacity (veh/h)			730		163	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	571	348	421	421	70
Volume Left	0	0	0	0	0
Volume Right	0	63	0	0	70
cSH	1700	1700	1700	1700	533
Volume to Capacity	0.34	0.20	0.25	0.25	0.13
Queue Length 95th (ft)	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		12.8
Approach LOS					B

Intersection Summary					
Average Delay			0.5		
Intersection Capacity Utilization			38.9%	ICU Level of Service	A
Analysis Period (min)			15		

Network Totals

Number of Intersections	51
Control Delay / Veh (s/v)	15
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	16
Total Delay (hr)	1422
Stops / Veh	0.12
Stops (#)	36391
Average Speed (mph)	18
Total Travel Time (hr)	2268
Distance Traveled (mi)	41310
Fuel Consumed (gal)	2879
Fuel Economy (mpg)	14.3
CO Emissions (kg)	201.23
NOx Emissions (kg)	39.15
VOC Emissions (kg)	46.64
Unserved Vehicles (#)	3547
Vehicles in dilemma zone (#)	827
Performance Index	1523.5

Total Network Performance By Run

Run Number	1	10	2	3	4	5	6
Total Delay (hr)	11249.5	11207.6	10916.7	10733.4	10982.2	10872.9	11118.3
Delay / Veh (s)	1906.6	1922.4	1835.6	1810.0	1856.0	1855.8	1897.6
Stop Delay (hr)	10838.6	10787.8	10498.3	10339.2	10598.8	10466.5	10719.0
St Del/Veh (s)	1837.0	1850.4	1765.2	1743.5	1791.2	1786.4	1829.4
Total Stops	70330	69161	66299	58477	59457	61699	67895
Stop/Veh	3.31	3.30	3.10	2.74	2.79	2.93	3.22
Travel Dist (mi)	28107.3	27983.6	28509.0	28587.5	28624.5	27797.4	27727.1
Travel Time (hr)	11897.0	11847.9	11571.2	11388.3	11637.1	11507.7	11754.3
Avg Speed (mph)	12	11	12	13	13	11	11
Fuel Used (gal)	3569.7	3553.1	3504.6	3464.7	3523.0	3466.1	3530.3
Fuel Eff. (mpg)	7.9	7.9	8.1	8.3	8.1	8.0	7.9
HC Emissions (g)	20558	20581	20578	21799	21986	20605	20015
CO Emissions (g)	839108	837374	841504	858168	864956	831078	835765
NOx Emissions (g)	56426	55936	57263	59029	59390	55677	54944
Vehicles Entered	21909	21672	22144	21978	22003	22035	21900
Vehicles Exited	20573	20305	20677	20719	20602	20149	20287
Hourly Exit Rate	20573	20305	20677	20719	20602	20149	20287
Input Volume	448214	448214	448214	448214	448214	448214	448214
% of Volume	5	5	5	5	5	4	5
Denied Entry Before	1070	1085	1024	1052	1049	1050	1038
Denied Entry After	18575	18534	18103	17912	18351	18061	18081

Total Network Performance By Run

Run Number	7	8	9	Avg
Total Delay (hr)	11417.8	11143.8	10860.6	11050.3
Delay / Veh (s)	2003.8	1880.5	1837.2	1879.7
Stop Delay (hr)	11019.5	10735.9	10474.9	10647.9
St Del/Veh (s)	1933.9	1811.6	1772.0	1811.3
Total Stops	64594	63272	61521	64264
Stop/Veh	3.15	2.97	2.89	3.04
Travel Dist (mi)	27186.9	27942.9	28398.9	28086.5
Travel Time (hr)	12041.2	11784.9	11513.0	11694.3
Avg Speed (mph)	11	12	12	12
Fuel Used (gal)	3570.4	3542.4	3488.9	3521.3
Fuel Eff. (mpg)	7.6	7.9	8.1	8.0
HC Emissions (g)	20068	20869	21910	20897
CO Emissions (g)	817052	846444	865284	843673
NOx Emissions (g)	54262	56482	59062	56847
Vehicles Entered	21443	22061	21990	21916
Vehicles Exited	19583	20608	20573	20407
Hourly Exit Rate	19583	20608	20573	20407
Input Volume	448214	448214	448214	448214
% of Volume	4	5	5	5
Denied Entry Before	1077	1191	1069	1069
Denied Entry After	18885	18293	18249	18300

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
	64	252.1	284.0	0.4	9	8	326.0
	61	58.1	71.4	0.2	8	7	66.2
	68	31.8	38.6	0.1	8	7	36.1
Glenwood Ave	85	128.8	152.1	0.3	7	6	146.8
	35	43.2	51.0	0.1	7	6	46.2
	65	24.4	28.5	0.1	6	6	25.7
Glenwood Ave	91	53.0	61.3	0.1	6	6	55.9
Crabtree Mall Entr	2	37.8	44.0	0.1	6	5	41.4
Glenwood Ave #2	82	78.4	87.6	0.1	5	4	86.5
Glenwood Ave	89	133.9	147.2	0.2	4	4	137.4
Blue Ridge Rd	3	25.2	27.5	0.0	4	4	28.1
Crabtree View Pl	81	18.6	24.4	0.1	10	9	21.1
Glenwood Ave #1	87	28.0	35.4	0.1	10	9	31.7
I-440 WB On/Off Ramp	4	15.7	20.3	0.1	11	10	16.7
WB I-440 On Ramp fro	44	13.3	19.3	0.1	17	17	14.0
EB I-440 On Ramp fro	23	9.1	12.8	0.0	12	13	8.8
Ridge Rd Extension	5	37.2	42.5	0.1	6	5	38.5
Total		988.6	1148.1	2.0	7	6	1127.1

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 2 Delay	Run 2 Speed	Run 3 Delay	Run 3 Speed	Run 4 Delay	Run 4 Speed	Run 5 Delay
	10	105.5	15	101.6	15	87.7	6
	9	55.3	12	36.4	12	34.4	7
	8	30.4	10	22.5	11	18.9	7
Glenwood Ave	7	120.7	8	101.6	9	86.3	7
	7	38.4	9	31.7	9	29.9	7
	7	21.7	8	18.0	9	17.3	6
Glenwood Ave	7	47.1	8	39.9	8	40.2	6
Crabtree Mall Entr	6	34.4	7	30.2	6	31.5	6
Glenwood Ave #2	5	69.7	6	62.6	5	68.9	5
Glenwood Ave	4	123.3	5	113.0	4	118.8	4
Blue Ridge Rd	5	23.7	5	22.3	5	24.3	5
Crabtree View Pl	11	16.2	11	15.7	11	15.8	10
Glenwood Ave #1	11	24.5	11	22.7	11	22.5	10
I-440 WB On/Off Ramp	11	14.7	11	14.8	11	14.4	11
WB I-440 On Ramp fro	18	12.1	18	12.3	16	14.4	18
EB I-440 On Ramp fro	14	7.8	12	9.7	11	10.0	14
Ridge Rd Extension	6	32.7	6	35.8	5	38.4	6
Total	8	878.2	9	691.2	9	673.7	7

Arterial Level of Service: EB Glenwood Ave #1

Access Street	Plan 6 Delay	Plan 6 Speed	Plan 7 Delay	Plan 7 Speed	Plan 8 Delay	Plan 8 Speed
	294.6	6	330.3	6	251.1	6
	68.6	7	73.9	8	59.9	8
	34.8	6	41.8	8	30.1	7
Glenwood Ave	126.0	5	171.8	7	119.7	6
	43.5	6	50.8	7	43.5	6
	24.0	6	28.4	6	24.5	6
Glenwood Ave	52.3	6	62.0	6	52.3	6
Crabtree Mall Entr	37.1	5	44.3	6	36.3	5
Glenwood Ave #2	72.9	4	85.7	5	72.3	5
Glenwood Ave	135.7	4	142.7	4	137.3	4
Blue Ridge Rd	23.7	4	29.5	5	24.3	5
Crabtree View Pl	19.6	8	24.7	10	17.6	10
Glenwood Ave #1	27.1	8	35.8	10	25.3	9
I-440 WB On/Off Ramp	15.4	10	17.8	12	13.9	10
WB I-440 On Ramp fro	12.4	17	13.6	18	12.7	17
EB I-440 On Ramp fro	7.5	13	8.8	12	9.2	12
Ridge Rd Extension	35.6	5	40.9	6	37.6	5
Total	1000.8	6	1211.8	7	967.6	7

Arterial Level of Service: EB Glenwood Ave #1

Access Street	Plan 8 Delay	Plan 9 Delay	Plan 10 Delay	Plan 11 Delay
	10	355.4	7	429.0
	10	43.4	5	96.8
	10	22.4	5	57.2
Glenwood Ave	10	78.7	4	229.7
	8	36.6	4	81.3
	7	20.5	4	47.2
Glenwood Ave	7	45.1	4	100.5
Crabtree Mall Entr	7	30.8	3	64.8
Glenwood Ave #2	5	65.9	3	147.0
Glenwood Ave	4	115.8	2	220.4
Blue Ridge Rd	5	23.9	4	30.3
Crabtree View Pl	11	15.9	8	23.3
Glenwood Ave #1	11	24.5	8	36.2
I-440 WB On/Off Ramp	11	15.4	10	17.8
WB I-440 On Ramp fro	18	12.5	15	16.4
EB I-440 On Ramp fro	13	8.8	10	11.4
Ridge Rd Extension	6	35.2	5	39.0
Total	8	885.9	5	1648.3

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Arts	Delay (Sec)	Travel (Min)	LOS	Arts Speed	Arts 1 Speed	Arts 2 Speed
EB I-440 On Ramp fro	5	349.8	371.7	0.3	58	18	281.4
EB I-440 On Ramp fro	23	2.7	6.3	0.1	38	35	3.2
WB I-440 On Ramp fro	44	1.8	7.9	0.0	20	19	2.2
I-440 WB On/Off Ramp	4	3.8	11.3	0.1	30	30	3.5
Glenwood Ave	87	3.4	7.4	0.1	29	29	3.5
	92	0.0	0.0	0.1		0.0	0.0
	83	1.6	5.9	0.1	32	35	1.0
	94	3.4	12.3	0.1	32	39	1.0
Glenwood Ave	100	0.9	2.5	0.0	52	69	0.3
Glenwood Ave #1	82	4.9	14.3	0.1	24	32	1.4
Marriott Dr	2	6.7	7.4	0.1	384	59	10.1
Glenwood Ave	91	0.8	6.3	0.1	39	40	0.6
	65	0.6	9.7	0.1	40	40	0.6
	35	0.3	4.5	0.1	40	40	0.3
Glenwood Ave	85	0.6	7.2	0.1	47	46	0.6
	68	1.7	26.3	0.3	39	39	1.6
	61	0.5	7.2	0.1	41	41	0.6
	64	1.1	14.3	0.2	41	40	1.2
Total		384.7	522.5	1.9	34	34	316.0

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Arts 1 Speed	Arts 2 Delay	Arts 2 Speed	Arts 3 Delay	Arts 3 Speed	Arts 4 Delay	Arts 4 Speed
EB I-440 On Ramp fro	18	351.0	18	450.4	18	373.5	18
EB I-440 On Ramp fro	37	2.9	39	2.5	39	2.5	37
WB I-440 On Ramp fro	21	1.6	21	1.6	21	1.5	20
I-440 WB On/Off Ramp	33	2.7	33	2.6	31	3.0	31
Glenwood Ave	31	2.9	33	2.6	30	3.1	29
	4.2	0.0	0.0	0.0	0.0	0.0	0.0
	35	1.0	35	0.9	34	1.1	35
	40	0.9	40	0.9	40	1.0	40
Glenwood Ave	71	0.2	70	0.2	71	0.2	71
Glenwood Ave #1	32	1.2	32	1.3	32	1.2	33
Marriott Dr	-73	-0.1	98	5.1	79	0.1	-76
Glenwood Ave	39	0.8	38	0.9	39	0.8	40
	40	0.7	40	0.6	40	0.7	40
	40	0.3	40	0.3	40	0.3	40
Glenwood Ave	46	0.6	46	0.6	46	0.6	46
	39	1.7	39	1.7	39	1.8	39
	41	0.5	41	0.4	41	0.6	41
	41	1.1	41	1.0	41	1.1	41
Total	37	269.9	33	477.9	35	393.0	35

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 4 Delay	Run 5 Speed	Run 6 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay
EB I-440 On Ramp fro	200.2	20	340.4	15	442.1	19	380.7
EB I-440 On Ramp fro	2.9	38	2.9	38	2.7	38	2.9
WB I-440 On Ramp fro	1.8	19	2.1	21	1.6	20	1.6
I-440 WB On/Off Ramp	3.3	26	5.1	32	2.7	29	4.1
Glenwood Ave	3.4	26	4.4	32	2.7	28	3.6
	0.0						
	1.0	25	3.2	36	0.8	28	2.4
	0.9	19	12.0	38	1.5	26	6.1
Glenwood Ave	0.2	28	3.2	59	0.6	40	1.7
Glenwood Ave #1	1.1	12	18.9	25	4.3	18	9.7
Marriott Dr	-3.3	1931	0.0	2199	0.0	668	5.8
Glenwood Ave	0.6	39	0.8	39	0.8	40	0.7
	0.7	41	0.6	40	0.7	40	0.6
	0.3	41	0.3	40	0.3	40	0.3
Glenwood Ave	0.6	47	0.6	47	0.6	47	0.6
	1.7	39	1.7	39	1.6	40	1.6
	0.5	41	0.5	41	0.5	41	0.4
	1.2	41	1.0	41	1.0	41	1.0
Total	285.2	30	397.3	35	470.4	33	403.4

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 8 Speed	Run 8 Delay	Run 9 Speed	Run 9 Delay
EB I-440 On Ramp fro	17	356.4	19	378.9
EB I-440 On Ramp fro	37	2.9	38	2.6
WB I-440 On Ramp fro	18	2.9	21	1.6
I-440 WB On/Off Ramp	22	7.3	31	3.4
Glenwood Ave	23	5.2	29	3.3
	23	3.6	36	0.8
	20	10.7	40	1.0
Glenwood Ave	33	2.4	66	0.4
Glenwood Ave #1	19	9.2	29	2.7
Marriott Dr	311	27.5	385	2.5
Glenwood Ave	39	0.8	38	1.0
	41	0.6	40	0.7
	41	0.3	40	0.3
Glenwood Ave	47	0.6	47	0.6
	39	1.7	39	1.7
	41	0.5	41	0.6
	41	1.1	41	1.1
Total	30	433.5	35	403.0

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 1: Glenwood Ave #1 & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations												
Volume (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1279	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)								0%				-2%
Storage Length (ft)	0	0		0	275		310			450		
Storage Lanes	2	2		1	1		1			2		
Taper Length (ft)	100	100		100	100		100			300		
Lane Util. Factor	0.97	1.00	1.00	0.97	*0.95	1.00	0.97	0.95	1.00	0.97	0.95	0.95
Ped Bike Factor			0.98			0.98			0.93		0.99	
Frt			0.850			0.850			0.850		0.982	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	3433	3539	1583	3433	3539	1583	3467	3480	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1863	1551	3433	3539	1559	3433	3539	1473	3467	3480	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)								35			45	
Link Distance (ft)								654			1586	
Travel Time (s)								12.7			24.0	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1279	179
Shared Lane Traffic (%)												
Lane Group Flow (vph)	358	272	407	293	369	1665	1182	1965	240	1528	1458	0
Turn Type	Prot	custom	custom	Prot	custom	Free	Prot		custom	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			3 2			Free			8 1			
Detector Phase	5	2	3 2	1	6		3	8	8 1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	15.0		7.0	15.0		7.0	10.0		7.0	10.0	
Minimum Split (s)	14.3	33.0		14.3	31.0		14.4	18.0		14.4	18.0	
Total Split (s)	21.0	33.0	80.0	19.0	31.0	0.0	47.0	71.0	90.0	57.0	81.0	0.0
Total Split (%)	11.7%	18.3%	44.4%	10.6%	17.2%	0.0%	26.1%	39.4%	50.0%	31.7%	45.0%	0.0%
Maximum Green (s)	14.0	26.0		12.0	24.0		40.0	64.0		50.0	74.0	
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.4	0.0	0.0	-2.4	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	4.0	7.0	4.6	7.0	7.0	4.6	4.0
Lead/Lag	Lead	Lead		Lag	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	C-Min		None	C-Min	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		17.0			17.0			4.0			4.0	
Pedestrian Calls (#/hr)		12			12			24			24	
Act Effct Green (s)	14.0	26.0	73.0	12.0	24.0	180.0	40.0	66.4	83.0	50.0	76.4	
Actuated g/C Ratio	0.08	0.14	0.41	0.07	0.13	1.00	0.22	0.37	0.46	0.28	0.42	
v/c Ratio	1.34	1.01	0.65	1.28	0.78	1.07	1.55	1.51	0.35	1.59	0.99	
Control Delay	233.7	131.3	49.0	216.0	87.9	47.8	289.4	263.5	28.9	308.8	71.1	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 1: Glenwood Ave #1 & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBR	EBR2	WBL	WBR	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	233.7	131.3	49.0	216.0	87.9	47.8	289.4	263.5	28.9	308.8	71.1	
LOS	F	F	D	F	F	D	F	F	C	F	E	
Approach Delay								255.9			192.7	
Approach LOS								F			F	
Queue Length 50th (ft)	~282	~332	387	~225	225	~259	~1014	~1696	138	~1319	895	
Queue Length 95th (ft)	#395	#537	518	#330	288	#514	m#1067	m#1692	m160	#1452	#1063	
Internal Link Dist (ft)								574			1506	
Turn Bay Length (ft)					275	275	310		175	450		
Base Capacity (vph)	267	269	629	229	472	1559	763	1305	679	963	1477	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.34	1.01	0.85	1.28	0.78	1.07	1.55	1.51	0.35	1.59	0.99	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 25 (14%), Referenced to phase 4:SBT and 8:NBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.59
 Intersection Signal Delay: 180.4
 Intersection Capacity Utilization 142.6%
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Glenwood Ave #1 & Creedmoor Rd.

ø2	ø1	ø4	ø3
33 s	19 s	81 s	47 s
ø5	ø6	ø8	ø7
21 s	31 s	71 s	57 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑↑				↔↔	↔	↑↑	↔	↔↔↔	↑↑	
Volume (vph)	676	4837	157	0	0	1875	121	718	368	985	1128	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	12	12	12	12	14	12	12	12	12	12	12
Grade (%)		2%			0%			2%				-2%
Storage Length (ft)	0		0	0		0	90		0	250		0
Storage Lanes	2		0	0		2	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	0.97	0.86	0.86	1.00	1.00	0.88	1.00	0.95	1.00	0.94	0.95	0.95
Ped Bike Factor		1.00									0.98	
Frnt		0.995				0.850			0.850		0.980	
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	3698	6305	0	0	0	2972	1752	3504	1567	5040	3442	0
Flt Permitted	0.950						0.950			0.950		
Satd. Flow (perm)	3698	6305	0	0	0	2972	1752	3504	1567	5040	3442	0
Right Turn on Red			No			No			Yes			Yes
Satd. Flow (RTOR)												9
Link Speed (mph)		45			45			35				35
Link Distance (ft)		180			354			458				520
Travel Time (s)		2.7			5.4			8.9				10.1
Confl. Peds. (#/hr)			12			12						24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	676	4837	157	0	0	1875	121	718	368	985	1128	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	676	4994	0	0	0	1875	121	718	368	985	1297	0
Turn Type	Prot					custom	Prot		Perm	Prot		
Protected Phases	5	2				6 7	3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2				6 7	3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0					7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	34.0					14.0	14.0	14.0	14.0	25.5	
Total Split (s)	33.0	112.0	0.0	0.0	0.0	110.0	14.0	37.0	37.0	31.0	54.0	0.0
Total Split (%)	18.3%	62.2%	0.0%	0.0%	0.0%	61.1%	7.8%	20.6%	20.6%	17.2%	30.0%	0.0%
Maximum Green (s)	26.0	105.0					7.0	30.0	30.0	24.0	47.0	
Yellow Time (s)	5.0	5.0					5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0					2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	5.0	2.0	4.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag	Lag						Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes						Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	2.0					3.0	2.0	2.0	2.0	2.0	
Recall Mode	None	C-Min					None	None	None	None	None	
Walk Time (s)		7.0									7.0	
Flash Dont Walk (s)		20.0									11.5	
Pedestrian Calls (#/hr)		12									24	
Act Effct Green (s)	28.0	107.0				105.0	9.0	32.0	32.0	26.0	49.0	
Actuated g/C Ratio	0.16	0.59				0.58	0.05	0.18	0.18	0.14	0.27	

Lane Group	ø6
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	41.0
Total Split (s)	79.0
Total Split (%)	44%
Maximum Green (s)	72.0
Yellow Time (s)	5.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	2.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	20.0
Pedestrian Calls (#/hr)	12
Act Effct Green (s)	
Actuated g/C Ratio	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 3: Glenwood Ave #1 & Lead Mine Rd 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
v/c Ratio	1.18	1.33				1.08	1.38	1.15	1.32	1.35	1.37	
Control Delay	151.8	178.4				65.5	281.0	149.5	220.2	216.1	216.4	
Queue Delay	590.1	0.0				21.8	0.0	0.0	0.0	0.0	23.7	
Total Delay	741.9	178.4				87.4	281.0	149.5	220.2	216.1	240.1	
LOS	F	F				F	F	F	F	F	F	
Approach Delay		245.6						184.2			229.7	
Approach LOS		F						F			F	
Queue Length 50th (ft)	~493	~2238				~1406	~187	~528	~566	~543	~1067	
Queue Length 95th (ft)	m#532	m#1960				m#1463	#345	#656	#777	m#638	#1209	
Internal Link Dist (ft)		100			274			378			440	
Turn Bay Length (ft)							90			250		
Base Capacity (vph)	575	3748				1734	88	623	279	728	944	
Starvation Cap Reductn	0	0				0	0	0	0	0	35	
Spillback Cap Reductn	397	0				78	0	0	0	0	0	
Storage Cap Reductn	0	0				0	0	0	0	0	0	
Reduced v/c Ratio	3.80	1.33				1.13	1.38	1.15	1.32	1.35	1.43	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 70 (39%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.38
 Intersection Signal Delay: 208.7
 Intersection Capacity Utilization 128.8%
 Analysis Period (min) 15
 Intersection LOS: F
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Glenwood Ave #1 & Lead Mine Rd

ø2	ø3	ø4
112 s	14 s	54 s
ø6	ø5	ø8
79 s	33 s	37 s
		ø7
		31 s

Lane Group	ø6
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑↑	↑	↓	↑↑↑	↑	↓↓↓	↑↑	↑			
Volume (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		4%			-7%			1%			0%	
Storage Length (ft)	250		0	300		400	250		250	0		100
Storage Lanes	0		1	1		1	1		2	0		0
Taper Length (ft)	100		100	100		100	150		100	100		100
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	0.86	0.86	1.00	1.00	1.00	1.00
Ped Bike Factor			0.94			0.98						
Frt			0.850			0.850			0.850			
Fit Protected				0.950			0.950	0.974				
Satd. Flow (prot)	0	4984	1567	1832	5263	1639	3029	3105	1575	0	0	0
Fit Permitted				0.950			0.950	0.000				
Satd. Flow (perm)	0	4984	1467	1832	5263	1608	3029	0	1575	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			45	
Link Distance (ft)		348			1403			568			311	
Travel Time (s)		5.3			21.3			15.5			4.7	
Confl. Peds. (#/hr)			12			12						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	2258	1145	100	2992	524	1891	566	379	0	0	0
Shared Lane Traffic (%)							33%					
Lane Group Flow (vph)	0	2258	1145	100	2992	524	1267	1190	379	0	0	0
Turn Type			pm+ov	Prot		Perm	Prot		pm+ov			
Protected Phases		2	3	1	6		3	8	1			
Permitted Phases			2			6			8			
Detector Phase		2	3	1	6	6	3	8	1			
Switch Phase												
Minimum Initial (s)		12.0	7.0	7.0	12.0	12.0	7.0	7.0	7.0			
Minimum Split (s)		31.0	14.0	14.0	19.0	19.0	14.0	14.0	14.0			
Total Split (s)	0.0	88.0	77.0	15.0	103.0	103.0	77.0	77.0	15.0	0.0	0.0	0.0
Total Split (%)	0.0%	48.9%	42.8%	8.3%	57.2%	57.2%	42.8%	42.8%	8.3%	0.0%	0.0%	0.0%
Maximum Green (s)		81.0	70.0	8.0	96.0	96.0	70.0	70.0	8.0			
Yellow Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0			
All-Red Time (s)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0
Lead/Lag		Lead		Lag					Lag			
Lead-Lag Optimize?		Yes		Yes					Yes			
Vehicle Extension (s)		3.0	2.0	3.0	3.0	3.0	2.0	2.0	3.0			
Recall Mode		C-Min	None	None	Min	Min	None	None	None			
Walk Time (s)		7.0										
Flash Dont Walk (s)		17.0										
Pedestrian Calls (#/hr)		12										
Act Effct Green (s)		83.0	155.0	10.0	98.0	98.0	72.0	72.0	87.0			
Actuated g/C Ratio		0.46	0.86	0.06	0.54	0.54	0.40	0.40	0.48			
v/c Ratio		0.98	0.88	0.98	1.04	0.60	1.05	0.96	0.50			

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Control Delay		33.8	7.8	164.7	69.6	31.3	89.8	69.4	34.5			
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay		33.8	7.8	164.7	69.6	31.3	89.8	69.4	34.5			
LOS		C	A	F	E	C	F	E	C			
Approach Delay		25.1			66.7			73.9				
Approach LOS		C			E			E				
Queue Length 50th (ft)		904	143	121	~1396	410	~940	794	302			
Queue Length 95th (ft)		m549	m42	#260	#1453	537	#1094	#965	405			
Internal Link Dist (ft)		268			1323			488			231	
Turn Bay Length (ft)				300		400	250		250			
Base Capacity (vph)		2298	1303	102	2865	875	1212	1242	761			
Starvation Cap Reductn		0	0	0	0	0	0	0	0			
Spillback Cap Reductn		0	0	0	0	0	0	0	0			
Storage Cap Reductn		0	0	0	0	0	0	0	0			
Reduced v/c Ratio		0.98	0.88	0.98	1.04	0.60	1.05	0.96	0.50			

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 136 (76%), Referenced to phase 2:EBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 54.4
 Intersection Capacity Utilization 102.1%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Glenwood Ave #1 & EB I-440 On Ramp from Ridge Rd/WB Glenwood Ave

ø2	ø1	ø3
88 s	15 s	77 s
ø6	ø8	
103 s	77 s	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↗	↕		↖	↗	↕	↖	↗	↕
Volume (vph)	0	0	61	411	0	68	101	2494	674	66	1810	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12	12	12	12
Grade (%)		-2%			6%			6%				-6%
Storage Length (ft)	0		0	0		0	50		100	250		250
Storage Lanes	0		1	1		0	1		1	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Ped Bike Factor			0.95		0.99				0.94		1.00	
Frt			0.865		0.957				0.850		0.999	
Flt Protected				0.950	0.966		0.950			0.950		
Satd. Flow (prot)	0	0	1627	1631	1571	0	1717	3662	1536	1823	5230	0
Flt Permitted				0.950	0.966		0.950			0.950		
Satd. Flow (perm)	0	0	1550	1631	1571	0	1717	3662	1445	1823	5230	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			35			45			45	
Link Distance (ft)		220			1261			520			689	
Travel Time (s)		6.0			24.6			7.9			10.4	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	61	411	0	68	101	2494	674	66	1810	9
Shared Lane Traffic (%)				41%								
Lane Group Flow (vph)	0	0	61	242	237	0	101	2494	674	66	1819	0
Turn Type			custom	Split			Prot		pm+ov	Prot		
Protected Phases			5	4	4		5	2	4	1	6	
Permitted Phases			5						2			
Detector Phase			5	4	4		5	2	4	1	6	
Switch Phase												
Minimum Initial (s)			7.0	7.0	7.0		7.0	12.0	7.0	7.0	12.0	
Minimum Split (s)			14.0	34.0	34.0		14.0	21.0	34.0	14.0	21.0	
Total Split (s)	0.0	0.0	23.0	35.0	35.0	0.0	23.0	131.0	35.0	14.0	122.0	0.0
Total Split (%)	0.0%	0.0%	12.8%	19.4%	19.4%	0.0%	12.8%	72.8%	19.4%	7.8%	67.8%	0.0%
Maximum Green (s)			16.0	28.0	28.0		16.0	124.0	28.0	7.0	115.0	
Yellow Time (s)			5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)			2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	5.0	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?			Yes				Yes	Yes		Yes	Yes	
Vehicle Extension (s)			1.0	2.0	2.0		1.0	2.0	2.0	1.0	2.0	
Recall Mode			None	None	None		None	C-Min	None	None	C-Min	
Walk Time (s)				7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)				20.0	20.0			7.0	20.0		7.0	
Pedestrian Calls (#/hr)				12	12			12	12		12	
Act Effct Green (s)			15.1	29.4	29.4		15.1	126.6	156.0	9.0	120.5	
Actuated g/C Ratio			0.08	0.16	0.16		0.08	0.70	0.87	0.05	0.67	
v/c Ratio			0.45	0.91	0.92		0.70	0.97	0.53	0.73	0.52	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			88.1	108.4	112.0		84.2	27.6	2.1	122.5	16.1	
Queue Delay			0.0	0.0	0.0		0.0	163.6	1.5	0.0	0.0	
Total Delay			88.1	108.4	112.0		84.2	191.2	3.6	122.5	16.1	
LOS			F	F	F		F	F	A	F	B	
Approach Delay					110.2			149.2				19.8
Approach LOS					F			F				B
Queue Length 50th (ft)			70	298	293		118	1385	105	79	390	
Queue Length 95th (ft)			123	#473	#473		m105	m1113	m88	#165	440	
Internal Link Dist (ft)		140			1181			440			609	
Turn Bay Length (ft)							50		100	250		
Base Capacity (vph)			163	272	262		172	2575	1273	91	3501	
Starvation Cap Reductn			0	0	0		0	757	393	0	0	
Spillback Cap Reductn			0	0	0		0	0	0	0	72	
Storage Cap Reductn			0	0	0		0	0	0	0	0	
Reduced v/c Ratio			0.37	0.89	0.90		0.59	1.37	0.77	0.73	0.53	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 162 (90%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 102.4
 Intersection Capacity Utilization 108.3%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: North Hills Dr/Centura Bank Entr. & Lead Mine Rd.

ø1	ø2	ø4
14 s	131 s	35 s
ø5	ø6	
23 s	122 s	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			0%			-4%			1%	
Storage Length (ft)	0		0	0		0	0		0	200		0
Storage Lanes	1		0	0		2	1		0	0		0
Taper Length (ft)	100		100	100		100	100		100	0		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor		0.96				0.96		1.00			1.00	
Frt		0.892				0.850		0.991			0.993	
Flt Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1761	1581	0	0	1788	2787	1805	5126	0	3416	3492	0
Flt Permitted	0.950				0.960		0.950			0.950		
Satd. Flow (perm)	1761	1581	0	0	1788	2679	1805	5126	0	3416	3492	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		184			232			822			273	
Travel Time (s)		5.0			7.9			16.0			5.3	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	138	28	72	127	25	812	110	2437	150	422	1799	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	138	100	0	0	152	812	110	2587	0	422	1886	0
Turn Type	Split			Split		pm+ov	Prot			Prot		
Protected Phases	3	3		4	4	1	5	2		1	6	
Permitted Phases						4						
Detector Phase	3	3		4	4	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	14.0		41.0	41.0	15.0	15.0	41.0		15.0	18.0	
Total Split (s)	18.0	18.0	0.0	41.0	41.0	29.0	16.0	92.0	0.0	29.0	105.0	0.0
Total Split (%)	10.0%	10.0%	0.0%	22.8%	22.8%	16.1%	8.9%	51.1%	0.0%	16.1%	58.3%	0.0%
Maximum Green (s)	11.0	11.0		34.0	34.0	22.0	9.0	85.0		22.0	98.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	1.0	1.0	2.0		1.0	2.0	
Recall Mode	None	None		None	None	C-Max	None	Min		C-Max	C-Min	
Walk Time (s)				7.0	7.0			7.0				
Flash Dont Walk (s)				17.0	17.0			10.0				
Pedestrian Calls (#/hr)				12	12			12				
Act Effct Green (s)	13.0	13.0				22.0	46.7	100.3		24.7	108.1	
Actuated g/C Ratio	0.07	0.07				0.12	0.26	0.09		0.14	0.60	
v/c Ratio	1.09	0.88				0.70	1.15	0.65		0.90	0.90	
Control Delay	177.4	136.2				91.8	128.9	70.6		78.9	19.2	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 7: Office Center Entrance & Creedmoor Rd. 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0			0.0	0.0	0.0	20.1		0.0	5.9	
Total Delay	177.4	136.2			91.8	128.9	70.6	40.3		78.9	25.1	
LOS	F	F			F	F	E	D		E	C	
Approach Delay		160.1			123.1			41.5			35.0	
Approach LOS		F			F			D			C	
Queue Length 50th (ft)	~182	119			176	~587	134	625		260	471	
Queue Length 95th (ft)	#338	#244			252	#651	m130	m743		m278	m526	
Internal Link Dist (ft)		104			152			742			193	
Turn Bay Length (ft)										200		
Base Capacity (vph)	127	114			358	709	169	2857		468	2103	
Starvation Cap Reductn	0	0			0	0	0	365		0	185	
Spillback Cap Reductn	0	0			0	0	0	1		0	0	
Storage Cap Reductn	0	0			0	0	0	0		0	0	
Reduced v/c Ratio	1.09	0.88			0.42	1.15	0.65	1.04		0.90	0.98	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 112 (62%), Referenced to phase 1:SBL and 6:SBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 56.3
 Intersection Capacity Utilization 102.1%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Office Center Entrance & Creedmoor Rd.

ø2	ø1	ø3	ø4
92 s	29 s	18 s	41 s
ø6	ø5		
105 s	16 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUJ_CVA Ext to I-440 PM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↔	↑↑	↔	↔↔	↑↑
Volume (vph)	489	468	2229	685	494	1504
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250	0		300	450	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	0.97	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.96		0.96		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	1522	3539	1522	3433	3539
Right Turn on Red		Yes		No		
Satd. Flow (RTOR)		5				
Link Speed (mph)	45		45			45
Link Distance (ft)	523		1673			822
Travel Time (s)	7.9		25.3			12.5
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	489	468	2229	685	494	1504
Shared Lane Traffic (%)						
Lane Group Flow (vph)	489	468	2229	685	494	1504
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	3	1	2	3	1	6
Permitted Phases		3		2		
Detector Phase	3	1	2	3	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	14.0	41.0	41.0	14.0	41.0
Total Split (s)	41.0	30.0	109.0	41.0	30.0	139.0
Total Split (%)	22.8%	16.7%	60.6%	22.8%	16.7%	77.2%
Maximum Green (s)	34.0	23.0	102.0	34.0	23.0	132.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	Min	None	C-Max	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	17.0		10.0	17.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	33.5	58.5	106.5	140.0	25.0	136.5
Actuated g/C Ratio	0.19	0.32	0.59	0.78	0.14	0.76
v/c Ratio	0.77	0.92	1.06	0.57	1.04	0.56
Control Delay	41.0	46.4	74.7	8.4	89.3	1.8
Queue Delay	0.0	0.0	1.7	0.0	0.0	0.2

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 9: Crabtree Valley Ave & Creedmoor Rd 6/24/2010



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Total Delay	41.0	46.4	76.4	8.4	89.3	2.0
LOS	D	D	E	A	F	A
Approach Delay	43.7		60.4			23.6
Approach LOS	D		E			C
Queue Length 50th (ft)	209	107	~1552	243	~319	72
Queue Length 95th (ft)	276	#274	#1667	318	m#392	88
Internal Link Dist (ft)	443		1593			742
Turn Bay Length (ft)	250			300	450	
Base Capacity (vph)	687	507	2095	1211	477	2685
Starvation Cap Reductn	0	0	0	0	0	438
Spillback Cap Reductn	0	0	8	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.92	1.07	0.57	1.04	0.67

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 105 (58%), Referenced to phase 1:SBL and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 45.2
 Intersection LOS: D
 Intersection Capacity Utilization 108.2%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: Crabtree Valley Ave & Creedmoor Rd

↑ ø2	↘ ø1	↙ ø3
109 s	30 s	41 s
↓ ø6		
139 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations									
Volume (vph)	257	412	601	950	1299	0	101	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.97	0.95	0.91	1.00	0.91	1.00	1.00
Ped Bike Factor		0.96			1.00				
Frt		0.850			0.989				
Flt Protected	0.950		0.950						
Satd. Flow (prot)	1770	1583	3502	3539	5023	0	0	0	0
Flt Permitted	0.950		0.950						
Satd. Flow (perm)	1770	1516	3502	3539	5023	0	0	0	0
Right Turn on Red		Yes					No		
Satd. Flow (RTOR)		14							
Link Speed (mph)	45			35	35			45	
Link Distance (ft)	387			300	284			263	
Travel Time (s)	5.9			5.8	5.5			4.0	
Confl. Peds. (#/hr)		12					12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	0%	2%	2%
Adj. Flow (vph)	257	412	601	950	1299	0	101	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	257	412	601	950	1400	0	0	0	0
Turn Type		custom	Prot						
Protected Phases		5	5	2	6				
Permitted Phases	4	4							
Detector Phase	4	5	5	2	6				
Switch Phase									
Minimum Initial (s)	7.0	12.0	12.0	7.0	12.0				
Minimum Split (s)	38.0	20.0	20.0	41.0	41.0				
Total Split (s)	49.0	53.0	53.0	131.0	78.0	0.0	0.0	0.0	0.0
Total Split (%)	27.2%	29.4%	29.4%	72.8%	43.3%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	42.0	46.0	46.0	124.0	71.0				
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0				
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	2.0	2.0	2.0	2.0
Lead/Lag		Lag	Lag		Lead				
Lead-Lag Optimize?		Yes	Yes		Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				
Recall Mode	None	Min	Min	C-Min	C-Min				
Walk Time (s)	7.0				7.0				
Flash Dont Walk (s)	14.0				17.0				
Pedestrian Calls (#/hr)	12				12				
Act Effct Green (s)	33.4	74.9	41.6	136.6	90.1				
Actuated g/C Ratio	0.19	0.42	0.23	0.76	0.50				
v/c Ratio	0.78	0.63	0.74	0.35	0.56				
Control Delay	69.7	28.0	54.9	6.8	36.2				
Queue Delay	0.0	0.0	0.0	0.0	0.0				
Total Delay	69.7	28.0	54.9	6.8	36.2				
LOS	E	C	D	A	D				

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 10: Crabtree Valley Ave & Blue Ridge Rd. 6/24/2010



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Approach Delay	44.0			25.4	36.2				
Approach LOS	D			C	D				
Queue Length 50th (ft)	314	219	345	132	550				
Queue Length 95th (ft)	m338	m389	296	221	m486				
Internal Link Dist (ft)	307			220	204			183	
Turn Bay Length (ft)									
Base Capacity (vph)	433	686	939	2686	2513				
Starvation Cap Reductn	0	0	0	0	0				
Spillback Cap Reductn	0	0	0	0	0				
Storage Cap Reductn	0	0	0	0	0				
Reduced v/c Ratio	0.59	0.60	0.64	0.35	0.56				

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 107 (59%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 33.0
 Intersection LOS: C
 Intersection Capacity Utilization 72.4%
 ICU Level of Service C
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Crabtree Valley Ave & Blue Ridge Rd.

↑ ø2 131 s	↘ ø4 49 s
↓ ø6 78 s	↙ ø5 53 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 11: Crabtree Valley Ave & Mail Parking Deck 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Volume (vph)	84	1101	12	30	818	391	16	5	15	115	5	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	200		300	0		0	0		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00				0.90		0.98			0.95	
Fr		0.998				0.850		0.888			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3528	0	1770	3539	1583	1770	1622	0	1770	1519	0
Flt Permitted	0.950			0.950			0.464			0.744		
Satd. Flow (perm)	1770	3528	0	1770	3539	1432	864	1622	0	1386	1519	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		880			946			363			596	
Travel Time (s)		13.3			14.3			5.5			11.6	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1101	12	30	818	391	16	5	15	115	5	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1113	0	30	818	391	16	20	0	115	128	0
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Detector Phase	5	2		1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0		4.0	12.0	12.0	4.0	4.0		7.0	7.0	
Minimum Split (s)	14.0	41.0		11.0	41.0	41.0	20.0	20.0		41.0	41.0	
Total Split (s)	28.0	113.0	0.0	17.0	102.0	102.0	50.0	50.0	0.0	50.0	50.0	0.0
Total Split (%)	15.6%	62.8%	0.0%	9.4%	56.7%	56.7%	27.8%	27.8%	0.0%	27.8%	27.8%	0.0%
Maximum Green (s)	21.0	106.0		10.0	95.0	95.0	43.0	43.0		43.0	43.0	
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	2.0	5.0	5.0	5.0	5.0	5.0	2.0	5.0	5.0	2.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0				7.0	7.0	
Flash Dont Walk (s)		7.0			7.0	7.0				10.0	10.0	
Pedestrian Calls (#/hr)		12			12	12				12	12	
Act Effct Green (s)	15.9	132.1		12.8	126.5	126.5	22.6	22.6		22.6	22.6	
Actuated g/C Ratio	0.09	0.73		0.07	0.70	0.70	0.13	0.13		0.13	0.13	
v/c Ratio	0.54	0.43		0.24	0.33	0.39	0.15	0.10		0.66	0.67	
Control Delay	83.4	5.9		90.4	7.6	9.6	70.3	67.8		92.2	91.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 11: Crabtree Valley Ave & Mall Parking Deck 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	83.4	5.9		90.4	7.6	9.6	70.3	67.8		92.2	91.4	
LOS	F	A		F	A	A	E	E		F	F	
Approach Delay		11.3			10.2			68.9			91.8	
Approach LOS		B			B			E			F	
Queue Length 50th (ft)	99	134		35	108	98	17	21		132	147	
Queue Length 95th (ft)	m135	m181		m48	218	411	43	49		200	217	
Internal Link Dist (ft)		800			866			283			516	
Turn Bay Length (ft)	300			200		300						
Base Capacity (vph)	226	2590		136	2488	1006	216	406		347	380	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.37	0.43		0.22	0.33	0.39	0.07	0.05		0.33	0.34	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 168 (93%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 18.8
 Intersection LOS: B
 Intersection Capacity Utilization 60.1%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Crabtree Valley Ave & Mall Parking Deck

→ ρ2	↙ ρ1	↓ ρ4
113 s	17 s	50 s
← ρ6	↘ ρ5	↑ ρ8
102 s	28 s	50 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Volume (vph)	192	683	356	854	844	844	135	293	603	511	169	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	500		0	100		0	0		0
Storage Lanes	1		1	2		1	1		1	2		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor			0.94			0.90			0.95		0.97	
Frt			0.850			0.850			0.850		0.909	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	1583	3433	1643	0
Fit Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1493	3433	3539	1432	1770	1863	1505	3433	1643	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		946			648			291			153	
Travel Time (s)		14.3			9.8			5.7			4.2	
Confl. Peds. (#/hr)			12			12			12			12
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	192	683	356	854	844	844	135	293	603	511	169	260
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	683	356	854	844	844	135	293	603	511	429	0
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0	7.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	14.0	14.0	41.0	
Total Split (s)	29.0	41.0	24.0	49.0	61.0	49.0	24.0	41.0	49.0	49.0	66.0	0.0
Total Split (%)	16.1%	22.8%	13.3%	27.2%	33.9%	27.2%	13.3%	22.8%	27.2%	27.2%	36.7%	0.0%
Maximum Green (s)	22.0	34.0	17.0	42.0	54.0	42.0	17.0	34.0	42.0	42.0	59.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lead	Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		7.0			7.0			10.0			10.0	
Pedestrian Calls (#/hr)		12			12			12			12	
Act Effct Green (s)	30.0	36.0	59.9	46.7	52.7	96.7	23.9	33.3	80.0	44.0	53.4	
Actuated g/C Ratio	0.17	0.20	0.33	0.26	0.29	0.54	0.13	0.18	0.44	0.24	0.30	
v/c Ratio	0.65	0.96	0.70	0.96	0.81	1.05	0.57	0.85	0.88	0.61	0.88	
Control Delay	64.3	78.8	33.1	86.2	66.3	68.6	84.4	92.8	58.7	64.0	79.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 12: Crabtree Valley Ave & Mall Entrance 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay	64.3	78.8	33.1	86.2	66.3	68.6	84.4	92.8	58.7	64.0	79.7	
LOS	E	E	C	F	E	E	F	F	E	E	E	
Approach Delay		63.3			73.7			71.8			71.2	
Approach LOS		E			E			E			E	
Queue Length 50th (ft)	217	421	258	~548	496	~606	151	333	602	279	482	
Queue Length 95th (ft)	#361	#562	383	#686	563	#827	#256	#460	#826	344	602	
Internal Link Dist (ft)		866			568			211			73	
Turn Bay Length (ft)	400		250	500			100					
Base Capacity (vph)	295	708	509	890	1101	806	235	373	689	839	557	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.65	0.96	0.70	0.96	0.77	1.05	0.57	0.79	0.88	0.61	0.77	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 144 (80%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 70.7
 Intersection Capacity Utilization 93.0%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service F

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 12: Crabtree Valley Ave & Mall Entrance

ø1	ø2	ø4	ø3
49 s	41 s	66 s	24 s
ø6	ø5	ø7	ø8
61 s	29 s	49 s	41 s

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Lane Configurations	↙	↗	↕	↗	↙↘	↕
Volume (vph)	187	309	1242	76	458	477
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		250	300	
Storage Lanes	1	1		1	2	
Taper Length (ft)	100	100		100	150	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.97	0.95
Ped Bike Factor		0.94		0.94		
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	3433	3539
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1493	3539	1493	3433	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	45		35			45
Link Distance (ft)	539		727			596
Travel Time (s)	8.2		14.2			9.0
Confl. Peds. (#/hr)		12		12		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	187	309	1242	76	458	477
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	309	1242	76	458	477
Turn Type		pm+ov		pm+ov	Prot	
Protected Phases	4	1	2	4	1	6
Permitted Phases		4	2	2		6
Detector Phase	4	1	2	4	1	6
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	7.0	7.0	12.0
Minimum Split (s)	41.0	19.0	41.0	41.0	19.0	41.0
Total Split (s)	45.0	42.0	93.0	45.0	42.0	135.0
Total Split (%)	25.0%	23.3%	51.7%	25.0%	23.3%	75.0%
Maximum Green (s)	38.0	35.0	86.0	38.0	35.0	128.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	C-Min	None	None	C-Min
Walk Time (s)	7.0		7.0	7.0		
Flash Dont Walk (s)	7.0		7.0	7.0		
Pedestrian Calls (#/hr)	12		12	12		
Act Effct Green (s)	26.3	57.5	107.5	133.8	31.2	143.7
Actuated g/C Ratio	0.15	0.32	0.60	0.74	0.17	0.80
v/c Ratio	0.72	0.63	0.59	0.07	0.77	0.17
Control Delay	88.6	53.7	25.5	5.8	61.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 13: Arrow Dr & Blue Ridge Rd. 6/24/2010



Lane Group	NBL	NBR	NET	NER	SWL	SWT
Total Delay	88.6	53.7	25.5	5.8	61.6	2.4
LOS	F	D	C	A	E	A
Approach Delay	66.8		24.4			31.4
Approach LOS	E		C			C
Queue Length 50th (ft)	214	297	466	20	235	43
Queue Length 95th (ft)	295	352	649	40	285	20
Internal Link Dist (ft)	459		647			516
Turn Bay Length (ft)				250	300	
Base Capacity (vph)	393	546	2113	1243	711	2825
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.57	0.59	0.06	0.64	0.17

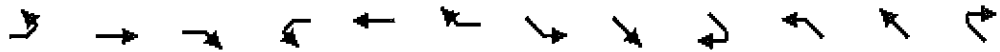
Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 179 (99%), Referenced to phase 2:NET and 6:SWT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 34.4 Intersection LOS: C
 Intersection Capacity Utilization 70.7% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 13: Arrow Dr & Blue Ridge Rd.

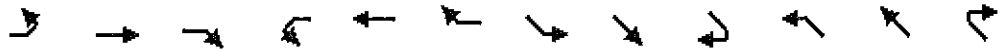
φ1	φ2	φ4
42 s	93 s	45 s
φ6		
135 s		

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations					↑↑	↑					↑↑	
Volume (vph)	0	0	0	0	2574	852	0	0	0	0	1023	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	14	12
Grade (%)		0%			-1%			0%			0%	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr						0.850						
Fit Protected												
Satd. Flow (prot)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Fit Permitted												
Satd. Flow (perm)	0	0	0	0	3557	1591	0	0	0	0	3974	0
Right Turn on Red			No			No			No	No		No
Satd. Flow (RTOR)												
Link Speed (mph)		45			25			45			45	
Link Distance (ft)		331			584			383			483	
Travel Time (s)		5.0			15.9			5.8			7.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2574	852	0	0	0	0	1023	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2574	852	0	0	0	0	1023	0
Turn Type						Perm						
Protected Phases					8						6	
Permitted Phases						8						
Detector Phase					8	8					6	
Switch Phase												
Minimum Initial (s)					7.0	7.0					12.0	
Minimum Split (s)					20.0	20.0					20.0	
Total Split (s)	0.0	0.0	0.0	0.0	129.0	129.0	0.0	0.0	0.0	0.0	51.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	0.0%	71.7%	71.7%	0.0%	0.0%	0.0%	0.0%	28.3%	0.0%
Maximum Green (s)					122.0	122.0					44.0	
Yellow Time (s)					5.0	5.0					5.0	
All-Red Time (s)					2.0	2.0					2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	2.0	2.0	2.0	5.0	5.0	2.0	2.0	2.0	2.0	5.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0	3.0					3.0	
Recall Mode					None	None					C-Min	
Act Effct Green (s)					124.0	124.0					46.0	
Actuated g/C Ratio					0.69	0.69					0.26	
v/c Ratio					1.05	0.78					1.01	
Control Delay					61.1	25.1					74.7	
Queue Delay					0.0	0.0					0.0	
Total Delay					61.1	25.1					74.7	
LOS					E	C					E	
Approach Delay					52.1						74.7	
Approach LOS					D						E	
Queue Length 50th (ft)					~1735	638					~619	
Queue Length 95th (ft)					#1836	841					m587	

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave 6/24/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Internal Link Dist (ft)		251			504			303			403	
Turn Bay Length (ft)												
Base Capacity (vph)					2450	1096					1016	
Starvation Cap Reductn					0	0					0	
Spillback Cap Reductn					0	0					0	
Storage Cap Reductn					0	0					0	
Reduced v/c Ratio					1.05	0.78					1.01	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 76 (42%), Referenced to phase 6:NWT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 57.3
 Intersection LOS: E
 Intersection Capacity Utilization 107.8%
 ICU Level of Service G
 Analysis Period (min) 15
 * User Entered Value
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 109: Glenwood Ave #1 & I-440 WB Off Ramp to WB Glenwood Ave

 6	 8
51 s	129 s

HCM Unsignalized Intersection Capacity Analysis
 2: Glenwood Ave #1 & Marriott Dr
 Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 6/26/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑	↗			↗			↗
Volume (veh/h)	0	1768	684	0	2680	112	0	0	698	0	0	59
Sign Control		Free			Free			Stop			Stop	
Grade		2%			0%			-1%			-1%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1768	684	0	2680	112	0	0	698	0	0	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2792			2452			3167	4560	884	4262	5132	1340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2792			2452			3167	4560	884	4262	5132	1340
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	0	0	100	59
cM capacity (veh/h)	137			188			3	1	289	0	0	143

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	884	884	684	1340	1340	112	698	59
Volume Left	0	0	0	0	0	0	0	0
Volume Right	0	0	684	0	0	112	698	59
cSH	1700	1700	1700	1700	1700	1700	289	143
Volume to Capacity	0.52	0.52	0.40	0.79	0.79	0.07	2.42	0.41
Queue Length 95th (ft)	0	0	0	0	0	0	1397	45
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	676.6	46.9
Lane LOS							F	E
Approach Delay (s)	0.0			0.0			676.6	46.9
Approach LOS							F	E

Intersection Summary		
Average Delay		79.2
Intersection Capacity Utilization	98.8%	ICU Level of Service F
Analysis Period (min)		15

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)

2: Glenwood Ave #1 & Marriott Dr

6/26/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑						↑↑			
Volume (vph)	0	1768	684	0	0	0	0	0	698	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	12	12	12	12	12	12
Grade (%)		2%			0%			-1%			-1%	
Storage Length (ft)	0		250	0		200	0		0	0		0
Storage Lanes	0		1	0		0	0		2	0		0
Taper Length (ft)	100		100	250		100	100		100	100		100
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor			0.90									
Frt			0.850						0.850			
Flt Protected												
Satd. Flow (prot)	0	3971	1567	0	0	0	0	0	2801	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	3971	1418	0	0	0	0	0	2801	0	0	0
Right Turn on Red	No		No			No			No	No		No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		359			599			252			281	
Travel Time (s)		5.4			9.1			6.9			5.5	
Confl. Peds. (#/hr)			12									
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1768	684	0	0	0	0	0	698	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1768	684	0	0	0	0	0	698	0	0	0
Turn Type			Perm						custom			
Protected Phases		2							1			
Permitted Phases			2									
Detector Phase		2	2						1			
Switch Phase												
Minimum Initial (s)		12.0	12.0						7.0			
Minimum Split (s)		41.0	41.0						14.0			
Total Split (s)	0.0	113.0	113.0	0.0	0.0	0.0	0.0	0.0	67.0	0.0	0.0	0.0
Total Split (%)	0.0%	62.8%	62.8%	0.0%	0.0%	0.0%	0.0%	0.0%	37.2%	0.0%	0.0%	0.0%
Maximum Green (s)		106.0	106.0						60.0			
Yellow Time (s)		5.0	5.0						5.0			
All-Red Time (s)		2.0	2.0						2.0			
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	2.0	5.0	5.0	2.0	2.0	2.0	2.0	2.0	5.0	2.0	2.0	2.0
Lead/Lag		Lag	Lag						Lead			
Lead-Lag Optimize?		Yes	Yes						Yes			
Vehicle Extension (s)		3.0	3.0						3.0			
Recall Mode		C-Min	C-Min						None			
Walk Time (s)		7.0	7.0									
Flash Dont Walk (s)		7.0	7.0									
Pedestrian Calls (#/hr)		12	12									
Act Effct Green (s)		117.3	117.3						52.7			
Actuated g/C Ratio		0.65	0.65						0.29			
v/c Ratio		0.68	0.74						0.85			

Lanes, Volumes, Timings WB US 70 Overpass_Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 2: Glenwood Ave #1 & Marriott Dr 6/26/2010



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		17.5	13.0						70.2			
Queue Delay		0.0	0.0						0.0			
Total Delay		17.5	13.0						70.2			
LOS		B	B						E			
Approach Delay		16.3										
Approach LOS		B										
Queue Length 50th (ft)		434	130						444			
Queue Length 95th (ft)		m724	m95						497			
Internal Link Dist (ft)		279			519			172			201	
Turn Bay Length (ft)			250									
Base Capacity (vph)		2587	924						965			
Starvation Cap Reductn		0	0						0			
Spillback Cap Reductn		0	0						0			
Storage Cap Reductn		0	0						0			
Reduced v/c Ratio		0.68	0.74						0.72			

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 108 (60%), Referenced to phase 2:EBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 28.2 Intersection LOS: C

Intersection Capacity Utilization 81.6% ICU Level of Service D

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Glenwood Ave #1 & Marriott Dr

↗ φ1	↘ φ2
87 s	113 s

HCM Unsignalized Intersection Capacity Analysis
 8: Crabtree Mall Entrance & Blue Ridge Rd
 Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 6/24/2010

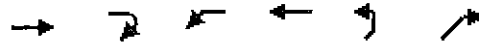


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↘
Volume (veh/h)	0	475	0	1207	925	360
Sign Control	Stop			Free	Free	
Grade	2%			-2%	2%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	475	0	1207	925	360
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)				634	458	
pX, platoon unblocked	0.78	0.74	0.74			
vC, conflicting volume	1528	462	925			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	603	0	185			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	41	100			
cM capacity (veh/h)	336	799	1023			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	475	604	604	462	462	360
Volume Left	0	0	0	0	0	0
Volume Right	475	0	0	0	0	360
cSH	799	1700	1700	1700	1700	1700
Volume to Capacity	0.59	0.36	0.36	0.27	0.27	0.21
Queue Length 95th (ft)	100	0	0	0	0	0
Control Delay (s)	15.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	15.9	0.0		0.0		
Approach LOS	C					

Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization		61.6%		ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis - Creedmoor SPUI_CVA Ext to I-440 PM (2035)
 16: Crabtree Valley Ave & Edwards Mill Rd 6/24/2010



Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations	↑↑			↑↑		↑
Volume (veh/h)	1135	44	0	957	0	62
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1135	44	0	957	0	62
Pedestrians				6	6	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				1	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	523			880		
pX, platoon unblocked					0.91	
vC, conflicting volume				1185	1642	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol				1185	1506	602
tC, single (s)				4.1	6.8	6.9
tC, 2 stage (s)						
tF (s)				2.2	3.5	3.3
p0 queue free %				100	100	86
cM capacity (veh/h)				582	101	438

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1
Volume Total	757	422	478	478	62
Volume Left	0	0	0	0	0
Volume Right	0	44	0	0	62
cSH	1700	1700	1700	1700	438
Volume to Capacity	0.45	0.25	0.28	0.28	0.14
Queue Length 95th (ft)	0	0	0	0	12
Control Delay (s)	0.0	0.0	0.0	0.0	14.6
Lane LOS					B
Approach Delay (s)	0.0		0.0		14.6
Approach LOS					B

Intersection Summary					
Average Delay			0.4		
Intersection Capacity Utilization			45.5%		ICU Level of Service A
Analysis Period (min)	15				

Network Totals

Number of Intersections	51
Control Delay / Veh (s/v)	41
Queue Delay / Veh (s/v)	3
Total Delay / Veh (s/v)	44
Total Delay (hr)	4334
Stops / Veh	0.15
Stops (#)	52026
Average Speed (mph)	9
Total Travel Time (hr)	5301
Distance Traveled (mi)	45857
Fuel Consumed (gal)	5308
Fuel Economy (mpg)	8.6
CO Emissions (kg)	371.05
NOx Emissions (kg)	72.19
VOC Emissions (kg)	86.00
Unserved Vehicles (#)	4901
Vehicles in dilemma zone (#)	941
Performance Index	4478.2

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Total Delay (hr)	13238.5	13344.6	12975.8	12981.3	12871.6	13385.8	13146.9
Delay / Veh (s)	2070.9	2063.4	1965.4	1952.5	1988.3	2370.8	2045.3
Stop Delay (hr)	12734.1	12857.5	12454.5	12477.2	12391.2	12980.2	12652.6
St Del/Veh (s)	1992.0	1988.1	1886.4	1876.7	1914.1	2299.0	1968.4
Total Stops	92964	82015	90239	85872	82157	70626	90442
Stop/Veh	4.04	3.52	3.80	3.59	3.53	3.47	3.91
Travel Dist (mi)	29459.4	30309.0	30867.2	31138.6	30684.3	25375.6	29787.9
Travel Time (hr)	13937.8	14063.2	13707.6	13720.8	13597.3	13988.0	13853.0
Avg Speed (mph)	10	11	11	11	11	8	10
Fuel Used (gal)	4065.8	4117.9	4058.4	4065.6	4025.0	3953.9	4063.0
Fuel Eff. (mpg)	7.2	7.4	7.6	7.7	7.6	6.4	7.3
HC Emissions (g)	23048	23563	25132	24164	23260	21684	22192
CO Emissions (g)	884264	909358	933823	922049	906716	817256	883444
NOx Emissions (g)	59915	62210	65355	63933	62129	54165	59732
Vehicles Entered	23901	23933	24476	24602	23948	21541	23920
Vehicles Exited	22128	22632	23061	23268	22663	19112	22360
Hourly Exit Rate	22128	22632	23061	23268	22663	19112	22360
Input Volume	513734	513734	513734	513734	513734	513734	513734
% of Volume	4	4	4	5	4	4	4
Denied Entry Before	1174	1258	1189	1194	1217	1204	1162
Denied Entry After	22224	22175	21363	21698	21829	24038	22044

Total Network Performance By Run

Run Number	8	9	10	Avg
Total Delay (hr)	12843.8	13032.4	13254.7	13107.6
Delay / Veh (s)	1937.5	2048.4	2065.6	2045.6
Stop Delay (hr)	12325.4	12510.1	12766.3	12614.9
St Del/Veh (s)	1859.3	1966.3	1989.5	1968.7
Total Stops	91968	86155	84581	85695
Stop/Veh	3.85	3.76	3.66	3.71
Travel Dist (mi)	30701.4	30064.4	29866.2	29825.4
Travel Time (hr)	13575.3	13743.8	13962.9	13815.0
Avg Speed (mph)	11	10	10	10
Fuel Used (gal)	4025.6	4040.4	4087.4	4050.3
Fuel Eff. (mpg)	7.6	7.4	7.3	7.4
HC Emissions (g)	24182	22565	22676	23247
CO Emissions (g)	915294	883320	889627	894515
NOx Emissions (g)	63413	59962	60488	61130
Vehicles Entered	24546	23492	23881	23823
Vehicles Exited	23185	22317	22321	22308
Hourly Exit Rate	23185	22317	22321	22308
Input Volume	513734	513734	513734	513734
% of Volume	5	4	4	4
Denied Entry Before	1280	1148	1168	1198
Denied Entry After	21075	22240	22113	22078

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Phase	Delay (Sec)	Travel Time (Min)	Delay (Min)	Speed (MPH)	Run 1 Speed	Run 1 Delay
	64	657.2	330.3	0.4	6	7	752.2
	61	65.0	101.3	0.2	6	6	60.7
	68	45.8	52.7	0.1	6	6	42.6
Glenwood Ave	85	177.3	200.7	0.3	5	5	172.0
	35	52.1	59.9	0.1	6	6	52.0
	65	28.5	32.7	0.1	6	6	28.5
Glenwood Ave	91	61.5	69.8	0.1	6	6	61.8
Crabtree Mall Entr	2	43.6	49.8	0.1	5	5	43.8
Glenwood Ave #2	82	92.9	102.1	0.1	4	4	89.9
Glenwood Ave	89	173.4	186.8	0.2	3	3	172.0
Blue Ridge Rd	3	29.2	31.4	0.0	4	4	25.4
Crabtree View Pl	81	23.6	29.4	0.1	8	10	18.0
Glenwood Ave #1	87	34.0	41.4	0.1	8	9	29.5
I-440 WB On/Off Ramp	4	18.7	23.3	0.1	9	10	17.7
WB I-440 On Ramp fro	44	15.3	21.3	0.1	16	16	14.3
EB I-440 On Ramp fro	23	14.3	18.0	0.0	15	17	18.7
Ridge Rd Extension	5	45.1	50.4	0.1	5	5	40.8
Total		1800.7	1960.3	2.0	6	6	1669.9

Arterial Level of Service: EB Glenwood Ave #1

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
	6	962.1	6	920.5	7	749.9	7
	6	90.8	6	87.0	6	80.5	6
	5	47.3	6	45.9	6	42.1	6
Glenwood Ave	5	185.4	5	174.2	5	167.0	6
	6	52.7	6	49.6	6	49.4	6
	6	28.1	6	27.3	6	26.9	6
Glenwood Ave	6	61.6	6	58.0	6	58.6	6
Crabtree Mall Entr	5	43.5	5	42.3	5	38.5	5
Glenwood Ave #2	4	94.0	4	95.0	5	79.3	4
Glenwood Ave	3	158.5	3	177.9	3	172.4	3
Blue Ridge Rd	4	29.2	4	28.8	5	32.3	4
Crabtree View Pl	8	24.0	9	22.4	10	18.8	9
Glenwood Ave #1	8	35.7	8	35.7	10	28.4	9
I-440 WB On/Off Ramp	9	19.5	9	19.1	10	16.6	10
WB I-440 On Ramp fro	16	14.5	16	14.8	17	13.4	16
EB I-440 On Ramp fro	16	8.1	15	11.5	16	14.0	15
Ridge Rd Extension	4	52.4	5	44.3	5	45.3	5
Total	5	1907.6	6	1854.2	6	1633.3	6

Arterial Level of Service: EB Glenwood Ave #1

Class Street	Flow 0 Delay	Flow 1 Delay	Flow 2 Delay	Flow 3 Delay	Flow 4 Delay	Flow 5 Delay	Flow 6 Delay
	141.0	5	157.9	5	144.3	6	153.1
	78.2	5	104.1	5	102.1	6	86.8
	40.7	5	55.0	5	52.2	6	45.4
Glenwood Ave	158.8	4	216.5	4	207.7	5	167.6
	45.2	4	70.1	5	63.3	6	47.8
	25.0	4	38.1	5	35.5	6	26.7
Glenwood Ave	53.8	4	81.1	5	75.2	6	57.5
Crabtree Mall Entr	39.2	4	60.6	4	50.3	5	40.9
Glenwood Ave #2	85.6	3	129.6	4	95.5	4	91.9
Glenwood Ave	180.2	3	213.7	3	218.2	4	149.7
Blue Ridge Rd	26.5	3	43.6	4	28.0	4	27.7
Crabtree View Pl	20.9	4	56.0	9	20.7	9	20.8
Glenwood Ave #1	30.1	5	58.9	9	31.5	9	32.7
I-440 WB On/Off Ramp	17.5	6	28.8	10	17.3	10	18.0
WB I-440 On Ramp fro	14.2	10	27.4	16	14.3	16	14.7
EB I-440 On Ramp fro	12.8	9	21.3	16	12.6	16	9.4
Ridge Rd Extension	45.5	4	49.9	5	45.3	5	43.7
Total	1568.2	4	2212.7	5	2014.5	6	1714.5

Arterial Level of Service: EB Glenwood Ave #1

Class Street	Flow 0 Delay	Flow 1 Delay	Flow 10 Delay	Flow 15 Delay
	6	87.4	6	87.0
	6	44.3	6	45.3
Glenwood Ave	6	164.0	5	171.7
	6	46.0	6	50.5
	6	25.1	6	27.4
Glenwood Ave	6	54.1	6	59.9
Crabtree Mall Entr	5	40.1	5	41.3
Glenwood Ave #2	4	87.4	4	90.3
Glenwood Ave	4	144.3	3	160.5
Blue Ridge Rd	4	25.8	4	28.1
Crabtree View Pl	9	19.8	8	24.2
Glenwood Ave #1	9	30.5	8	33.9
I-440 WB On/Off Ramp	10	17.6	9	18.1
WB I-440 On Ramp fro	17	14.0	16	14.9
EB I-440 On Ramp fro	17	10.9	16	25.5
Ridge Rd Extension	5	39.0	5	46.9
Total	6	1776.2	6	1778.4

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed	Run 1 Speed	Run 1 Delay
EB I-440 On Ramp fro	5	785.7	807.5	0.3	15	13	759.0
EB I-440 On Ramp fro	23	4.7	8.3	0.1	29	25	5.8
WB I-440 On Ramp fro	44	5.8	11.9	0.0	13	9	10.7
I-440 WB On/Off Ramp	4	13.1	20.7	0.1	16	13	18.8
Glenwood Ave	87	10.0	14.0	0.1	15	13	12.1
	92	0.0	0.0	0.1		0.0	0.0
	83	3.7	8.0	0.1	23	20	5.1
	94	7.5	16.3	0.1	24	19	11.6
Glenwood Ave	100	2.2	3.8	0.0	35	26	3.4
Glenwood Ave #1	82	7.4	16.8	0.1	20	16	11.5
Marriott Dr	2	0.0	0.0	0.1		0.0	0.0
Glenwood Ave	91	0.4	5.9	0.1	42	42	0.3
	65	0.6	9.7	0.1	40	41	0.6
	35	0.4	4.6	0.1	40	40	0.3
Glenwood Ave	85	0.8	7.4	0.1	45	46	0.7
	68	2.5	26.9	0.3	38	39	2.2
	61	0.8	7.4	0.1	40	40	0.7
	64	1.5	14.7	0.2	40	40	1.4
Total		847.2	984.1	1.9	28	24	844.3

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 2 Speed	Run 2 Delay	Run 3 Speed	Run 3 Delay	Run 4 Speed	Run 4 Delay	Run 5 Speed
EB I-440 On Ramp fro	16	865.1	18	643.0	18	849.2	18
EB I-440 On Ramp fro	32	3.8	34	3.4	35	3.2	35
WB I-440 On Ramp fro	18	2.9	18	2.9	19	2.3	19
I-440 WB On/Off Ramp	20	8.8	20	8.8	24	6.6	25
Glenwood Ave	16	9.4	17	9.0	18	8.0	19
	0.0	0.0	9.8	0.0	0.0	9.8	13.4
	27	2.5	28	2.4	28	2.3	28
	31	3.5	32	3.2	33	2.9	35
Glenwood Ave	47	1.2	50	1.0	51	0.9	57
Glenwood Ave #1	26	3.6	27	3.3	28	3.0	29
Marriott Dr	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Glenwood Ave	42	0.3	42	0.4	42	0.3	42
	40	0.7	40	0.6	40	0.6	40
	40	0.4	40	0.4	40	0.3	40
Glenwood Ave	45	0.8	45	0.9	45	0.8	44
	39	2.4	38	2.4	38	2.6	38
	40	0.7	40	0.7	39	0.9	40
	40	1.5	40	1.5	39	1.7	40
Total	31	907.6	30	684.7	33	885.8	30

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 5 Delay	Run 6 Speed	Run 6 Delay	Run 7 Speed	Run 7 Delay	Run 8 Speed	Run 8 Delay
EB I-440 On Ramp fro	818.4	10	784.2	17	798.5	17	824.4
EB I-440 On Ramp fro	3.2	19	9.0	29	4.6	34	3.4
WB I-440 On Ramp fro	2.2	7	15.8	18	2.5	18	2.6
I-440 WB On/Off Ramp	5.8	8	32.4	23	7.0	23	7.0
Glenwood Ave	7.3	11	15.4	17	8.5	18	8.1
	0.0						
	2.4	16	7.5	25	3.2	26	3.0
	2.3	14	19.4	25	6.6	25	6.5
Glenwood Ave	0.7	18	5.5	38	1.8	36	2.0
Glenwood Ave #1	2.6	11	22.8	20	8.1	22	6.0
Marriott Dr	8.7						
Glenwood Ave	0.4	42	0.3	41	0.4	41	0.4
	0.7	41	0.6	40	0.7	40	0.7
	0.4	40	0.3	40	0.4	40	0.4
Glenwood Ave	0.9	46	0.7	45	0.8	45	0.9
	2.7	39	2.0	38	2.7	38	2.5
	0.8	40	0.6	40	0.7	40	0.7
	1.6	40	1.3	39	1.6	39	1.6
Total	862.1	19	918.0	30	848.3	29	880.0

Arterial Level of Service: NW Glenwood Ave #1

Cross Street	Run 9 Speed	Run 9 Delay	Run 10 Speed	Run 10 Delay
EB I-440 On Ramp fro	17	705.1	14	822.0
EB I-440 On Ramp fro	28	4.8	24	6.1
WB I-440 On Ramp fro	11	8.2	10	9.4
I-440 WB On/Off Ramp	12	19.7	12	19.3
Glenwood Ave	13	12.1	14	11.0
	20	5.1	22	4.3
	18	13.0	21	9.4
Glenwood Ave	26	3.4	32	2.5
Glenwood Ave #1	18	9.4	20	7.9
Marriott Dr				
Glenwood Ave	42	0.3	42	0.3
	41	0.6	40	0.7
	40	0.3	40	0.4
Glenwood Ave	45	0.8	45	0.8
	38	2.6	38	2.7
	40	0.8	40	0.8
	39	1.7	40	1.5
Total	24	802.3	24	907.7