

Traffic Impact Analysis

For

The Hamptons Subdivision

Chatham County, NC

Prepared for:

Windjam 23, LLC
1130 Situs Court
Suite 250
Raleigh, NC 27606

Prepared by:

WITHERS & RAVENEL
ENGINEERS | PLANNERS | SURVEYORS

February 2006

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Appendix B	Trip Generation (The Hamptons)
Appendix C	Capacity Analyses (Synchro Reports)
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Section 1: Executive Summary

The proposed Hamptons Subdivision is a residential development consisting of 89 single-family detached dwellings units. The site is located in Chatham County northeast of the Town of Pittsboro on Mount Gilead Church Road, between Big Hole Road and Bynum Ridge Road. As currently envisioned, the development will be completed in 2010.

Access to the site is proposed via two full-movement driveway connections onto Mount Gilead Church Road. Both driveway connections will create new tee-intersections. Roadway stubs are located on the northern and western edges of the development for future connection to adjacent developments. However, no developments at these locations have been identified and the roadway stubs will not be analyzed as access locations.

Withers & Ravenel, Inc. was retained to evaluate the performance of the proposed project accesses along Mount Gilead Church Road to determine if special improvements such as turn lanes would be required. This study consists of several analyses related to the existing and proposed traffic volumes on the roadway network. The capacity analyses take into consideration trip generation potential, trip distribution, background traffic growth and the related improvements to meet anticipated transportation demands. Since the purpose of this study is to analyze the site access points upon build-out of the subdivision, capacity analyses were performed only for the 2010 build-out scenario.

Mount Gilead Church Road and North Site Drive

This intersection is expected to operate with acceptable levels-of-service during both the AM and PM peak hours. No additional improvements are necessary at this intersection.

Mount Gilead Church Road and South Site Drive

This intersection is expected to operate with acceptable levels-of-service during both the AM and PM peak hours. No additional improvements are necessary at this intersection.

Section 2: Introduction

The proposed Hamptons Subdivision is a residential development consisting of 89 single-family detached dwellings units. The site is located in Chatham County northeast of the Town of Pittsboro on Mount Gilead Church Road, between Big Hole Road and Bynum Ridge Road. As currently envisioned, the development will be completed in 2010.

Access to the site is proposed via two full-movement driveway connections onto Mount Gilead Church Road. Both driveway connections will create new tee-intersections. Roadway stubs are located on the northern and western edges of the development for future connection to adjacent developments. However, no developments at these locations have been identified and the roadway stubs will not be analyzed as access locations.

The purpose of this study is to evaluate the performance of the new intersections created by the proposed site driveways and to identify if any specific improvements will be required to accommodate them. This report presents trip generation, distribution, capacity analyses, and recommendations for transportation improvements required to meet anticipated traffic demands. Since the purpose of this study is to analyze the site access points upon build-out of the subdivision, capacity analyses were performed only for the 2010 build-out scenario.

Section 3: Study Area

3-1. Intersections Studied

The study area for this TIA includes the following intersections:

- Mount Gilead Church Road and North Site Drive
- Mount Gilead Church Road and South Site Drive

This study area was determined based on discussions with the Chatham County Planning staff. Figure 1 shows the vicinity map and Figure 2 shows the proposed preliminary site plan for the project.

3-2. Existing Conditions

The proposed Hamptons Subdivision is northeast of The Town of Pittsboro and is located in the Chatham County planning jurisdiction on the western side of Mount Gilead Church Road, between Big Hole Road and Bynum Ridge Road. The immediate surrounding land is primarily rural residential.

Mount Gilead Church Road (SR 1700) is a two-lane major arterial designated as a major thoroughfare in the DCHC Thoroughfare plan. It has a 2004 ADT of approximately 2,000 vehicles per day and a statutory speed limit of 55 mph in the project vicinity.



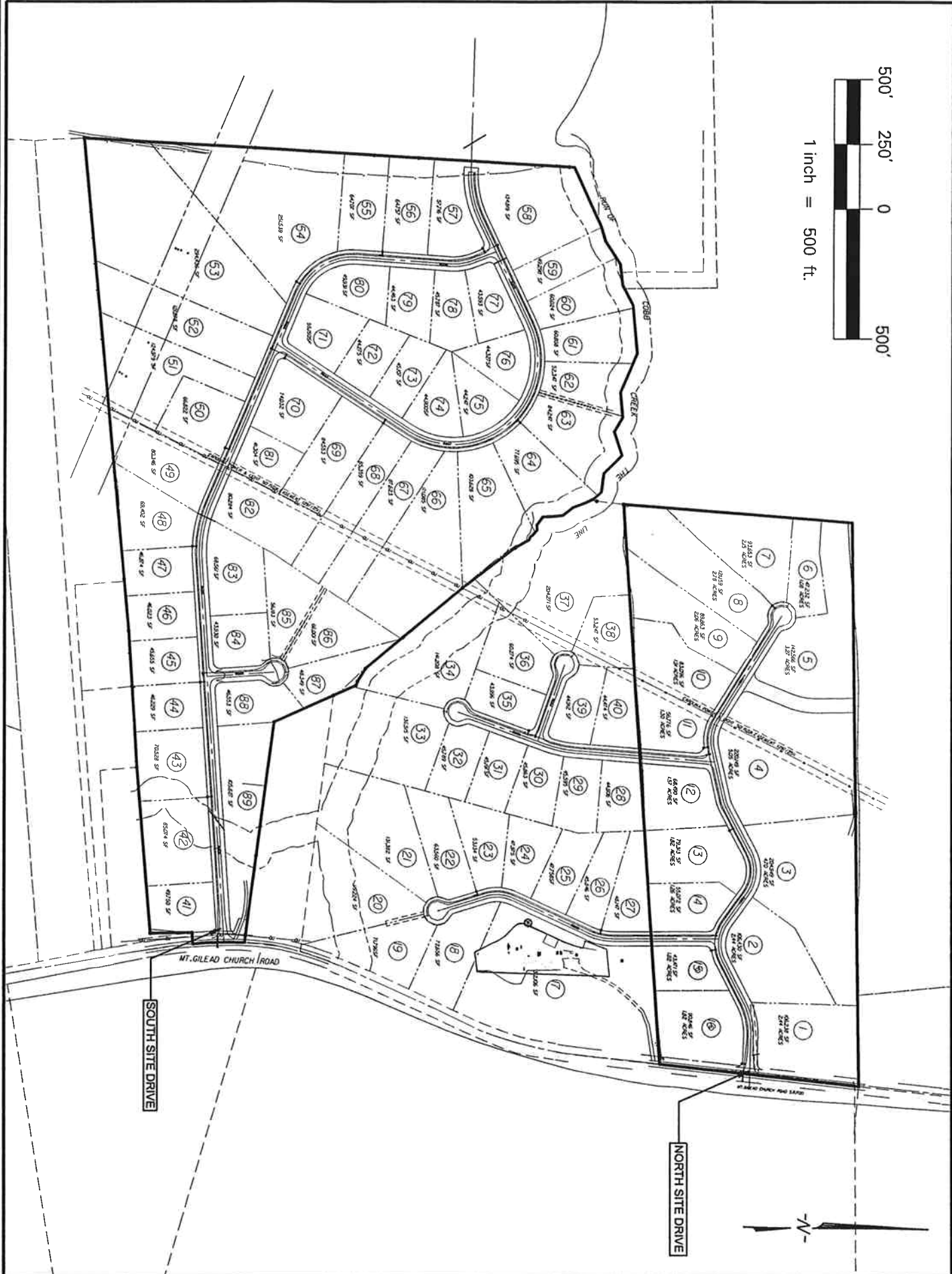
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VICINITY MAP
FIGURE 1

THE HAMPTONS SUBDIVISION



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SITE PLAN
 FIGURE 2

THE HAMPTONS SUBDIVISION

Section 4: Trip Generation

The trip generation potential of the proposed development was determined using the trip generation rates published in *Trip Generation* (Institute of Transportation Engineers, Seventh Edition, 2003) for all land uses.

The Hamptons Subdivision, as currently envisioned, includes 89 single-family detached dwelling units. Table 1 summarizes the estimated trip generation for the proposed development. As shown, the proposed development has the potential to generate 934 net new external trips during a typical weekday after buildout in 2010.

Table 1

Land Use	Density	24-Hour Vol	AM		PM	
			Enter	Exit	Enter	Exit
Single Family Dwelling	89 Units	934	18	54	61	36

Section 5: Site Trip Distribution

The proposed development's trips were assigned to the surrounding roadway network. The directional distribution and assignment was based on existing peak hour turning movements, existing land uses, and population densities in the area.

5-1. 2011 Distribution

The site traffic in 2010 was assigned to the roadway network based on the following trip distribution:

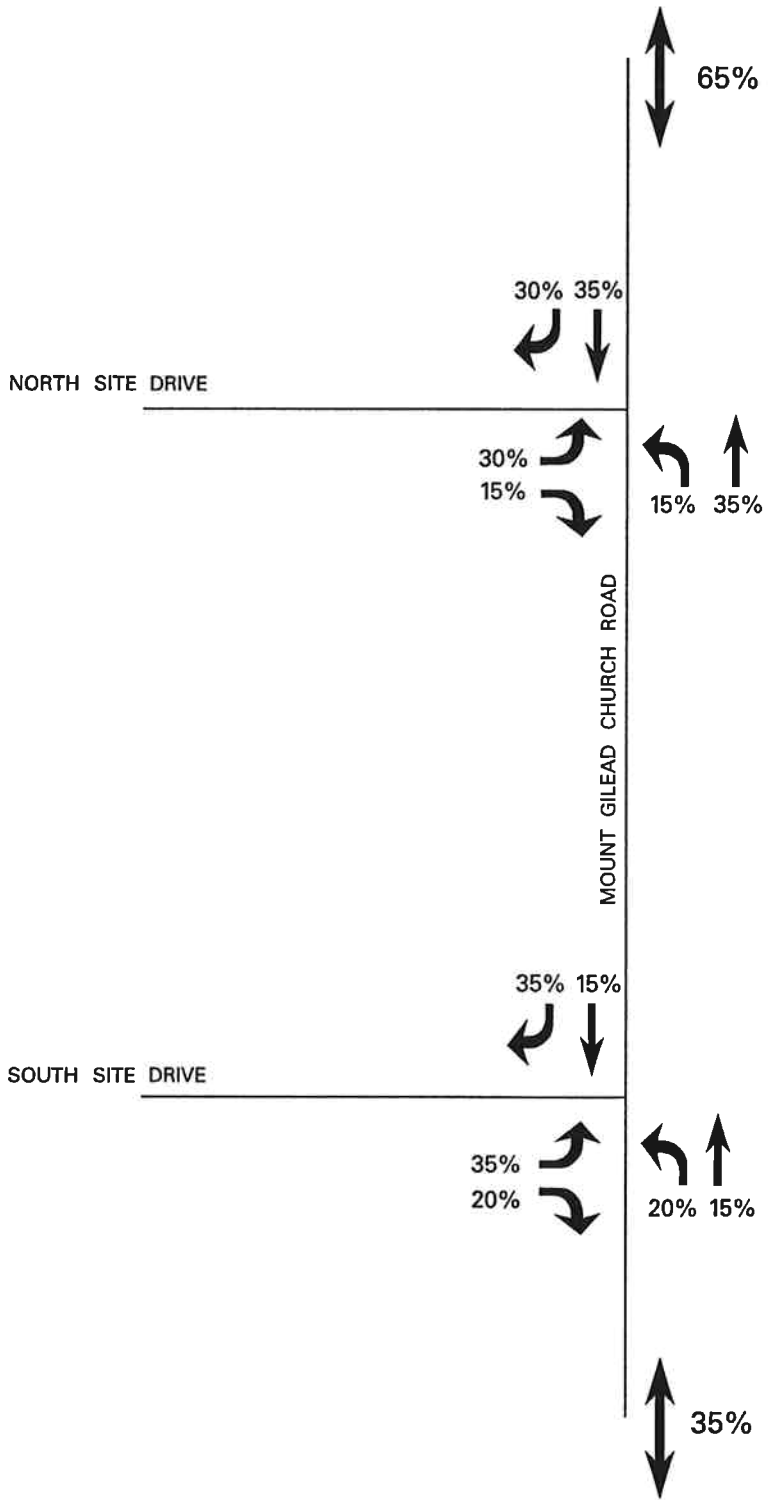
Overall Distribution – 65/35 (north/south)

- 65% to/from north on Mount Gilead Church Road
- 35% to/from the south on Mount Gilead Church Road

The site traffic was assigned to the roadway network based on the follow trip distribution from the proposed driveways:

- 45% to/from North Site Drive
- 55% to/from South Site Drive

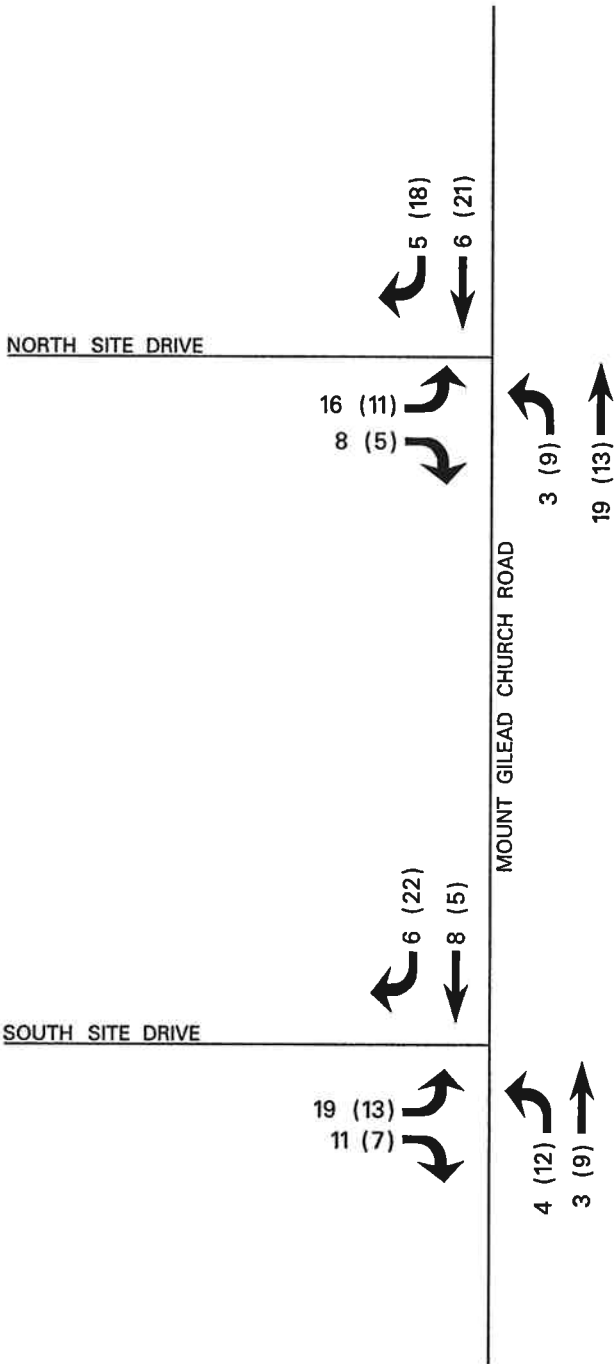
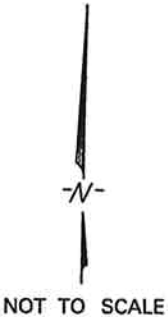
The 2010 site trip distribution and assignment is shown on Figure 3 and 4, respectively.



SITE TRAFFIC

A.M. VOLUMES
 18 ENTER
 54 EXIT

P.M. VOLUMES
 61 ENTER
 36 EXIT



KEY

AM XX
 PM (XX)

Section 6: Traffic Volumes

6-1. 2006 Existing Traffic

The existing traffic used for this development was taken from the Briar Chapel TIA that was performed by Kimley-Horn Inc., dated June 2004. The turning movements at the intersection of US 15-501 and Mount Gilead Church Road in that study were used to establish the through movements on Mount Gilead Church Road. The 2004 volumes that were used in the Briar Chapel TIA were grown by 3% for two years to make them the current 2006 Existing Traffic Volumes. The original traffic volumes are included in the Appendix A. Figure 5 shows the traffic volumes after being grown by 3% for two years to get the 2006 existing traffic volumes.

6-2. Historical Growth Traffic

Historical growth traffic is the increase in existing traffic volumes due to normal increases and regular growth throughout the study area. Historical growth traffic is calculated using an annual growth rate, which is applied to the existing traffic volumes up to the future horizon year. Given the location of the proposed development and the surrounding land uses, an annual growth rate of 3% was used in this analysis, which is standard NCDOT practice. The 2010 AM and PM peak-hour historical growth traffic volumes are shown in Figure 6.

6-3. Approved Development Traffic

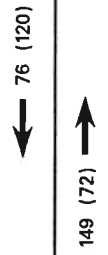
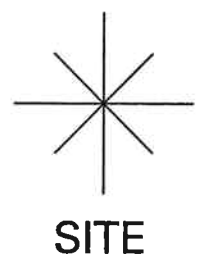
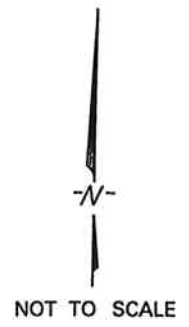
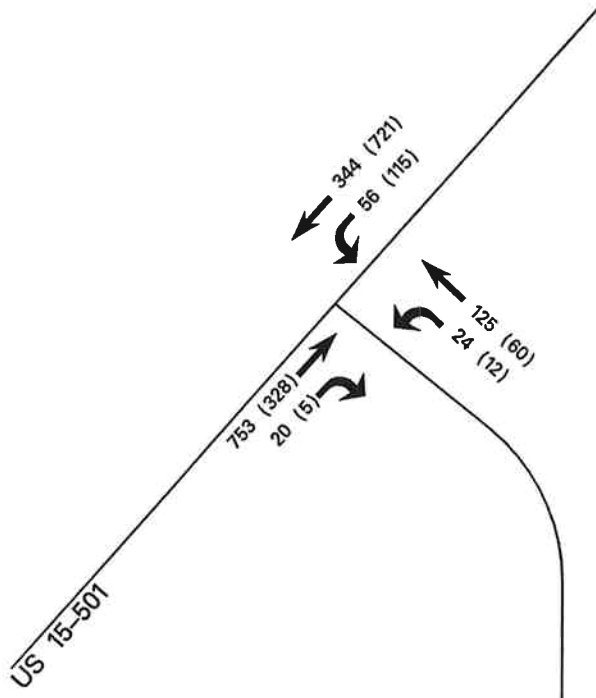
Approved development traffic is traffic generated by approved, but not yet constructed, developments within the study area. There are several approved and newly planned developments in the area. However, none are along Mount Gilead Church Road, and their anticipated addition of site traffic onto Mount Gilead Church Road is small. It was agreed during a meeting with Chatham County Planning Staff that the use of a 3% growth in background traffic would be an acceptable manner in which to account for those developments.

6-4. 2010 No-Build Conditions

The 2010 no-build traffic conditions include existing and historical growth traffic. The 2006 existing traffic volumes were grown at 3% for four years to obtain the background traffic for 2010. The 2010 AM and PM peak hour background and approved traffic volumes are shown in Figure 6.

6-5. 2010 Build-Out Conditions

The traffic volumes for 2010 build-out conditions include existing traffic, historical growth traffic, and proposed site traffic volumes. The 2010 AM and PM peak-hour build-out traffic volumes are shown in Figure 7.



MOUNT GILEAD CHURCH ROAD

KEY
 AM XX
 PM (XX)

MOUNT GILEAD CHURCH ROAD



NOT TO SCALE



SITE



KEY

AM XX
PM (XX)

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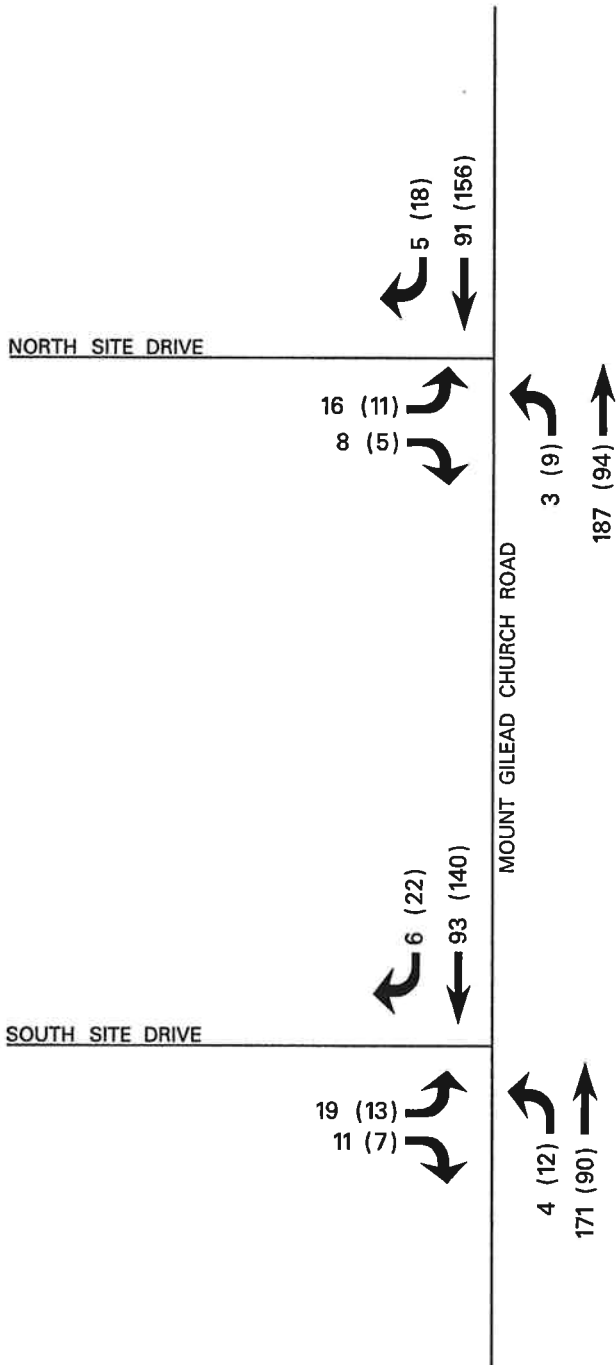
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2010 NO-BUILD
TRAFFIC VOLUMES
FIGURE 6

THE HAMPTONS SUBDIVISION



NOT TO SCALE



KEY

AM	XX
PM	(XX)

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2010 BUILD-OUT
 TRAFFIC VOLUMES
 FIGURE 7

THE HAMPTONS SUBDIVISION

Section 7: Capacity Analysis

Capacity analyses were performed for the AM and PM peak hours using the Synchro Version 6 software to determine the operating characteristics of the adjacent road network and the impacts of the proposed project. The North Carolina Department of Transportation Congestion Management Group uses and reports Synchro Level of Service output for the analysis of intersection operating conditions.

Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a set time period. Level-of-Service (LOS) describes capacity for the operating characteristics of a road segment or intersection. LOS is defined as a qualitative measure that describes operational conditions and motorist perceptions within a traffic stream. The *Highway Capacity Manual* defines six levels of service, LOS A through LOS F, with A being the best and F being the worst. LOS D is the typically accepted standard for signalized intersections in urban and suburban areas.

For signalized intersections, LOS is defined for the overall intersection operation. For unsignalized intersections, only the movements that must yield right-of-way experience control delay. Therefore, LOS criteria are defined for individual approaches and not the overall intersection operation. The LOS reported for an unsignalized intersection is the longest control delay experienced for either of the side streets, not for the total delay experienced at the intersection. The majority of the traffic moving through the intersection on the major street experiences little or no delay.

Table 3 lists the LOS control delay thresholds published in the *Highway Capacity Manual (HCM)* for signalized and unsignalized intersections. Synchro Version 6 software uses the same LOS thresholds as those published in the *HCM*.

Table 2

Level-of-Service Control Delay Thresholds for Signalized Intersections		Level-of-Service Control Delay Thresholds for Unsignalized Intersections	
Level-of-Service	Control Delay per Vehicle (seconds per vehicle)	Level-of-Service	Control Delay per Vehicle (seconds per vehicle)
A	≤10	A	≤10
B	> 10-20	B	> 10-15
C	> 20-35	C	> 15-25
D	> 35-55	D	> 25-35
E	> 55-80	E	> 35-50
F	> 80	F	> 50

Capacity analyses were performed for the 2010 build-out condition using the LOS reports generated by Synchro Version 6 software for the following intersections:

- Mount Gilead Church Road and North Site Drive
- Mount Gilead Church Road and East Site Drive

Capacity analysis reports generated by Synchro Version 6 software are included in the Appendix and are briefly summarized in the following tables.

7-1. Mount Gilead Church Road and North Site Drive

Based on capacity analysis, the proposed unsignalized intersection of Mount Gilead Church Road and the proposed South Site Drive is expected to operate with short delays during the AM peak hour and short delays during the PM peak hour for the minor street turning movements as shown in Table 5.

Table 4-1 below summarizes the delay and LOS for the proposed scenario for the intersection of Mount Gilead Church Road and North Site Drive.

Table 3-1

Mount Gilead Church Road and North Site Drive Intersection (Unsignalized)		
	Overall LOS and Delay (seconds)	
	AM	PM
2006 Existing Traffic	N/A	N/A
2010 No-Build Traffic	N/A	N/A
2010 Build-Out Traffic	B (10.0)*	B (10.0)*

*The LOS report represents the longest delay experienced on the side street.

7-2. Mount Gilead Church Road and South Site Drive

Based on capacity analysis, the proposed unsignalized intersection of Mount Gilead Church Road and South Site Drive is expected to operate with short delays during the AM peak hour and short delays during the PM peak hour for the minor street turning movements, as shown in Table 5.

Table 4-2 below summarizes the delay and LOS for the proposed scenario for the intersection of Mount Gilead Church Road and South Site Drive.

Table 3-2

Mount Gilead Church Road and South Site Drive Intersection (Unsignalized)		
	Overall LOS and Delay (seconds)	
	AM	PM
2006 Existing Traffic	N/A	N/A
2010 No-Build Traffic	N/A	N/A
2010 Build-Out Traffic	A (9.9)*	A (9.9)*

*The LOS report represents the longest delay experienced on the side street.

Table 4

Unsignalized Intersections	2010		2010	
	Levels of Service*		Build-Out	
	No-Build		Build-Out	
	AM	PM	AM	PM
North Site Drive and Mt Gilead Church Road				
EB North Site Drive	N/A	N/A	B	B
NB Mount Gilead Church Road	N/A	N/A	A	A
SB Mount Gilead Church Road	N/A	N/A	A	A
South Site Drive and Mt Gilead Church Road				
EB South Site Drive	N/A	N/A	A	A
NB Mount Gilead Church Road	N/A	N/A	A	A
SB Mount Gilead Church Road	N/A	N/A	A	A

Section 8: Recommendations

At build-out of the project in 2010, both of the site driveways are expected to operate with acceptable levels-of-service during both the AM and PM peak hours. No additional improvements are necessary at these proposed intersections.

Appendix

Appendix A	Turning Movement Counts (Briar Chapel TIA)
Appendix B	Trip Generation (The Hamptons) ²
Appendix C	Capacity Analyses (Synchro Reports)
Appendix D	Sim-Traffic Reports

***APPENDIX A
TURNING MOVEMENT COUNTS
BRIAR CHAPEL TIA***

NOT TO SCALE

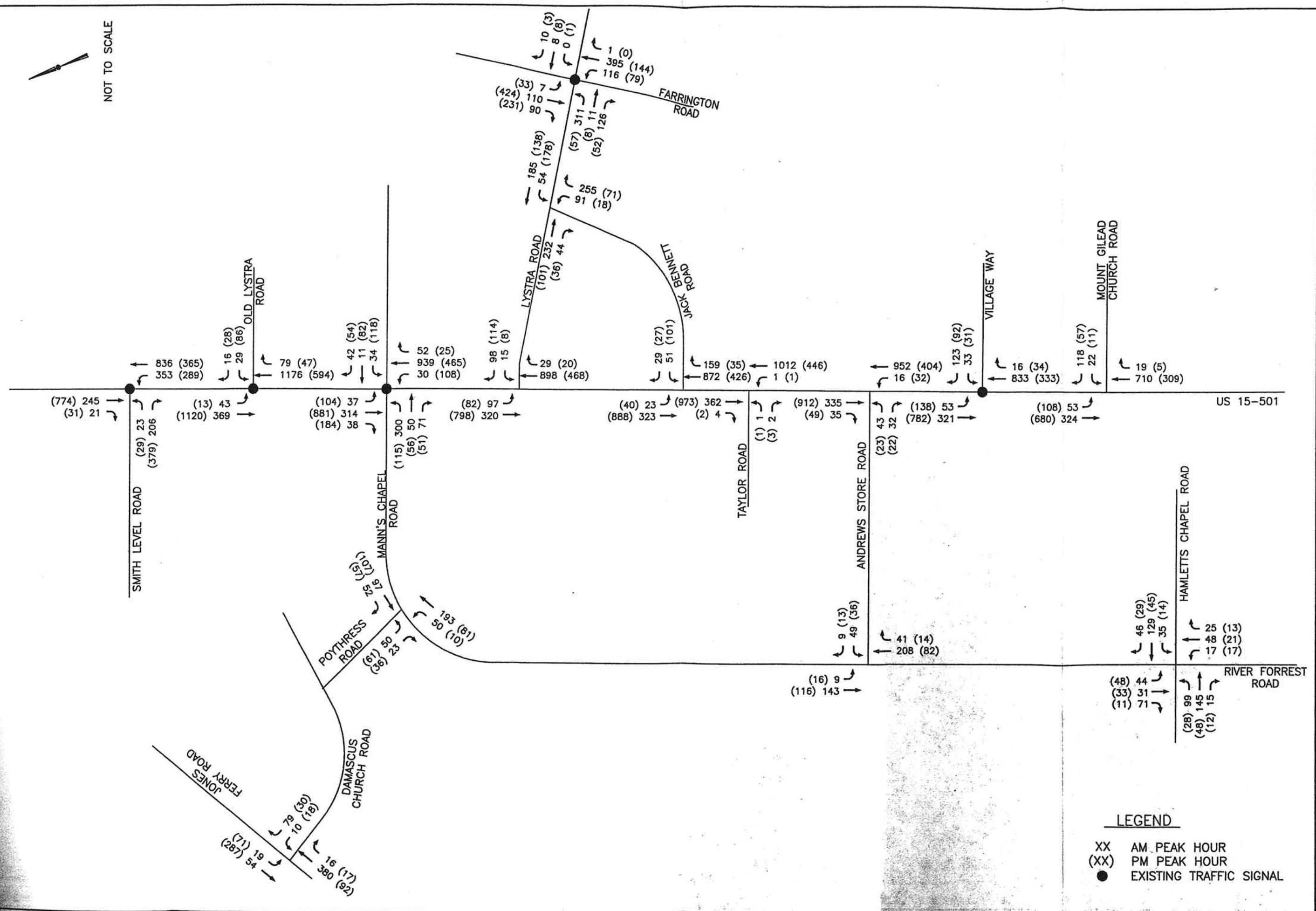


FIGURE 5

EXISTING 2004 PEAK HOUR TRAFFIC VOLUMES

BRIAR CHAPEL TRANSPORTATION IMPACT ASSESSMENT



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APPENDIX B
TRIP GENERATION (THE HAMPTONS)

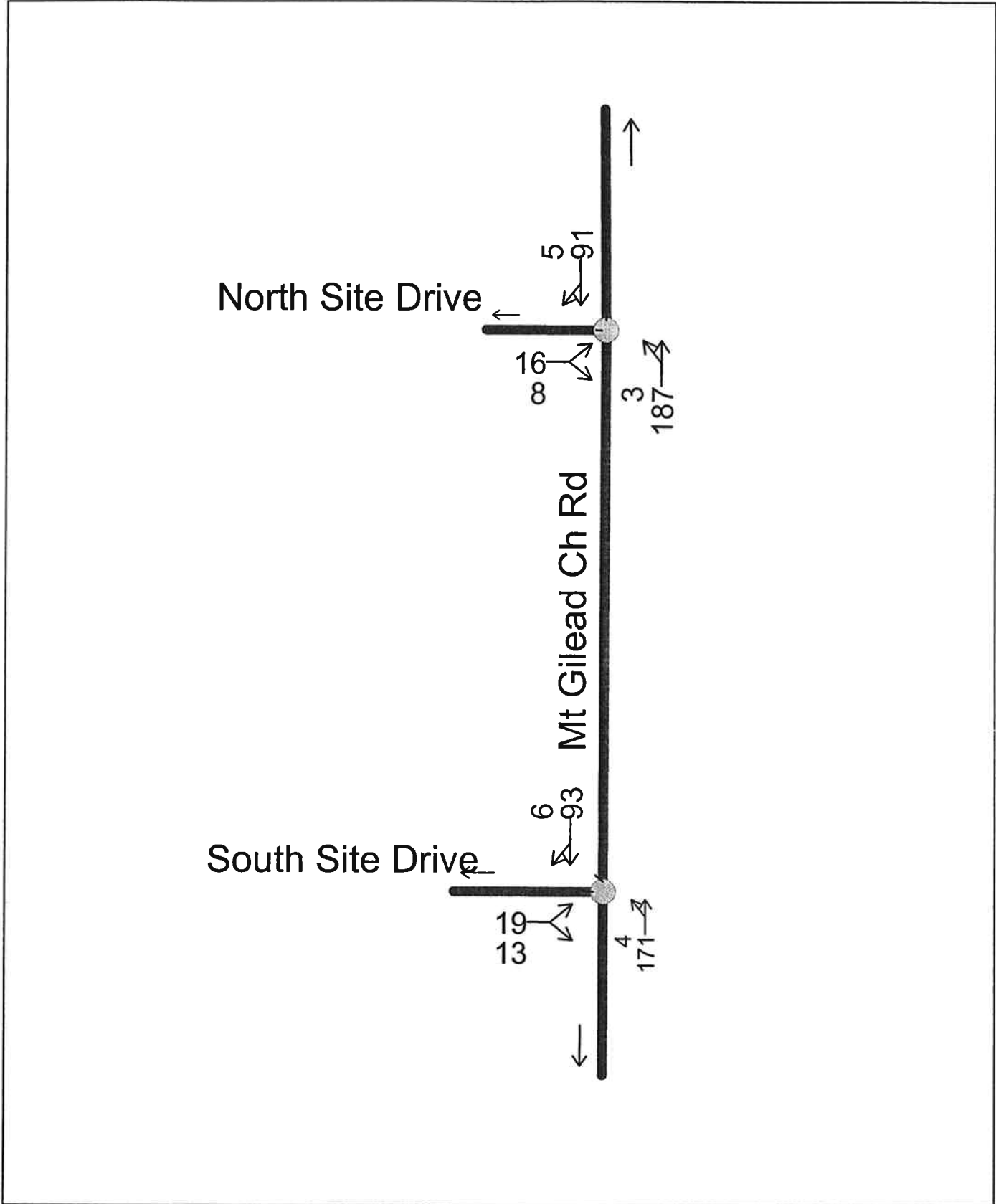
Summary of Multi-Use Trip Generation
 Average Weekday Driveway Volumes
 February 03, 2006

Land Use	Size	24 Hour Two-Way Volume	AM Pk Hour Enter	AM Pk Hour Exit	PM Pk Hour Enter	PM Pk Hour Exit
Single Family Detached Housing	89 Dwelling Units	934	18	54	61	36
Total		934	18	54	61	36

Note: A zero indicates no data available.

TRIP GENERATION BY MICROTRANS

APPENDIX C
AM AND PM CAPACITY ANALYSIS
SYNCHRO REPORTS





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘			↕	↗	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	16	8	3	187	91	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	18	9	3	208	101	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	318	104	107			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	104	107			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	673	951	1484			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	211	107
Volume Left	18	3	0
Volume Right	9	0	6
cSH	746	1484	1700
Volume to Capacity	0.04	0.00	0.06
Queue Length 95th (ft)	3	0	0
Control Delay (s)	10.0	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	10.0	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘			↕	↗	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	19	13	4	171	93	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	14	4	186	101	7

Pedestrians

Lane Width (ft)

Walking Speed (ft/s)

Percent Blockage

Right turn flare (veh)

Median type: None

Median storage (veh)

Upstream signal (ft)

pX, platoon unblocked

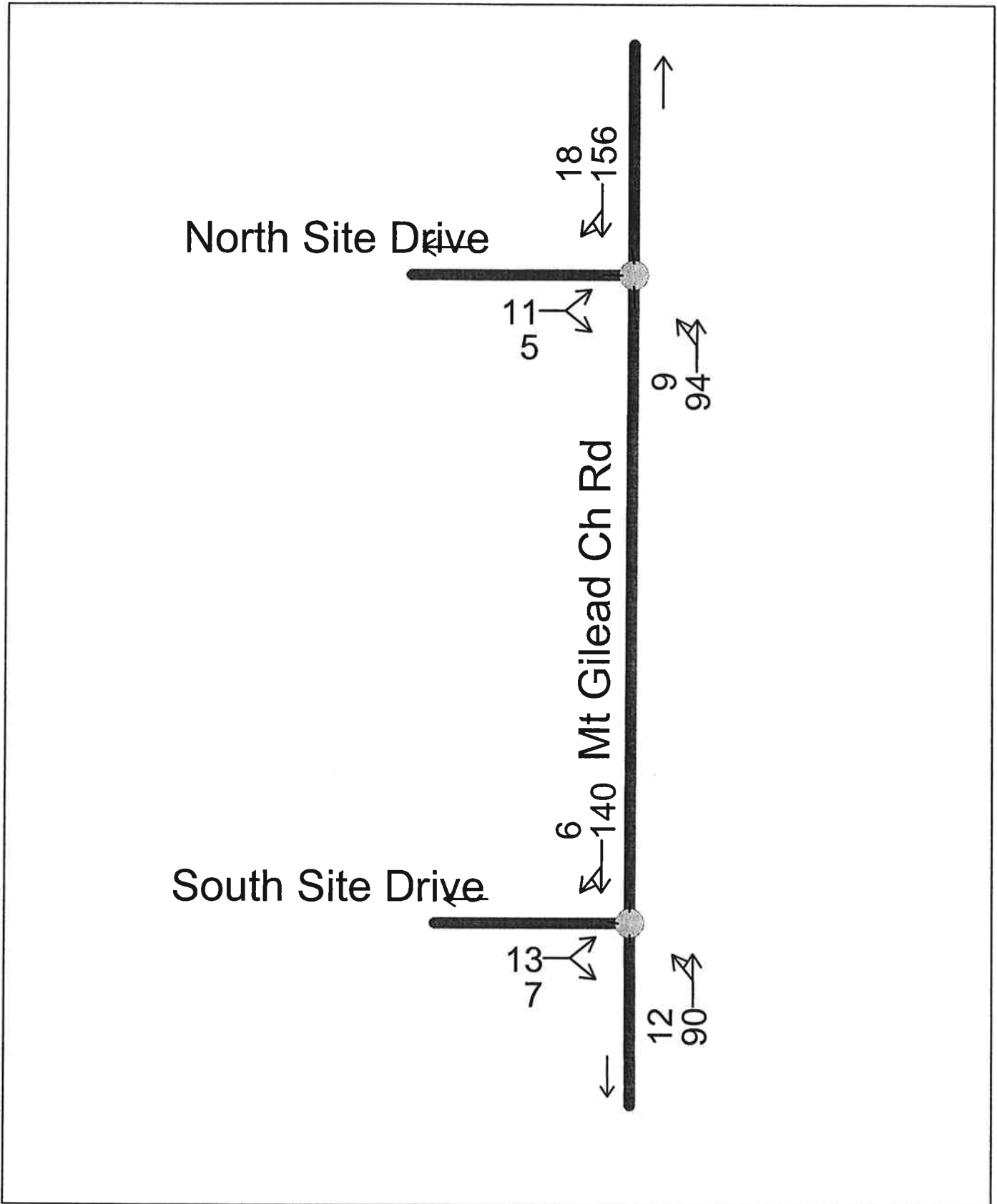
vC, conflicting volume	299	104	108
vC1, stage 1 conf vol			
vC2, stage 2 conf vol			
vCu, unblocked vol	299	104	108
tC, single (s)	6.4	6.2	4.1
tC, 2 stage (s)			
tF (s)	3.5	3.3	2.2
p0 queue free %	97	99	100
cM capacity (veh/h)	690	950	1483

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	35	190	108
Volume Left	21	4	0
Volume Right	14	0	7
cSH	777	1483	1700
Volume to Capacity	0.04	0.00	0.06
Queue Length 95th (ft)	4	0	0
Control Delay (s)	9.9	0.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	0.2	0.0
Approach LOS	A		

Intersection Summary

Average Delay	1.1
Intersection Capacity Utilization	22.2%
ICU Level of Service	A
Analysis Period (min)	15

Volumes





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↓	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	11	5	9	94	156	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	5	10	102	170	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	301	179	189			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	301	179	189			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	686	863	1385			
Direction, Lane #						
	EB 1	NB 1	SB 1			
Volume Total	17	112	189			
Volume Left	12	10	0			
Volume Right	5	0	20			
cSH	733	1385	1700			
Volume to Capacity	0.02	0.01	0.11			
Queue Length 95th (ft)	2	1	0			
Control Delay (s)	10.0	0.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.0	0.7	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			22.4%	ICU Level of Service	A	
Analysis Period (min)			15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↓	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	13	7	12	90	140	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	8	13	98	152	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	279	155	159			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	279	155	159			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	704	890	1421			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	22	111	159			
Volume Left	14	13	0			
Volume Right	8	0	7			
cSH	760	1421	1700			
Volume to Capacity	0.03	0.01	0.09			
Queue Length 95th (ft)	2	1	0			
Control Delay (s)	9.9	1.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	1.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

APPENDIX D
SIM-TRAFFIC REPORTS

Intersection: 3: North Site Drive & Mt Gilead Ch Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	32	54
Average Queue (ft)	12	2
95th Queue (ft)	36	18
Link Distance (ft)	737	2171
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: South Site Drive & Mt Gilead Ch Rd

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	32	31
Average Queue (ft)	12	3
95th Queue (ft)	36	17
Link Distance (ft)	644	602
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 3: North Site Drive & Mt Gilead Ch Rd

Movement	EB
Directions Served	LR
Maximum Queue (ft)	54
Average Queue (ft)	19
95th Queue (ft)	45
Link Distance (ft)	450
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: South Site Drive & Mt Gilead Ch Rd

Movement	EB
Directions Served	LR
Maximum Queue (ft)	32
Average Queue (ft)	19
95th Queue (ft)	43
Link Distance (ft)	569
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0
