

TECHNICAL APPENDIX

APPENDIX A

TRAFFIC COUNTS

Ramey Kemp and Associates, Inc.
 4928-A Windy Hill Drive
 Raleigh, NC 27609
 P:(919)872-5115 F:(919)878-5416

File Name : US15-501@Morris
 Site Code : 00032806
 Start Date : 03/28/2006
 Page No : 1

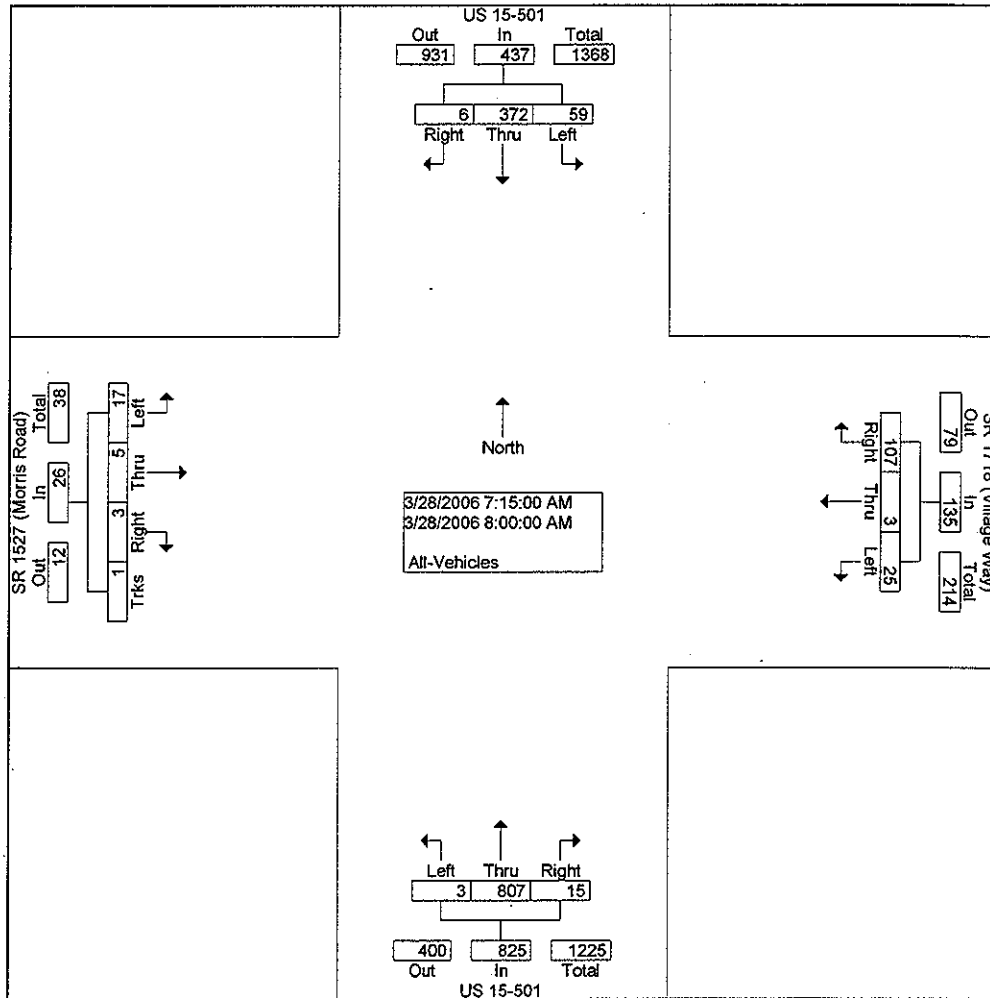
Groups Printed- All-Vehicles

Start Time	US 15-501 Southbound				SR 1718 (Village Way) Westbound				US 15-501 Northbound				SR 1527 (Morris Road) Eastbound				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks	Left	Thru	Right	Trks			
07:00 AM	10	78	0	0	6	0	16	0	1	138	1	6	5	1	2	1	6	259	265
07:15 AM	14	94	0	0	4	0	15	0	0	202	3	4	4	0	1	0	4	337	341
07:30 AM	7	111	4	5	3	2	30	0	1	219	4	3	5	3	0	0	8	389	397
07:45 AM	12	82	1	3	9	1	30	1	2	204	3	6	3	0	0	0	10	347	357
Total	43	365	5	8	22	3	91	1	4	763	11	19	17	4	3	1	28	1332	1360
08:00 AM	26	85	1	2	9	0	32	0	0	182	5	2	5	2	2	1	4	350	354
08:15 AM	7	95	1	6	5	0	39	0	2	158	5	6	2	0	0	0	12	314	326
08:30 AM	20	84	0	5	7	3	40	2	1	150	4	5	2	0	2	0	12	313	325
08:45 AM	16	109	4	5	6	2	24	2	2	112	6	4	0	1	0	0	11	282	293
Total	69	373	6	18	27	5	135	4	5	602	20	17	9	3	4	1	39	1259	1298
BREAK																			
04:30 PM	36	158	5	4	6	1	26	0	1	89	11	5	3	0	0	0	9	336	345
04:45 PM	32	181	4	2	1	1	22	0	3	106	4	2	1	0	2	0	4	357	361
Total	68	339	9	6	7	2	48	0	4	195	15	7	4	0	2	0	13	693	706
05:00 PM	25	191	5	1	4	2	34	3	0	82	7	4	3	0	2	1	8	356	364
05:15 PM	30	210	6	4	8	2	28	2	0	121	8	2	1	0	2	0	8	416	424
05:30 PM	43	198	10	4	2	2	27	0	1	115	5	3	2	1	3	0	7	409	416
05:45 PM	30	199	6	3	6	1	16	0	0	110	8	1	3	0	1	0	4	380	384
Total	128	798	27	12	20	7	105	5	1	428	28	10	9	1	8	1	27	1561	1588
06:00 PM	32	134	8	3	5	0	22	1	2	89	3	4	2	0	0	0	8	297	305
06:15 PM	24	134	4	5	6	0	24	1	2	77	2	3	1	0	0	0	9	274	283
Grand Total	364	2143	59	52	87	17	425	12	18	2154	79	60	42	8	17	3	124	5416	5540
Apprch %	14.2	83.5	2.3		16.4	3.2	80.3		0.8	95.7	3.5		60.0	11.4	24.3	4.3			
Total %	6.7	39.6	1.1		1.6	0.3	7.8		0.3	39.8	1.5		0.8	0.1	0.3	0.1		2.2	97.8

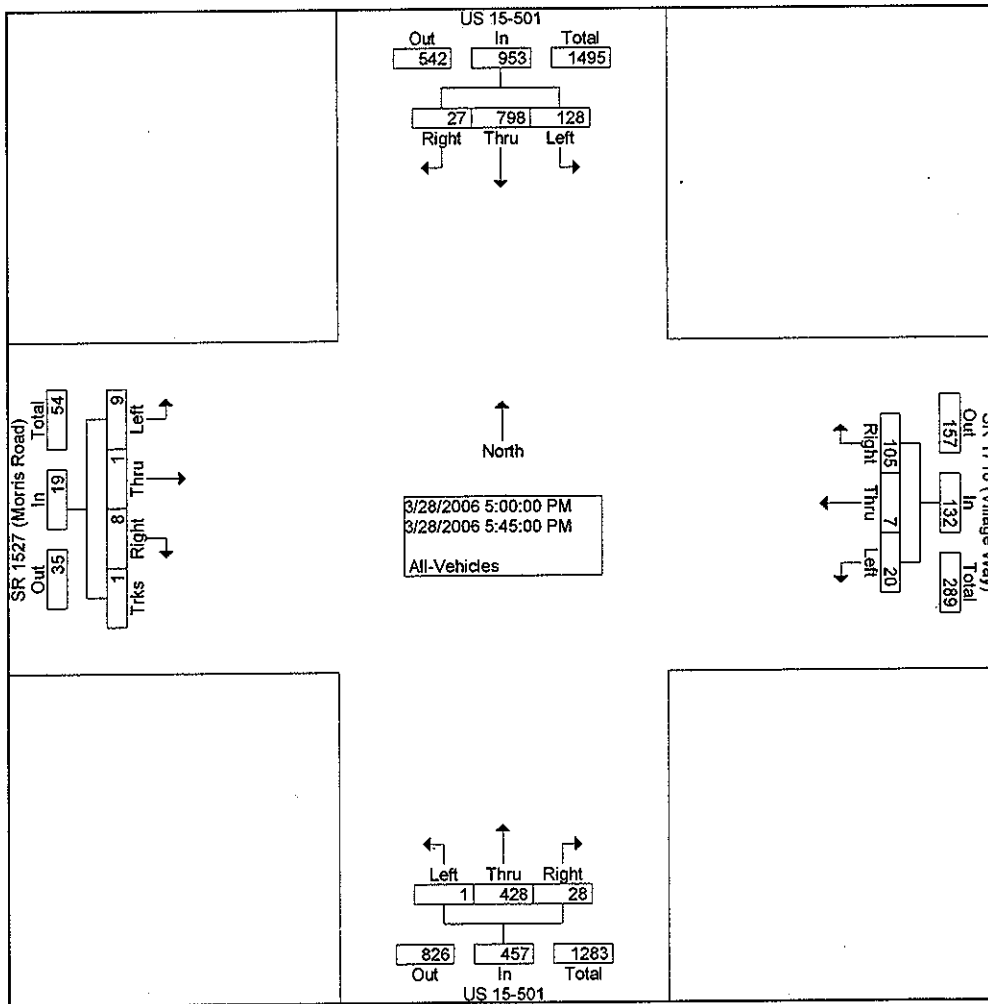
Ramey Kemp and Associates, Inc.
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File Name : US15-501@Morris
 Site Code : 00032806
 Start Date : 03/28/2006
 Page No : 2

Start Time	US 15-501 Southbound				SR 1718 (Village Way) Westbound				US 15-501 Northbound				SR 1527 (Morris Road) Eastbound					Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Trks	App. Total	
Peak Hour From 07:00 AM to 11:45 AM - Peak 1 of 1																		
Intersection	07:15 AM																	
Volume	59	372	6	437	25	3	107	135	3	807	15	825	17	5	3	1	26	1423
Percent	13.5	85.1	1.4		18.5	2.2	79.3		0.4	97.8	1.8		65.4	19.2	11.5	3.8		
07:30 Volume	7	111	4	122	3	2	30	35	1	219	4	224	5	3	0	0	8	389
Peak Factor																		0.915
High Int.	07:30 AM				08:00 AM				07:30 AM				08:00 AM					
Volume	7	111	4	122	9	0	32	41	1	219	4	224	5	2	2	1	10	
Peak Factor	0.895								0.823				0.921					0.650



Start Time	US 15-501 Southbound				SR 1718 (Village Way) Westbound				US 15-501 Northbound				SR 1527 (Morris Road) Eastbound					Int. Total		
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Trks	App. Total			
Peak Hour From 12:00 PM to 06:15 PM - Peak 1 of 1																				
Intersection 05:00 PM																				
Volume	128	798	27	953	20	7	105	132	1	428	28	457	9	1	8	1	19	1561		
Percent	13.4	83.7	2.8		15.2	5.3	79.5		0.2	93.7	6.1		47.4	5.3	42.1	5.3		416		
05:15 Volume	30	210	6	246	8	2	28	38	0	121	8	129	1	0	2	0	3	0.938		
Peak Factor																				
High Int. 05:30 PM																				
Volume	43	198	10	251	4	2	34	40	0	121	8	129	3	0	2	1	6			
Peak Factor	0.949								0.825								0.792			



APPENDIX B

CAPACITY ANALYSIS CALCULATIONS

EXISTING (2006) PEAK HOUR CONDITIONS













Ferrington Retail Development
1: Morris Road & US 15-501

Existing (2006)
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.950			0.854				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1770	0	1770	1591	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.545			0.752			0.493			0.267		
Satd. Flow (perm)	1015	1770	0	1401	1591	0	918	3539	1583	497	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			119				17			7
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	17	5	3	25	3	107	3	807	15	59	372	6
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	6	3	28	3	119	3	897	17	66	413	7
Lane Group Flow (vph)	19	9	0	28	122	0	3	897	17	66	413	7
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	11.6	11.6		11.6	11.6		46.4	44.6	44.6	49.5	51.3	51.3
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.59	0.66	0.66	0.68	0.76	0.76
v/c Ratio	0.12	0.03		0.13	0.35		0.00	0.38	0.02	0.13	0.15	0.01
Uniform Delay, d1	30.2	19.8		30.2	0.7		2.7	7.9	0.0	2.2	5.1	0.0
Delay	22.9	19.4		22.4	5.9		5.7	9.6	5.2	3.7	4.9	4.8
LOS	C	B		C	A		A	A	A	A	A	A
Approach Delay		21.8			9.0			9.5			4.8	
Approach LOS		C			A			A			A	
Queue Length 50th (ft)	5	2		8	1		0	121	0	6	23	0
Queue Length 95th (ft)	24	14		31	41		3	188	9	19	78	6

Ferrington Retail Development
 1: Morris Road & US 15-501

Existing (2006)
 Timing Plan: AM Peak

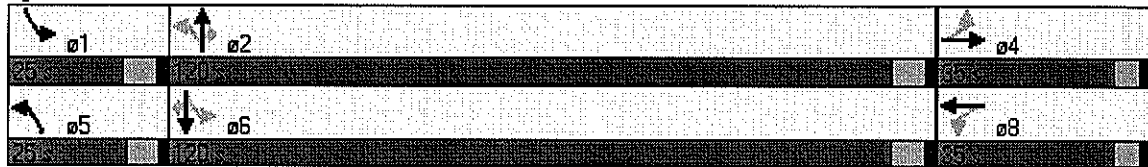
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 67.6
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 8.2
 Intersection Capacity Utilization 50.7%

Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 1: Morris Road & US 15-501















Ferrington Retail Development
1: Morris Road & US 15-501

Existing (2006)
Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.865			0.860				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1611	0	1770	1602	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.537			0.751			0.271			0.457		
Satd. Flow (perm)	1000	1611	0	1399	1602	0	505	3539	1583	851	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			117				31			28
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	9	1	8	20	7	105	1	428	28	128	798	27
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	10	1	9	22	8	117	1	476	31	142	887	30
Lane Group Flow (vph)	10	10	0	22	125	0	1	476	31	142	887	30
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	11.8	11.8		11.8	11.8		40.3	32.2	32.2	46.7	44.4	44.4
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.51	0.48	0.48	0.66	0.66	0.66
v/c Ratio	0.06	0.04		0.09	0.34		0.00	0.28	0.04	0.20	0.38	0.03
Uniform Delay, d1	26.6	2.6		26.8	1.7		4.0	9.9	0.0	3.1	7.4	0.4
Delay	20.1	13.0		20.0	5.8		6.0	11.9	5.2	4.1	6.8	3.8
LOS	C	B		B	A		A	B	A	A	A	A
Approach Delay		16.6			7.9			11.5			6.4	
Approach LOS		B			A			B			A	
Queue Length 50th (ft)	2	0		5	2		0	55	0	15	58	0
Queue Length 95th (ft)	15	12		25	42		1	99	14	35	183	13

Ferrington Retail Development
 1: Morris Road & US 15-501

Existing (2006)
 Timing Plan: PM Peak

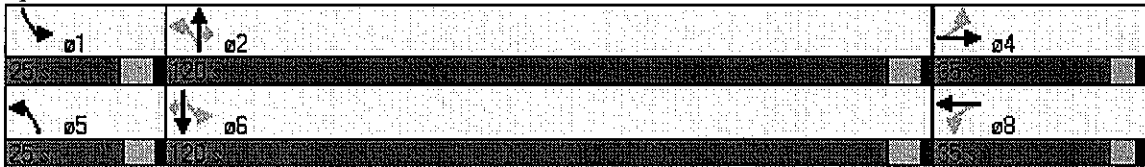
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 67.6
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 8.1
 Intersection Capacity Utilization 50.5%

Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 1: Morris Road & US 15-501



APPENDIX C

ADJACENT DEVELOPMENT TRAFFIC

**Transportation Impact Assessment
for
Briar Chapel
Chatham County, North Carolina**

Prepared for:


**The John R. McAdams Company, Inc.
Research Triangle Park, North Carolina**

Prepared By:

**Kimley-Horn and Associates, Inc.
P.O. Box 33068
Raleigh, North Carolina 27636-3068
(919) 677-2000**

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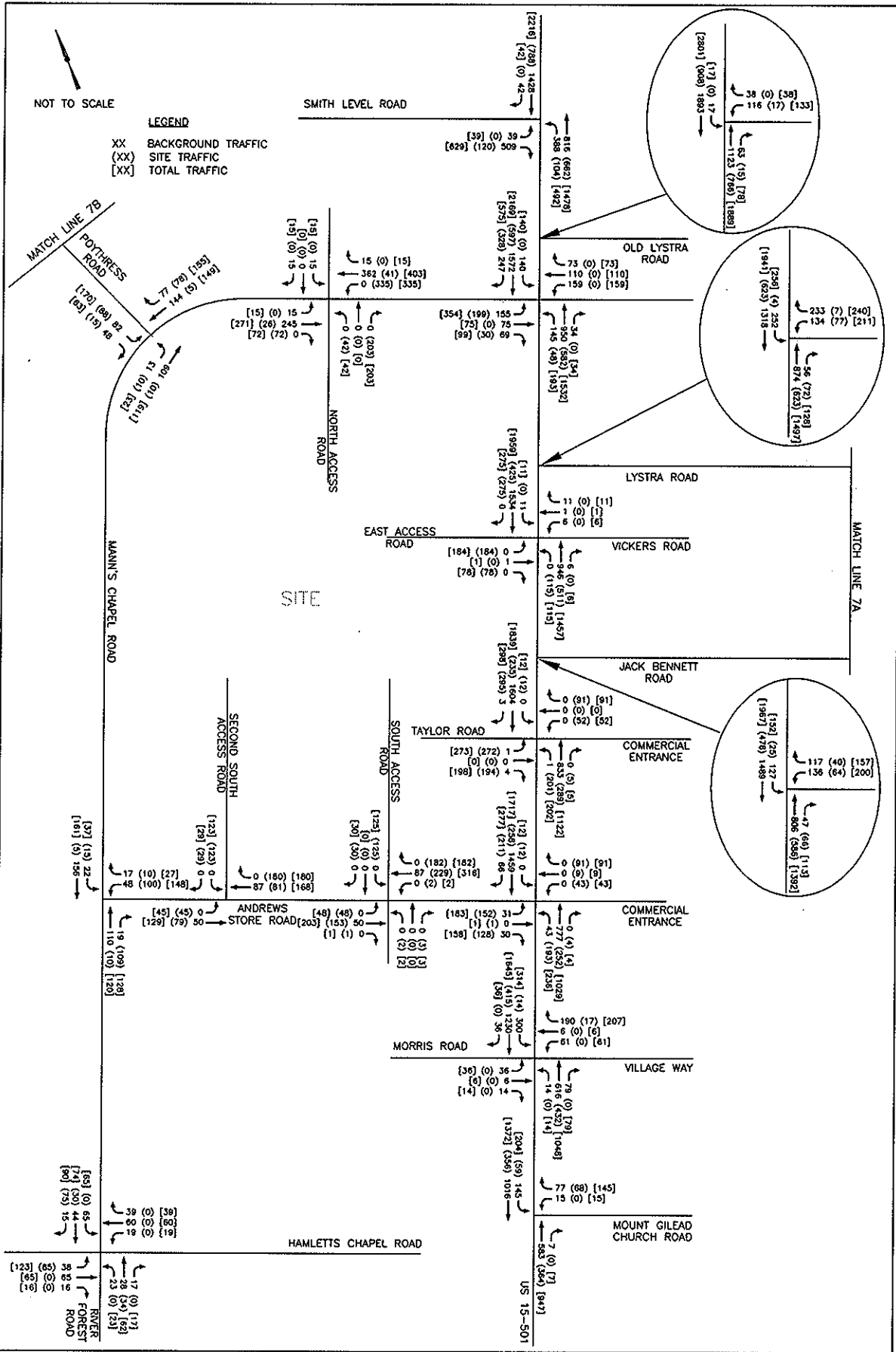
June 2004



A circular professional seal for Allen L. Williford, a North Carolina Professional Engineer. The seal contains the text: "NORTH CAROLINA PROFESSIONAL SEAL 8254 ENGINEER ALLEN L. WILLIFORD". A handwritten signature "Allen L. Williford" and the date "6/19/04" are written over the seal.



A circular professional seal for Emily F. Hollis, a North Carolina Professional Engineer. The seal contains the text: "NORTH CAROLINA PROFESSIONAL SEAL 029407 ENGINEER EMILY F. HOLLIS". A handwritten signature "Emily F. Hollis" is written over the seal, and the date "6-14-2004" is written below it.



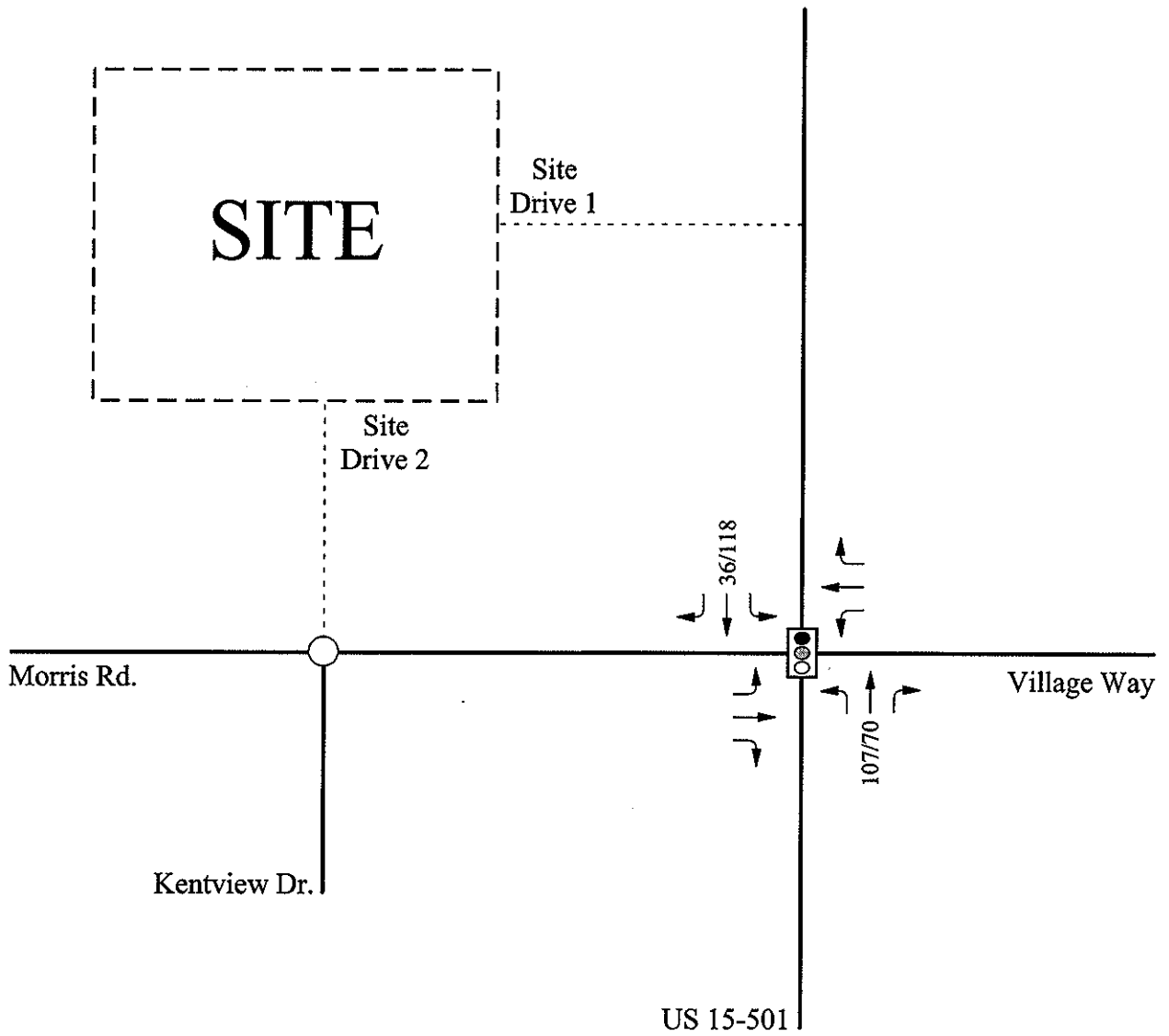
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**BRIAR CHAPEL
 TRANSPORTATION IMPACT ASSESSMENT**

**PROJECTED 2014 PM PEAK HOUR
 TRAFFIC VOLUMES**

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.

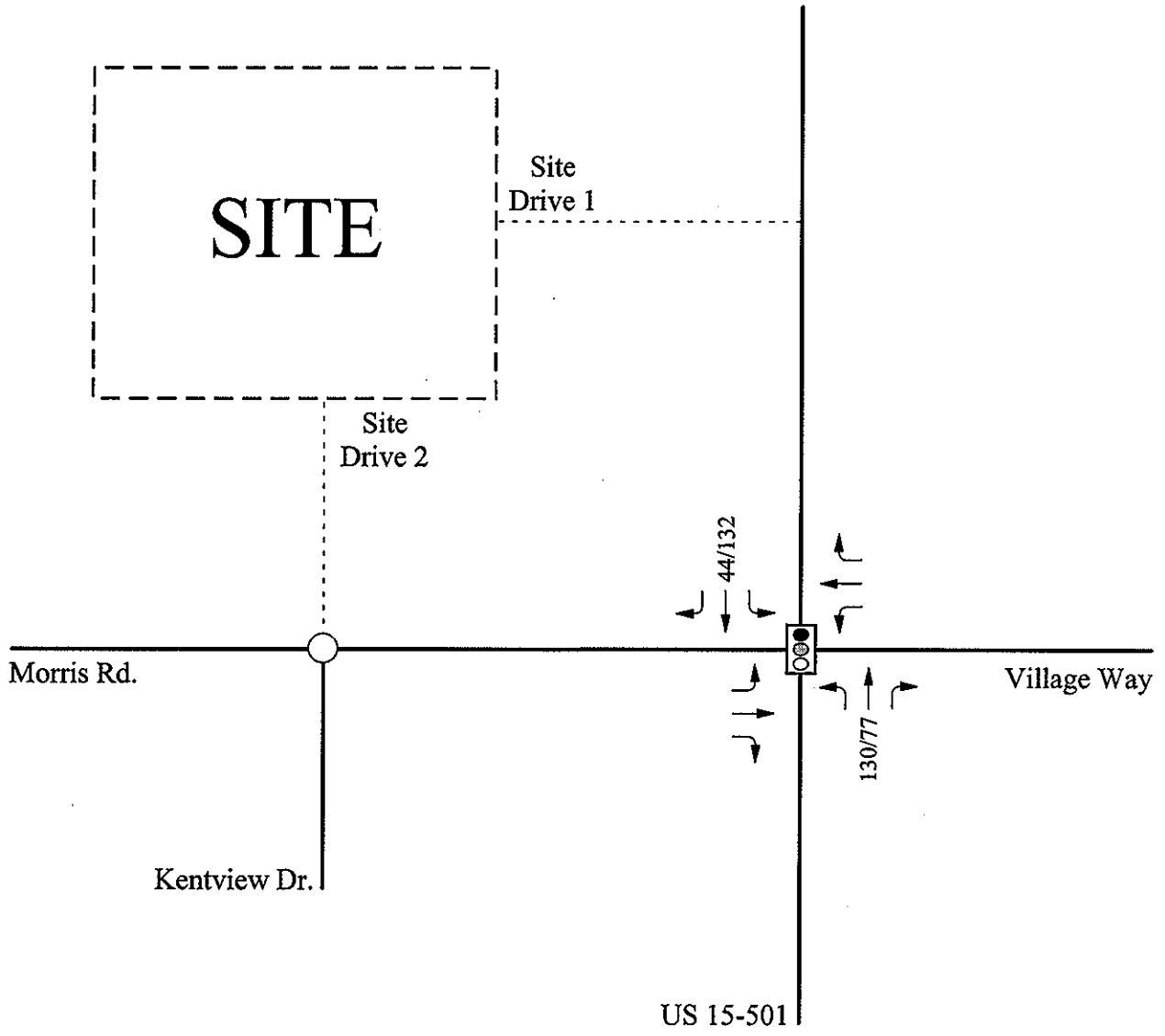


LEGEND




-  Signalized Intersection
-  Unsignalized Intersection
- X/Y → AM/PM Weekday Peak Hour Traffic



FEARRINGTON RETAIL DEVELOPMENT CHATHAM COUNTY, NORTH CAROLINA		
Preserve Expansion Traffic		
	Scale: Not to Scale	

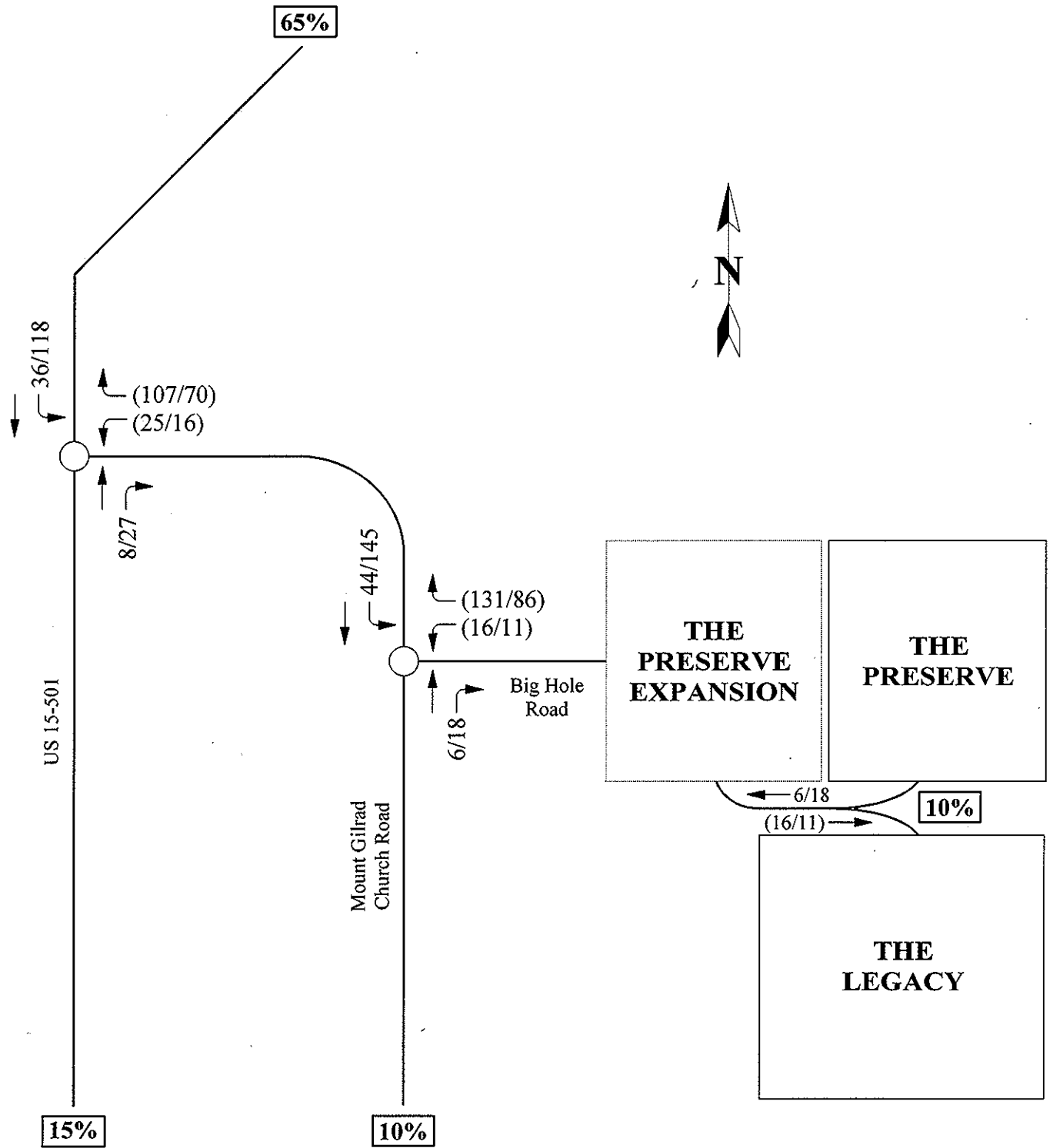


LEGEND

-  Signalized Intersection
-  Unsignalized Intersection
- X/Y  AM/PM Weekday Peak Hour Traffic



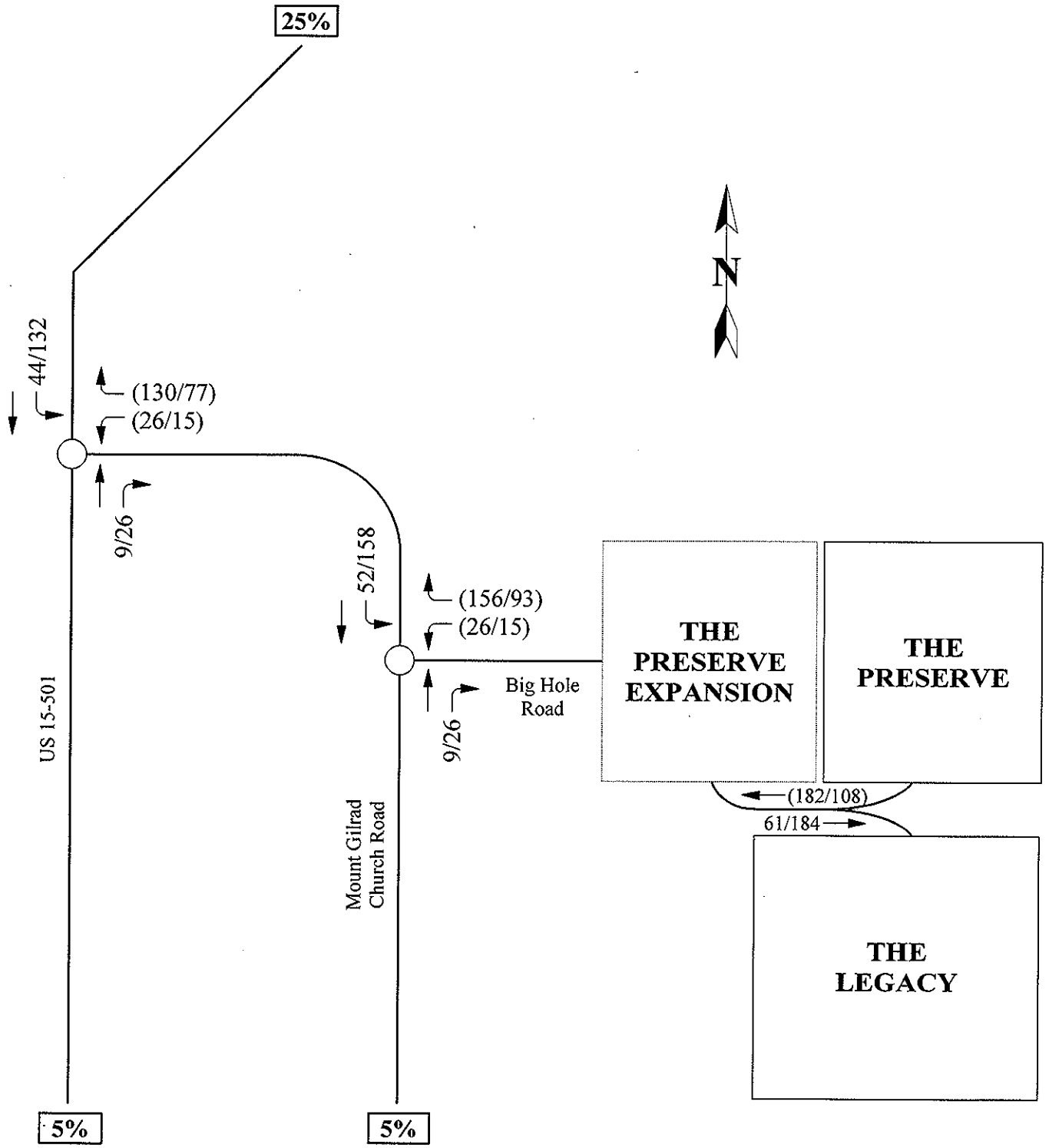
FEARRINGTON RETAIL DEVELOPMENT CHATHAM COUNTY, NORTH CAROLINA		
Diverted Traffic - Preserve and Legacy Developments		
	Scale: Not to Scale	



LEGEND

- Unsignalized Intersection
- XX/XX Traffic Volumes
- XX (XX) AM Peak/PM Peak
- XX (XX) Enter (Exit)

<i>THE PRESERVE EXPANSION CHATHAM COUNTY, NORTH CAROLINA</i>	
<i>SITE TRIP ASSIGNMENT</i>	
<i>SCALE: Not to Scale</i>	<i>Figure 9</i>



LEGEND

- Unsignalized Intersection
- XX/XX Traffic Volumes
- AM Peak/PM Peak
- XX (XX) Enter (Exit)

<i>THE PRESERVE EXPANSION CHATHAM COUNTY, NORTH CAROLINA</i>		
<i>DIVERTED TRIP ASSIGNMENT</i>		
<i>SCALE: Not to Scale</i>	<i>Figure 11</i>	

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS

BACKGROUND (2009) PEAK HOUR CONDITIONS













Ferrington Retail Development
1: Morris Road & US 15-501

Background (2009)
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.950			0.853				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1770	0	1770	1589	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.495			0.752			0.272			0.100		
Satd. Flow (perm)	922	1770	0	1401	1589	0	507	3539	1583	186	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			138				12			7
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	18	5	3	27	3	124	3	1368	16	77	796	6
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	20	6	3	30	3	138	3	1520	18	86	884	7
Lane Group Flow (vph)	20	9	0	30	141	0	3	1520	18	86	884	7
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	10.8	10.8		10.8	10.8		57.2	50.5	50.5	61.5	59.8	59.8
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.61	0.61	0.61	0.72	0.72	0.72
v/c Ratio	0.17	0.04		0.16	0.43		0.01	0.71	0.02	0.28	0.35	0.01
Uniform Delay, d1	34.8	22.8		34.7	0.7		3.0	11.2	2.2	2.5	6.1	0.0
Delay	36.1	30.4		35.4	7.7		4.3	12.2	4.8	3.1	5.1	3.3
LOS	D	C		D	A		A	B	A	A	A	A
Approach Delay		34.3			12.6			12.1			4.9	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)	9	3		13	1		0	268	1	8	57	0
Queue Length 95th (ft)	35	18		46	56		2	403	10	22	176	5

Ferrington Retail Development
 1: Morris Road & US 15-501

Background (2009)
 Timing Plan: AM Peak

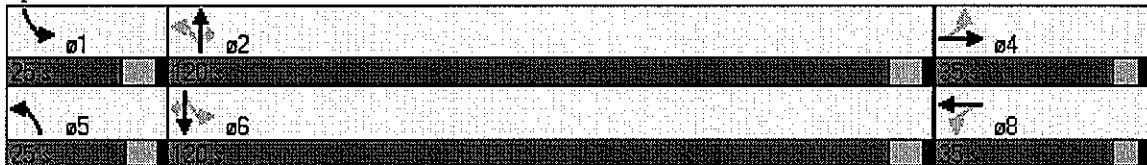
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %								12%				
95th Bay Block Time %								19%				
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 82.9
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 9.8
 Intersection Capacity Utilization 69.1%

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 1: Morris Road & US 15-501



Ferrington Retail Development
1: Morris Road & US 15-501

Background (2009)
Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.865			0.858				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1611	0	1770	1598	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.482			0.751			0.092			0.223		
Satd. Flow (perm)	898	1611	0	1399	1598	0	171	3539	1583	415	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			138				33			17
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	10	1	8	21	7	124	1	925	30	147	1408	29
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	11	1	9	23	8	138	1	1028	33	163	1564	32
Lane Group Flow (vph)	11	10	0	23	146	0	1	1028	33	163	1564	32
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effect Green (s)	11.7	11.7		11.7	11.7		54.3	47.0	47.0	60.9	59.2	59.2
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.59	0.58	0.58	0.73	0.73	0.73
v/c Ratio	0.09	0.04		0.12	0.43		0.00	0.50	0.04	0.34	0.61	0.03
Uniform Delay, d1	33.9	3.4		34.1	1.8		3.0	9.9	0.0	2.6	8.1	2.1
Delay	31.5	19.6		30.8	7.5		5.0	11.4	3.4	3.3	7.0	3.5
LOS	C	B		C	A		A	B	A	A	A	A
Approach Delay		25.8			10.7			11.2			6.6	
Approach LOS		C			B			B			A	
Queue Length 50th (ft)	4	0		7	3		0	148	0	17	138	1
Queue Length 95th (ft)	23	16		38	61		1	238	12	39	411	14

Ferrington Retail Development
 1: Morris Road & US 15-501

Background (2009)
 Timing Plan: PM Peak

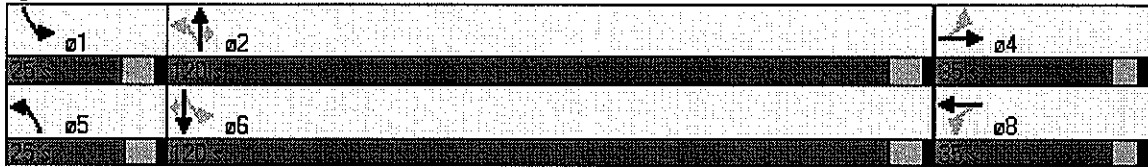
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %												
95th Bay Block Time %								6%			17%	
Queuing Penalty (veh)											14	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 81.1
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.61
 Intersection Signal Delay: 8.6
 Intersection Capacity Utilization 70.5%

Intersection LOS: A
 ICU Level of Service C

Splits and Phases: 1: Morris Road & US 15-501



APPENDIX E

CAPACITY ANALYSIS CALCULATIONS COMBINED (2009) PEAK HOUR CONDITIONS

Ferrington Retail Development
1: Morris Road & US 15-501

Combined (2009)
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.872			0.869				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1624	0	1770	1619	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.450			0.521			0.253			0.100		
Satd. Flow (perm)	838	1624	0	970	1619	0	471	3539	1583	186	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		112			138				12			21
Headway 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
Link Speed (mph)		35			25			30				55
Link Distance (ft)		900			3123			1033				670
Travel Time (s)		17.5			85.2			23.5				8.3
Volume (vph)	104	17	101	27	18	124	185	1368	16	77	845	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	116	19	112	30	20	138	206	1520	18	86	939	23
Lane Group Flow (vph)	116	131	0	30	158	0	206	1520	18	86	939	23
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	22.5	22.5		22.5	22.5		63.6	55.4	55.4	60.0	53.6	53.6
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.62	0.55	0.55	0.58	0.54	0.54
v/c Ratio	0.61	0.29		0.14	0.33		0.47	0.78	0.02	0.32	0.49	0.03
Uniform Delay, d1	35.2	4.5		31.3	3.9		6.0	17.7	3.4	5.8	14.7	1.0
Delay	42.0	10.9		37.8	9.7		7.0	19.0	7.2	7.2	16.3	5.9
LOS	D	B		D	A		A	B	A	A	B	A
Approach Delay		25.5			14.2			17.5			15.3	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	68	10		16	10		46	418	2	18	212	1
Queue Length 95th (ft)	165	68		51	75		84	577	13	38	307	14

Ferrington Retail Development
 1: Morris Road & US 15-501

Combined (2009)
 Timing Plan: AM Peak

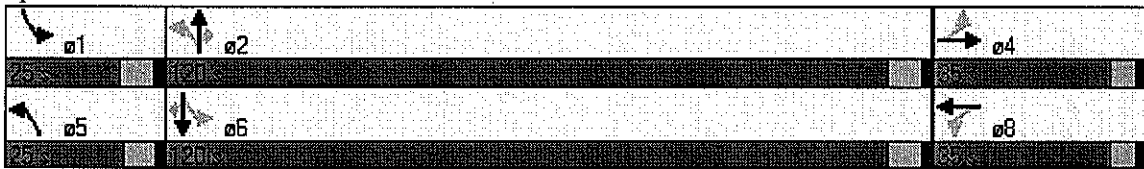
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %								24%				
95th Bay Block Time %	33%							26%			10%	
Queuing Penalty (veh)	21							51			4	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 100
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 17.2
 Intersection Capacity Utilization 80.5%

Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 1: Morris Road & US 15-501















Ferrington Retail Development
1: Morris Road & US 15-501

Combined (2009) With Improvements
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	225		0	225		225	250		175
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.872			0.869				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1624	0	1770	1619	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.673			0.214			0.082		
Satd. Flow (perm)	3433	1624	0	1254	1619	0	399	3539	1583	153	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		112			137				15			23
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	104	17	101	27	18	124	185	1368	16	77	845	21
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	116	19	112	30	20	138	206	1520	18	86	939	23
Lane Group Flow (vph)	116	131	0	30	158	0	206	1520	18	86	939	23
Turn Type	Prot			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Detector Phases	7	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.0	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	14.0	33.2	0.0	19.2	19.2	0.0	17.9	72.7	72.7	14.1	68.9	68.9
Total Split (%)	12%	28%	0%	16%	16%	0%	15%	61%	61%	12%	57%	57%
Maximum Green (s)	7.0	25.7		11.7	11.7		11.3	65.6	65.6	7.0	61.8	61.8
Yellow Time (s)	5.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	2.0	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag	Lag	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	3.0
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	8.8	22.0		11.1	11.1		69.8	63.3	63.3	65.5	61.2	61.2
Actuated g/C Ratio	0.09	0.21		0.11	0.11		0.67	0.63	0.63	0.63	0.61	0.61
v/c Ratio	0.40	0.30		0.22	0.53		0.49	0.68	0.02	0.36	0.44	0.02
Uniform Delay, d1	47.4	4.9		45.1	5.9		5.4	16.0	1.5	5.5	13.6	0.0
Delay	46.8	9.6		46.3	11.8		6.5	17.8	5.9	9.5	15.4	5.1
LOS	D	A		D	B		A	B	A	A	B	A
Approach Delay		27.1			17.3			16.3			14.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	37	10		18	13		46	413	1	18	210	0
Queue Length 95th (ft)	76	63		52	81		82	543	12	48	290	13

Ferrington Retail Development
 1: Morris Road & US 15-501

Combined (2009) With Improvements
 Timing Plan: AM Peak

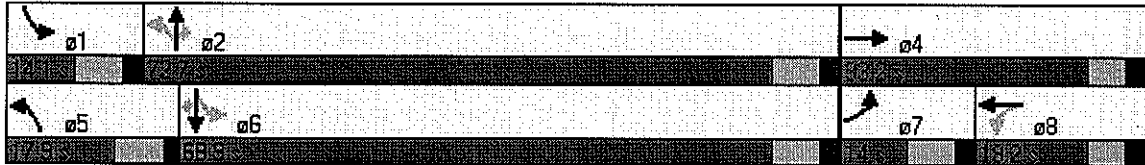
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953			590	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)	225			225			225		225	250		175
50th Bay Block Time %								24%				
95th Bay Block Time %								27%			9%	
Queuing Penalty (veh)								52			4	













Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 100.8
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 16.7
 Intersection Capacity Utilization 78.3%

Intersection LOS: B
 ICU Level of Service C

















Splits and Phases: 1: Morris Road & US 15-501









						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 	 	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	49	0	1596	894	91
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	0	54	0	1773	993	101
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)				670		
pX, platoon unblocked						
vC, conflicting volume	1880	497	1094			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1880	497	1094			
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	90	100			
cM capacity (veh/h)	63	519	633			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	54	887	887	497	497	101
Volume Left	0	0	0	0	0	0
Volume Right	54	0	0	0	0	101
cSH	519	1700	1700	1700	1700	1700
Volume to Capacity	0.10	0.52	0.52	0.29	0.29	0.06
Queue Length (ft)	9	0	0	0	0	0
Control Delay (s)	12.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			53.2%	ICU Level of Service		A

Ferrington Retail Development
3: Morris Road & Site Driveway 2

Combined (2009)
Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	26	5	5	12	213	5	5	5	197	5	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	6	29	6	6	13	237	6	6	6	219	6	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)					900							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	250			34			194	304	32	194	188	132
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	245			34			188	299	32	188	183	126
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 %	100			100			99	99	99	71	99	99
cM capacity (veh/h)	1312			1577			753	604	1042	753	701	918
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	40	256	17	230								
Volume Left	6	6	6	219								
Volume Right	6	237	6	6								
cSH	1312	1577	761	755								
Volume to Capacity	0.00	0.00	0.02	0.30								
Queue Length (ft)	0	0	2	32								
Control Delay (s)	1.1	0.2	9.8	11.8								
Lane LOS	A	A	A	B								
Approach Delay (s)	1.1	0.2	9.8	11.8								
Approach LOS			A	B								
Intersection Summary												
Average Delay			5.5									
Intersection Capacity Utilization			44.7%		ICU Level of Service				A			

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↖	↗	↖	↗	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	26	12	213	197	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	6	29	13	237	219	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)			410			
pX, platoon unblocked						
vC, conflicting volume	250				53	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250				53	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				77	99
cM capacity (veh/h)	1316				951	1067
Direction, Lane #	EB 1	WB 1	WB 2	SB 1		
Volume Total	34	13	237	224		
Volume Left	6	0	0	219		
Volume Right	0	0	237	6		
cSH	1316	1700	1700	953		
Volume to Capacity	0.00	0.01	0.14	0.24		
Queue Length (ft)	0	0	0	23		
Control Delay (s)	1.3	0.0	0.0	9.9		
Lane LOS	A			A		
Approach Delay (s)	1.3	0.0		9.9		
Approach LOS				A		
Intersection Summary						
Average Delay			4.5			
Intersection Capacity Utilization			26.3%		ICU Level of Service	A

Intersection: 1: Morris Road & US 15-501

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	76	65	108	47	228	251	465	454	24	109	206	206
Average Queue (ft)	29	43	52	19	64	87	206	195	2	42	132	115
95th Queue (ft)	59	66	89	44	125	199	343	338	10	76	198	181
Link Distance (ft)			784		3066		966	966			598	598
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225	225		225		225			225	250		
Storage Blk Time (%)					0.00	0.00	0.04	0.04				0.01
Queuing Penalty (veh)					0	0	8	1				0

Intersection: 1: Morris Road & US 15-501

Movement	SB
Directions Served	R
Maximum Queue (ft)	29
Average Queue (ft)	9
95th Queue (ft)	29
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	175
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Site Driveway 1 & US 15-501

Movement	EB
Directions Served	R
Maximum Queue (ft)	47
Average Queue (ft)	22
95th Queue (ft)	41
Link Distance (ft)	409
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Morris Road & Site Driveway 2

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	28	26	64
Average Queue (ft)	2	10	35
95th Queue (ft)	13	28	57
Link Distance (ft)	784	654	380
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 9

Ferrington Retail Development
1: Morris Road & US 15-501

Combined (2009)
Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	225		0	225		225	250		175
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.862			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1606	0	1770	1632	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.427			0.181			0.090			0.257		
Satd. Flow (perm)	795	1606	0	337	1632	0	168	3539	1583	479	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		183			114				33			67
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	229	19	220	21	26	124	315	834	30	147	1416	113
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	254	21	244	23	29	138	350	927	33	163	1573	126
Lane Group Flow (vph)	254	265	0	23	167	0	350	927	33	163	1573	126
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.5	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	25.0	120.0	120.0	25.0	120.0	120.0
Total Split (%)	19%	19%	0%	19%	19%	0%	14%	67%	67%	14%	67%	67%
Maximum Green (s)	27.5	27.5		27.5	27.5		18.4	112.9	112.9	17.9	112.9	112.9
Yellow Time (s)	4.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.5	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							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	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	30.3	30.3		30.3	30.3		94.3	77.7	77.7	80.6	69.0	69.0
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.70	0.58	0.58	0.60	0.51	0.51
v/c Ratio	1.42	0.53		0.30	0.37		0.98	0.45	0.04	0.41	0.87	0.15
Uniform Delay, d1	52.1	13.2		43.3	13.3		33.8	16.2	0.0	7.7	28.7	7.8
Delay	199.9	16.5		52.0	17.4		65.0	16.2	3.5	7.4	28.3	7.7
LOS	F	B		D	B		E	B	A	A	C	A
Approach Delay		106.2			21.6			28.9			25.1	
Approach LOS		F			C			C			C	
Queue Length 50th (ft)	~299	59		17	37		220	232	0	42	611	25
Queue Length 95th (ft)	#557	173		54	119		#486	288	14	65	704	57

Ferrington Retail Development
 1: Morris Road & US 15-501

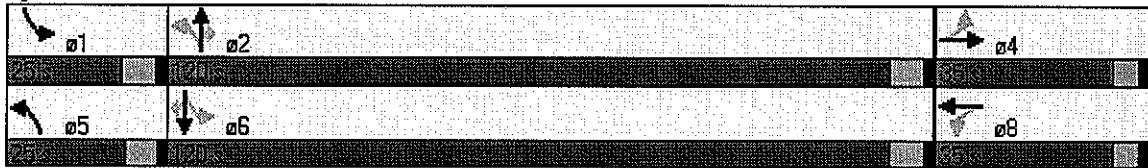
Combined (2009)
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953				590
50th Up Block Time (%)												4%
95th Up Block Time (%)												8%
Turn Bay Length (ft)	100			225			225		225	250		175
50th Bay Block Time %	59%						3%	4%				29%
95th Bay Block Time %	75%	33%					55%	10%				28%
Queuing Penalty (veh)	176	41					133	24				141

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 134.7
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.42
 Intersection Signal Delay: 37.1
 Intersection LOS: D
 Intersection Capacity Utilization 103.7%
 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: 1: Morris Road & US 15-501















Ferrington Retail Development
1: Morris Road & US 15-501

Combined (2009) With Improvements
Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	225		0	225		225	250		175
Storage Lanes	2		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	50
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frnt		0.862			0.876				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1606	0	1770	1632	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.596			0.064			0.308		
Satd. Flow (perm)	3433	1606	0	1110	1632	0	119	3539	1583	574	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		233			138				33			70
Headway 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
Link Speed (mph)		35			25			30			55	
Link Distance (ft)		900			3123			1033			670	
Travel Time (s)		17.5			85.2			23.5			8.3	
Volume (vph)	229	19	220	21	26	124	315	834	30	147	1416	113
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	254	21	244	23	29	138	350	927	33	163	1573	126
Lane Group Flow (vph)	254	265	0	23	167	0	350	927	33	163	1573	126
Turn Type	Prot			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8			2		2	6		6
Detector Phases	7	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	4.0	7.0		7.0	7.0		7.0	14.0	14.0	7.0	14.0	14.0
Minimum Split (s)	14.0	14.5		14.5	14.5		13.6	21.1	21.1	14.1	21.1	21.1
Total Split (s)	15.0	29.5	0.0	14.5	14.5	0.0	28.0	76.3	76.3	14.2	62.5	62.5
Total Split (%)	13%	25%	0%	12%	12%	0%	23%	64%	64%	12%	52%	52%
Maximum Green (s)	8.0	22.0		7.0	7.0		21.4	69.2	69.2	7.1	55.4	55.4
Yellow Time (s)	5.0	4.0		4.0	4.0		5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	2.0	3.5		3.5	3.5		1.5	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag	Lag	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	3.0
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)	10.0	24.6		9.5	9.5		82.3	68.0	68.0	64.7	55.5	55.5
Actuated g/C Ratio	0.09	0.21		0.08	0.08		0.70	0.58	0.58	0.55	0.47	0.47
v/c Ratio	0.86	0.51		0.25	0.64		0.90	0.45	0.04	0.40	0.94	0.16
Uniform Delay, d1	52.8	4.5		50.3	8.7		33.1	13.8	0.0	7.5	29.0	7.4
Delay	72.5	8.1		52.9	14.4		44.1	13.8	3.3	7.8	33.7	8.5
LOS	E	A		D	B		D	B	A	A	C	A
Approach Delay		39.6			19.0			21.6			29.7	
Approach LOS		D			B			C			C	
Queue Length 50th (ft)	102	20		17	21		211	195	0	36	585	23
Queue Length 95th (ft)	#178	99		45	94		#380	243	13	58	#754	57

Ferrington Retail Development
 1: Morris Road & US 15-501

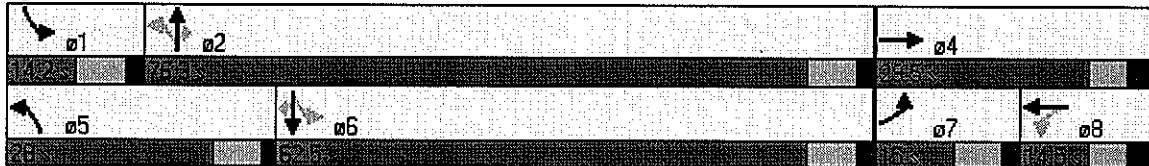
Combined (2009) With Improvements
 Timing Plan: PM Peak











Lane Group												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		820			3043			953				590
50th Up Block Time (%)												2%
95th Up Block Time (%)												12%
Turn Bay Length (ft)	225			225			225		225	250		175
50th Bay Block Time %							1%					31%
95th Bay Block Time %							39%	6%				35%
Queuing Penalty (veh)							90	10				151

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 116.9
 Natural Cycle: 100
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 27.8
 Intersection LOS: C
 Intersection Capacity Utilization 101.6%
 ICU Level of Service F
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Morris Road & US 15-501



						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	178	0	1187	1498	217
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	0	198	0	1319	1664	241
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)				670		
pX, platoon unblocked						
vC, conflicting volume	2324	832	1906			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2324	832	1906			
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	37	100			
cM capacity (veh/h)	31	312	308			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	198	659	659	832	832	241
Volume Left	0	0	0	0	0	0
Volume Right	198	0	0	0	0	241
cSH	312	1700	1700	1700	1700	1700
Volume to Capacity	0.63	0.39	0.39	0.49	0.49	0.14
Queue Length (ft)	101	0	0	0	0	0
Control Delay (s)	34.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	D					
Approach Delay (s)	34.5	0.0		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay			2.0			
Intersection Capacity Utilization			66.6%	ICU Level of Service		B







Ferrington Retail Development
3: Morris Road & Site Driveway 2

Combined (2009)
Timing Plan: PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	19	5	5	37	417	5	5	5	450	5	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	6	21	6	6	41	463	6	6	6	500	6	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)					900							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	504			27			327	551	24	327	322	273
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	453			27			258	504	24	258	252	198
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 %	99			100			99	99	99	19	99	99
cM capacity (veh/h)	1004			1587			617	422	1053	616	585	764
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	510	17	511								
Volume Left	6	6	6	500								
Volume Right	6	463	6	6								
cSH	1004	1587	607	617								
Volume to Capacity	0.01	0.00	0.03	0.83								
Queue Length (ft)	0	0	2	218								
Control Delay (s)	1.5	0.1	11.1	32.7								
Lane LOS	A	A	B	D								
Approach Delay (s)	1.5	0.1	11.1	32.7								
Approach LOS			B	D								
Intersection Summary												
Average Delay			15.9									
Intersection Capacity Utilization			77.3%		ICU Level of Service				C			

Ferrington Retail Development
3: Morris Road & Site Driveway 2

Combined (2009) Scenario 2
Timing Plan: PM Peak

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↑	↑	↕	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	19	37	417	450	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (veh/h)	6	21	41	463	500	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)			410			
pX, platoon unblocked						
vC, conflicting volume	504				73	41
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504				73	41
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				46	99
cM capacity (veh/h)	1060				926	1030
Direction, Lane #	EB 1	WB 1	WB 2	SB 1		
Volume Total	27	41	463	506		
Volume Left	6	0	0	500		
Volume Right	0	0	463	6		
cSH	1060	1700	1700	927		
Volume to Capacity	0.01	0.02	0.27	0.55		
Queue Length (ft)	0	0	0	85		
Control Delay (s)	1.8	0.0	0.0	13.4		
Lane LOS	A			B		
Approach Delay (s)	1.8	0.0		13.4		
Approach LOS				B		
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization			40.4%		ICU Level of Service	A

Intersection: 1: Morris Road & US 15-501

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	195	202	221	48	216	250	425	288	28	276	537	601
Average Queue (ft)	108	126	122	18	86	176	133	95	3	94	306	312
95th Queue (ft)	178	198	201	42	176	278	296	185	14	232	432	468
Link Distance (ft)			784		3066		966	966			598	598
Upstream Blk Time (%)												0.00
Queuing Penalty (veh)												1
Storage Bay Dist (ft)	225	225		225		225			225	250		
Storage Blk Time (%)			0.00		0.00	0.10				0.00	0.10	0.18
Queuing Penalty (veh)			0		0	40				0	14	21

Intersection: 1: Morris Road & US 15-501

Movement	SB
Directions Served	R
Maximum Queue (ft)	201
Average Queue (ft)	69
95th Queue (ft)	193
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	175
Storage Blk Time (%)	0.00
Queuing Penalty (veh)	0

Intersection: 2: Site Driveway 1 & US 15-501

Movement	EB
Directions Served	R
Maximum Queue (ft)	128
Average Queue (ft)	62
95th Queue (ft)	103
Link Distance (ft)	409
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Morris Road & Site Driveway 2

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	29	28	26	197
Average Queue (ft)	4	3	11	95
95th Queue (ft)	18	15	30	152
Link Distance (ft)	1280	784	654	380
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 76