

**AYDAN COURT CONDOMINIUMS
TRAFFIC IMPACT STUDY ADDENDUM**



Prepared for:

The Town of Chapel Hill
Engineering Department

Prepared by:

HNTB North Carolina, PC

343 East Six Forks Road

Suite 200

Raleigh, NC 27609

February, 2008

HNTB

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2/28/08



Proposed Changes to Original Aydan Court Condominiums Traffic Impact Study

A new residential development called Aydan Court Condominiums, located on N.C. Highway 54 (Raleigh Road) near Little John Road and Downing Creek Parkway, is being proposed for construction in Chapel Hill. A prior site plan and development density for the project had a traffic impact study prepared in July, 2007 by HNTB North Carolina, PC. This Addendum document to that study will analyze the following proposed changes to the Aydan Court Condominiums project:

- Number of condominium units reduced from 85 to 59;
- Proposed driveway location is now moved to align with Downing Creek Parkway and a “left-over” type median access is to be created along N.C. 54 that will allow left-turns into the site driveway (from the west) and Downing Creek Parkway (from the east);
- The existing full access median break along N.C. 54 at nearby Little John Road will be closed.

Figure 1 shows the general location of the site. The project is anticipated to be complete by 2010 (unchanged from the original traffic impact study). This Addendum report analyzes only the changes to the full build-out scenario for the year 2011 (one year after anticipated project completion). **Figure 2** displays the revised preliminary site plans for the proposed Aydan Court Condominiums development and nearby roadways.

Any information presented in the original traffic impact study that is unaffected by the proposed changes to land use and site access will NOT be presented in this document. Any references to information from the original document will be made, as necessary.

Revised Site Traffic Generation

With the addition of new peak hour trips during the AM, noon, and PM peak hours, there are potential site traffic impacts to the study area intersections. **Table 1** shows the site trip generation details, with generation rates taken from the *ITE Trip Generation Manual, Volume 7*. No trip reductions for “pass-by” type tripmaking were made for this study. In addition, no trip reduction factor for transit was accounted for, due to the distance to existing transit routes and bus stops from the site and the lack of pedestrian connections to those stops. No noon peak generation data currently exists in the ITE methodologies, so an average of the projected AM and PM peak generated trips was used to evaluate noon peak impacts.



Table 1
Proposed Aydan Court Condominiums (L.U. Code 230)

Scenario	Development Density	Generation Rate	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
					IN	OUT	
Daily Traffic	59 Condominium Units	5.86	50%	50%	173	173	346
AM Peak		0.44	16%	84%	4	22	26
Noon Peak		0.48*	44%*	56%*	13*	16*	29
PM Peak		0.52	68%	32%	21	10	31

* Average Values between AM and PM peak data

Revised Site Trip Distribution and Assignment

Due to the proposed changes to median access at the proposed Site Driveway, Downing Creek Parkway and Little John Road, a reanalysis of site trip distribution was necessary to account for the following changes:

- All site traffic from the west will now use the median left-over instead of u-turning at Hunting Ridge Road (original study);
- All site traffic exiting and heading east will be required to u-turn at either Barbee Chapel Road or the new full median break intersection along N.C. 54 for the Woodmont development. This intersection is expected to be built after the 2011 analysis year for the Aydan Court Condominium project, so all u-turns for this scenario were moved to the westbound approach at the Barbee Chapel Road/N.C. 54 intersection. The original traffic study had this traffic distribution u-turning at Little John Road, which will be closed to all u-turns/left-turns.

The revised site trip distribution is shown in **Figure 3**. Revised site traffic assignment for all three peak hours is shown in **Figure 4**, and is based on the trip generation data in the previous section and the trip distribution percentages estimates.

Revisions to background traffic flows at the existing Little John Road/N.C. 54 intersection were also necessary to account for the proposed median closure. All existing/future northbound left-turns were routed to being right-turns with an immediate u-turn at the proposed left-over just east of Little John Road. All existing/future westbound left-turns were routed upstream to the proposed left-over into Downing Creek Parkway. Downing Creek Parkway's existing intersection with N.C. 54 was not part of the original traffic impact study, and no peak hour traffic volumes were collected for it. No analysis of this northbound right-turn stop controlled movement is included in this analysis addendum.



Revised 2011 Peak Hour Traffic Volumes

To account for traffic flow changes for background and site-related traffic, updated 2011 peak hour traffic volumes were calculated for the Without Site and With Site conditions and are shown in **Figures 5 and 6**.

Revised Peak Hour Level-of-Service Analysis

Updated peak hour level of service capacity analyses were conducted for the 2011 Condition 3 – With Site Traffic scenario using the Synchro Version 7.0 software for signalized intersections and the HCS+ software for unsignalized intersection, as was done in the original study. A summary of the traffic operations for each intersection, related to vehicular delays (intersection average as a whole if signalized, critical movement if stop-controlled) and the corresponding LOS is shown in **Table 2** below.

**Table 2 – Capacity Analysis Results for Study Area Intersections
 Condition 3 – 2011 With Site Traffic**

Intersections	LOS			Average Vehicular Delay (sec/veh)		
	AM	Noon	PM	AM	Noon	PM
N.C. 54 and Barbee Chapel Road	F	C	F	146.4	30.5	82.5
EB LT	C	C	C	24.3	26.1	31.1
EB TH	D	C	F	49.9	30.1	96.8
EB RT	C	C	F	33.5	26.8	111.1
WB LT/U-TURN	F	D	F	141.2	49.0	271.4
WB TH	F	B	C	200.8	20.0	26.1
WB RT	C	B	B	28.4	16.6	17.0
NB LT	F	E	F	298.6	65.6	83.9
NB THRT	D	D	E	39.7	42.8	72.1
SB LT	D	C	F	54.1	34.9	221.6
SB THRT	C	C	D	29.7	28.5	40.3
N.C 54 and Little John Road	N/A	N/A	N/A	N/A	N/A	N/A
NB RT	D	C	F	27.7	18.3	50.8
N.C. 54 and Hunting Ridge Road	E	A	D	74.1	9.1	48.4
EB LT	A	A	A	5.1	3.2	4.6
EB TH	B	A	E	11.7	8.6	75.5
EB RT	A	A	A	4.5	4.9	5.8
WB LT	A	A	C	4.2	3.6	23.4
WB THRT	F	A	B	113.7	7.2	18.2
NB LT	F	E	E	100.6	67.2	58.1
NB THRT	F	E	D	81.2	56.0	53.3
SB LT	E	E	E	70.6	56.6	76.2
SB THRT	E	D	E	68.4	54.9	58.0
N.C. 54 and Site Driveway (RIRO)/ /Downing Creek Parkway	N/A	N/A	N/A	N/A	N/A	N/A
EB LT	F	C	D	84.6	15.4	29.3
WB LT	C	C	F	20.9	18.6	173.9
NB RT	N/A	N/A	N/A	N/A	N/A	N/A
SB RT	F	C	D	69.3	17.5	29.5

N/A => Not Applicable, i.e. movement is non-existent or no improvements made



Revised Mitigation Measures / Recommendations

Applicant Committed Improvements

Based on the revised site plan provided for this Addendum study, there are several transportation-related improvements to be made external to the site property. **Figure 7** shows a schematic of these improvements. The site plan shows a right-turn lane constructed along westbound N.C. 54 to serve as a deceleration lane for the site driveway, as well as future pavement designation for an eventual third westbound through travel lane on N.C. 54. The right-turn lane is shown to be approximately 100 feet long with a 75 foot taper.

Additionally, the revised access proposal includes a dual lane left-over in the existing N.C. 54 median. The proposed eastbound and westbound left-turn lanes have 100 feet of full storage with a 75 foot taper. The peak hour capacity analysis results shown in the previous section indicate that the eastbound left-turn lane into the site driveway is over capacity in the 2011 AM peak hour and the westbound left-turn lane is over capacity in the 2011 PM peak hour. Analysis of HCS-predicted maximum queue length indicates that the eastbound AM maximum queue is less than two vehicles (requiring a minimum of 50 feet eastbound storage). However, the predicted westbound PM peak hour left-turn queue is nearly six vehicles, which would overflow the available queue storage (25 foot estimate per vehicle) and potentially cause queue spillback into through travel lanes on N.C. 54, which is potentially dangerous. It is recommended that the westbound left-turn storage bay for the proposed left-over be extended to at least 200 feet to accommodate estimated maximum peak hour queuing.

According to the Applicant, the left-over improvement is tied to the closure of the full median break at Little John Road, which was proposed in the original Woodmont Traffic Impact Study.

Necessary Improvements

As was stated in this section of the original traffic impact study, based on the estimated site traffic impacts on study area traffic operations, no additional improvements are required to mitigate site-related traffic impacts. There are a number of significant improvements needing implementation to mitigate projected traffic growth between 2007 and the 2011 design year, with or without the proposed site. **Figure 8** shows a schematic of the proposed necessary improvements to the study area. **Table 3**, on the next page, shows the peak hour LOS results for the mitigation recommendations described below.

The existing intersection of N.C. 54 and Barbee Chapel Road is over capacity in the AM peak hour and operations are projected to worsen considerably by the 2011 design year – primarily due to approved background traffic from other developments and general area-wide traffic growth. Recommendations to properly mitigate impacts at this intersection include the construction of an additional left-turn lane and a new exclusive right-turn lane for the northbound Barbee Chapel Road approach. In addition, the construction of this laneage configuration will allow improved signal phasing strategies. The traffic signal should be redesigned, with new signal heads to allow right-turn



“overlap” phasing for the westbound, eastbound, and northbound approaches. The new northbound dual left-turn lanes should have 500 feet of storage and the right-turn lane should have 250 feet of storage to accommodate worst-case queues.

**Table 3 – Capacity Analysis Results for Study Area Intersections
 Condition 4 – 2011 With Site Traffic and Mitigation**

Intersections	LOS			Average Vehicular Delay (sec/veh)		
	AM	Noon	PM	AM	Noon	PM
N.C. 54 and Barbee Chapel Road	F	C	E	84.9	31.0	65.6
EB LT	C	C	D	20.5	27.9	37.9
EB TH	D	C	F	39.6	29.1	84.0
EB RT	B	B	D	10.2	11.2	35.1
WB LT/U-TURN	E	E	F	61.9	60.0	255.4
WB TH	F	B	C	107.6	19.5	25.8
WB RT	A	A	A	9.4	6.2	5.7
NB LT	F	E	E	152.9	65.2	79.1
NB TH	F	E	E	80.4	63.0	78.6
NB RT	D	D	E	45.5	45.2	71.8
SB LT	F	E	F	94.1	78.0	95.9
SB THRT	E	E	F	77.4	77.6	91.9
N.C 54 and Little John Road	N/A	N/A	N/A	N/A	N/A	N/A
NB RT	C*	B*	C*	16.5*	13.3*	22.6*
N.C. 54 and Hunting Ridge Road	B	A	B	14.4	7.1	13.2
EB LT	D	E	E	51.1	56.1	60.4
EB TH	A	A	B	7.8	6.4	13.7
EB RT	A	A	A	6.2	5.3	6.1
WB LT	D	E	E	50.6	57.2	79.6
WB THRT	B	A	A	15.8	4.1	8.0
NB LT	E	E	E	65.6	62.2	57.9
NB THRT	D	D	D	54.3	52.1	53.3
SB LT	D	D	E	48.4	52.7	76.0
SB THRT	D	D	E	46.8	51.2	58.0
N.C. 54 and Site Driveway (RIRO)/ Downing Creek Parkway	N/A	N/A	N/A	N/A	N/A	N/A
EB LT	C*	B*	C*	24.4*	11.1*	15.4*
WB LT	B*	B*	D*	13.1*	12.2*	28.0*
NB RT	N/A	N/A	N/A	N/A	N/A	N/A
SB RT	D*	B*	C*	26.2*	13.0*	17.3*

N/A => Not Applicable, i.e. movement is non-existent or no improvements made

* => Estimated LOS/Delay based on using two-lane HCS methodology on three-lane N.C. 54 section

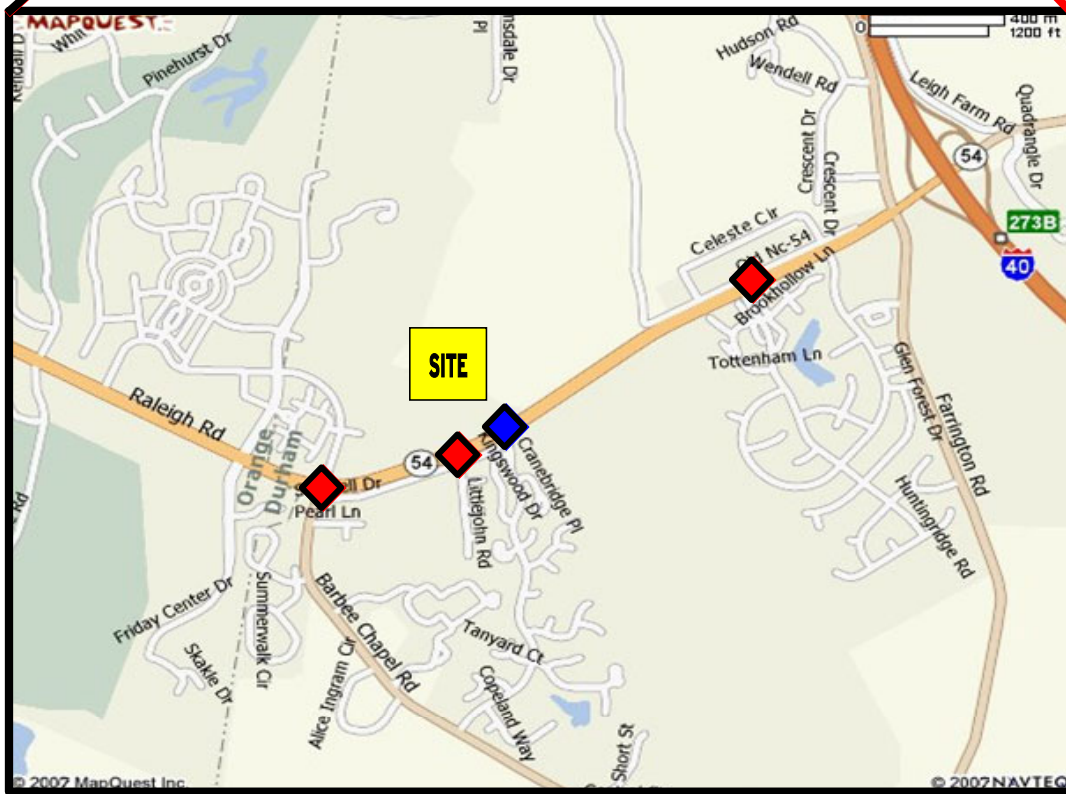
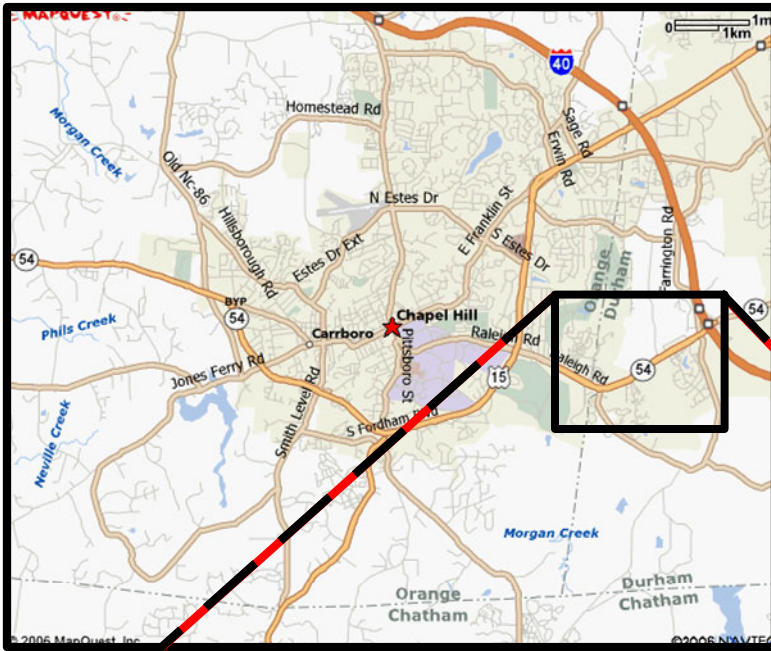
To mitigate overall high traffic growth along the N.C. 54 corridor in the study area, an additional through travel lane will need to be constructed between Barbee Chapel Road and Farrington Road (east of the study area). The beneficial effects of this improvement are shown in the 2011 Mitigation Scenario. This is the only possible improvement to allow the N.C. 54/Hunting Ridge Road intersection to operate acceptably in all peak hours. It also would eliminate lane underutilization east of the Barbee Chapel Road intersection, where lanes are added/dropped as the road transitions from a six-lane to a four-lane section. If this improvement were to be constructed after the Aydan Court Condominiums site is built, the ultimate design for the widening should still include a westbound right-turn deceleration lane for the Aydan



Court site driveway intersection. This improvement would also create additional gaps in through traffic on N.C. 54 that would, in turn, reduce delays for minor stop-controlled approaches to N.C. 54, such as Little John Road and Downing Creek Parkway.

LEGEND

- ◆ = Existing Intersections
- ◆ = Site Driveway



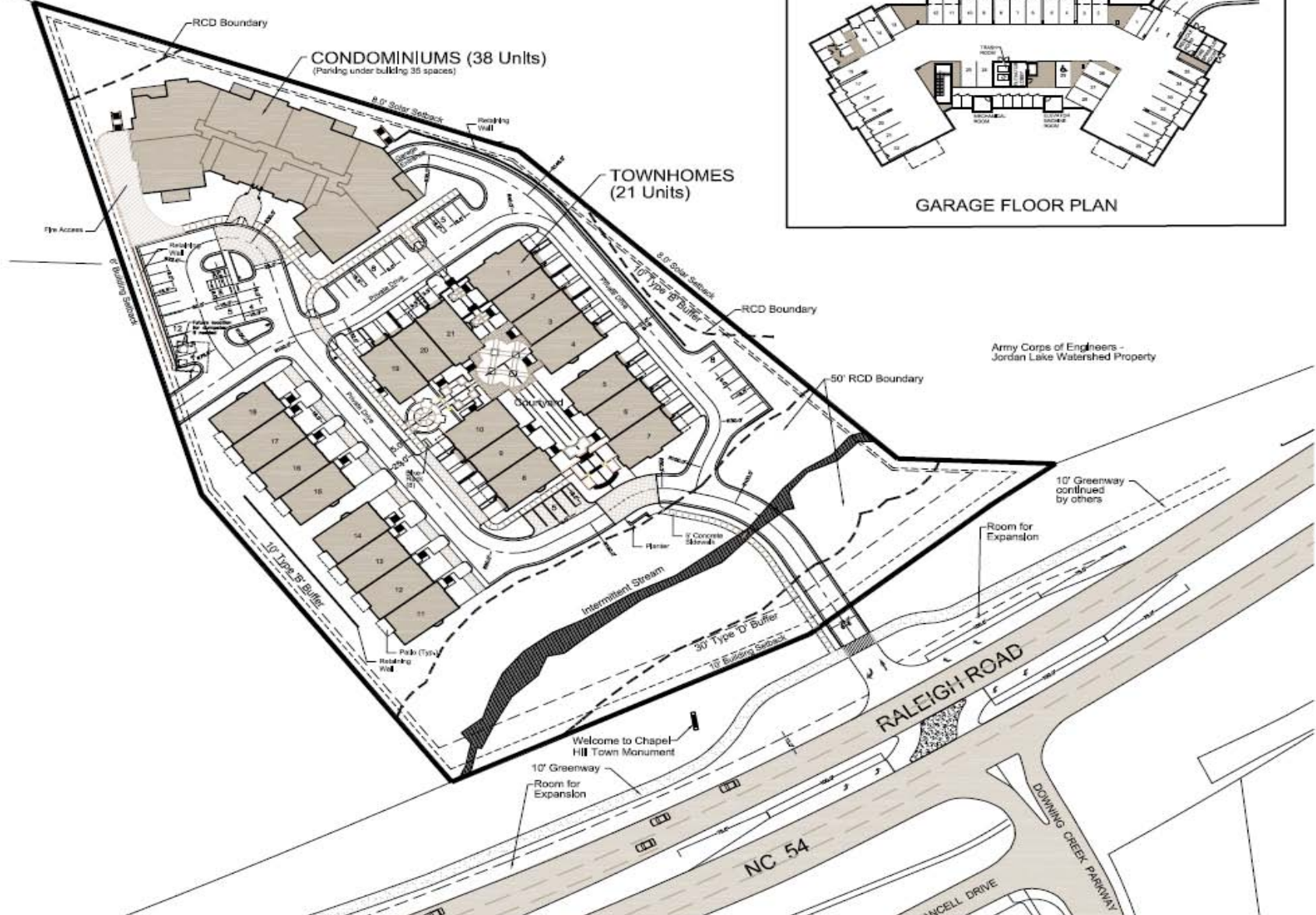
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SITE LOCATION MAP

DATE: February, 2008

FIGURE 1

**NOT
TO
SCALE**



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REVISED SITE PLAN



**NOT
TO
SCALE**

DATE: February, 2008

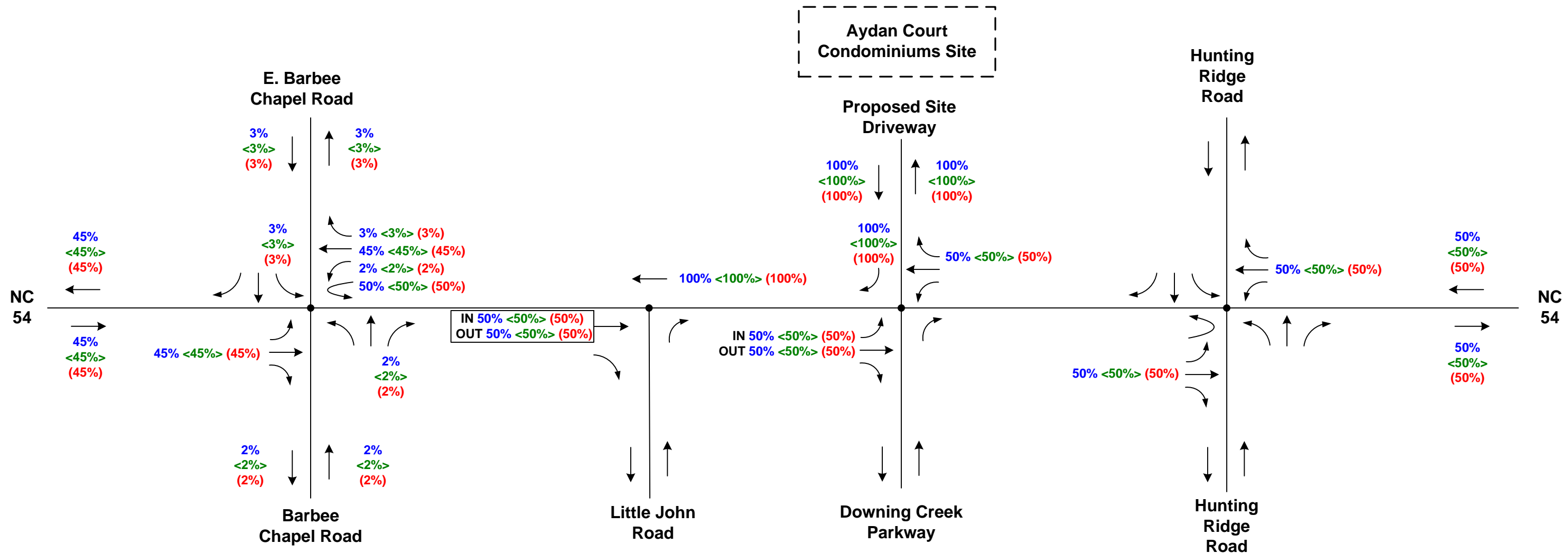
FIGURE 2

151

**SITE TRIP DISTRIBUTION
PERCENTAGES TAKEN FROM HIGH
VOLUME ROADWAY AADT AND
PREVIOUS TRAFFIC STUDIES**

LEGEND

- XX% = AM Peak
- <XX%> = Noon Peak
- (XX%) = PM Peak



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2011 SITE TRIP DISTRIBUTION %


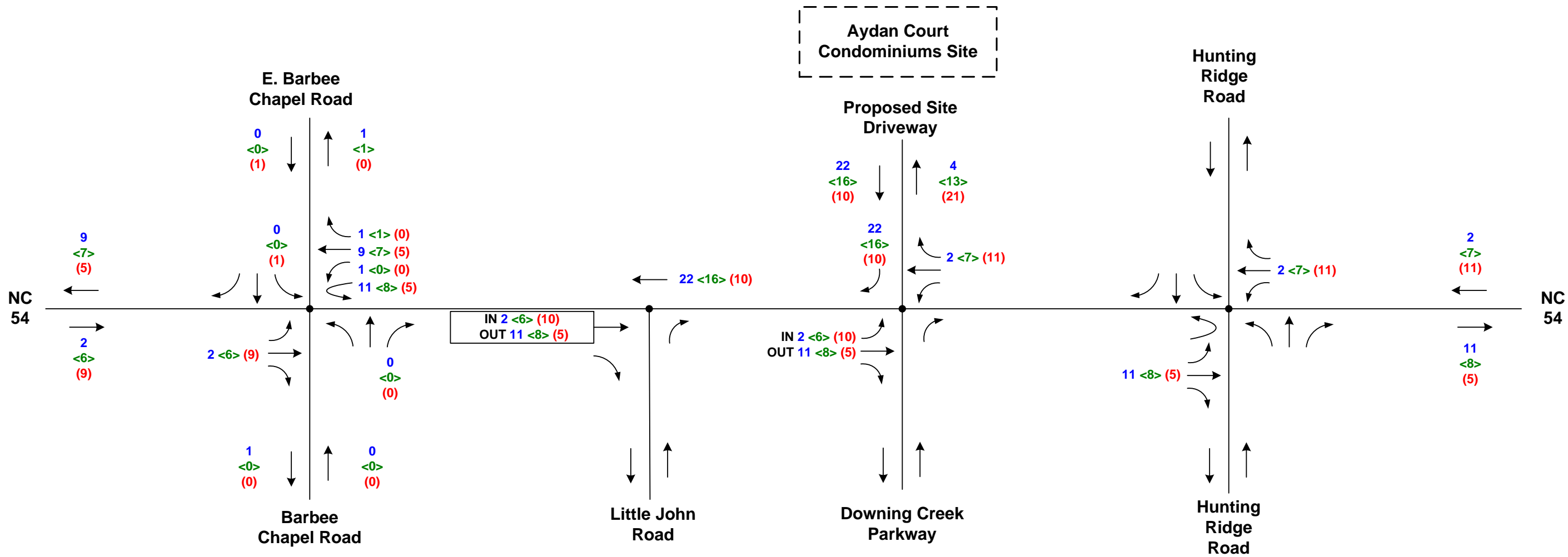
DATE: February, 2008


NOT
TO
SCALE

FIGURE 3

SITE TRAFFIC ASSIGNMENT = TRIP GENERATION DATA X RELATIVE PROPORTION OF EXTERNAL SITE TRIP DISTRIBUTION PERCENTAGES


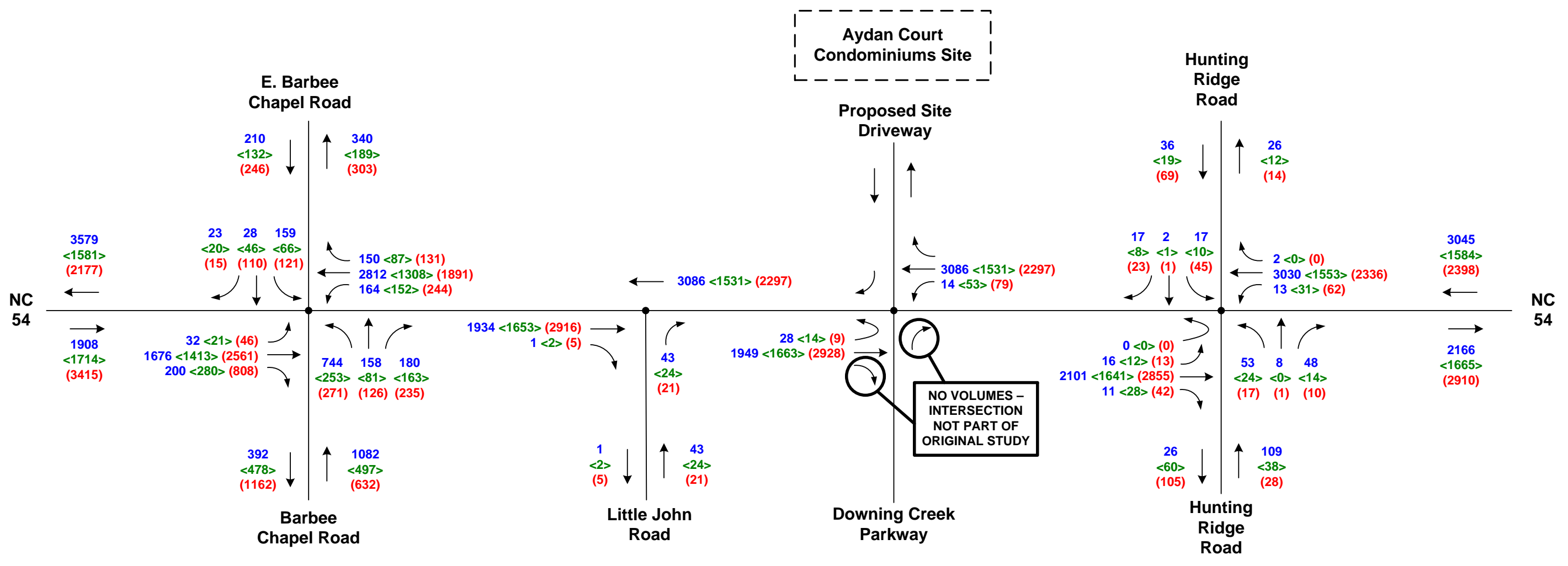
LEGEND	
XXX	= AM Peak
<XXX>	= Noon Peak
(XXX)	= PM Peak

	Aydan Court Condominiums Traffic Impact Study Addendum
	2011 SITE TRAFFIC ASSIGNMENT
NOT TO SCALE	DATE: February, 2008
	FIGURE 4

2011 WITHOUT SITE TRAFFIC =
 AMBIENT GROWTH + APPROVED
 BACKGROUND TRAFFIC

LEGEND	
XXX	= AM Peak
<XXX>	= Noon Peak
(XXX)	= PM Peak



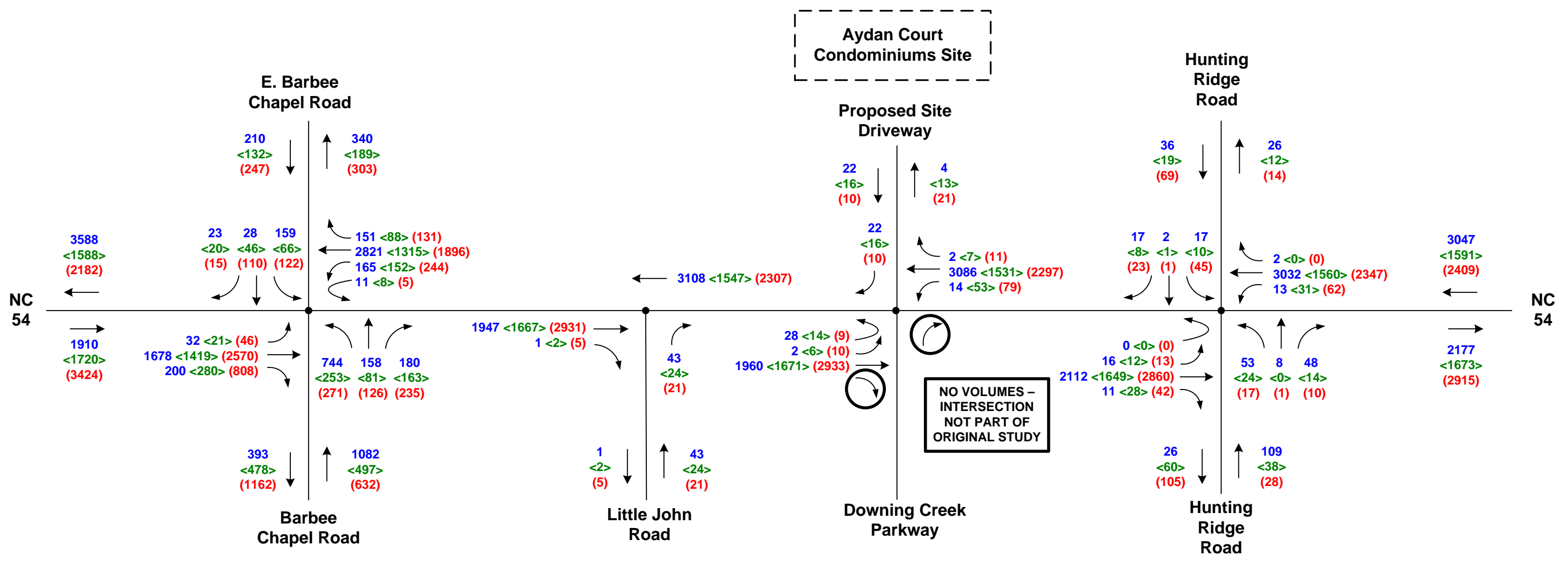

 NOT TO SCALE	Aydan Court Condominiums Traffic Impact Study Addendum
	2011 TRAFFIC VOLUMES WITHOUT SITE
	DATE: February, 2008

FIGURE 5



2011 WITH SITE TRAFFIC = 2011
WITHOUT SITE TRAFFIC VOLUMES +
SITE TRAFFIC ASSIGNMENT

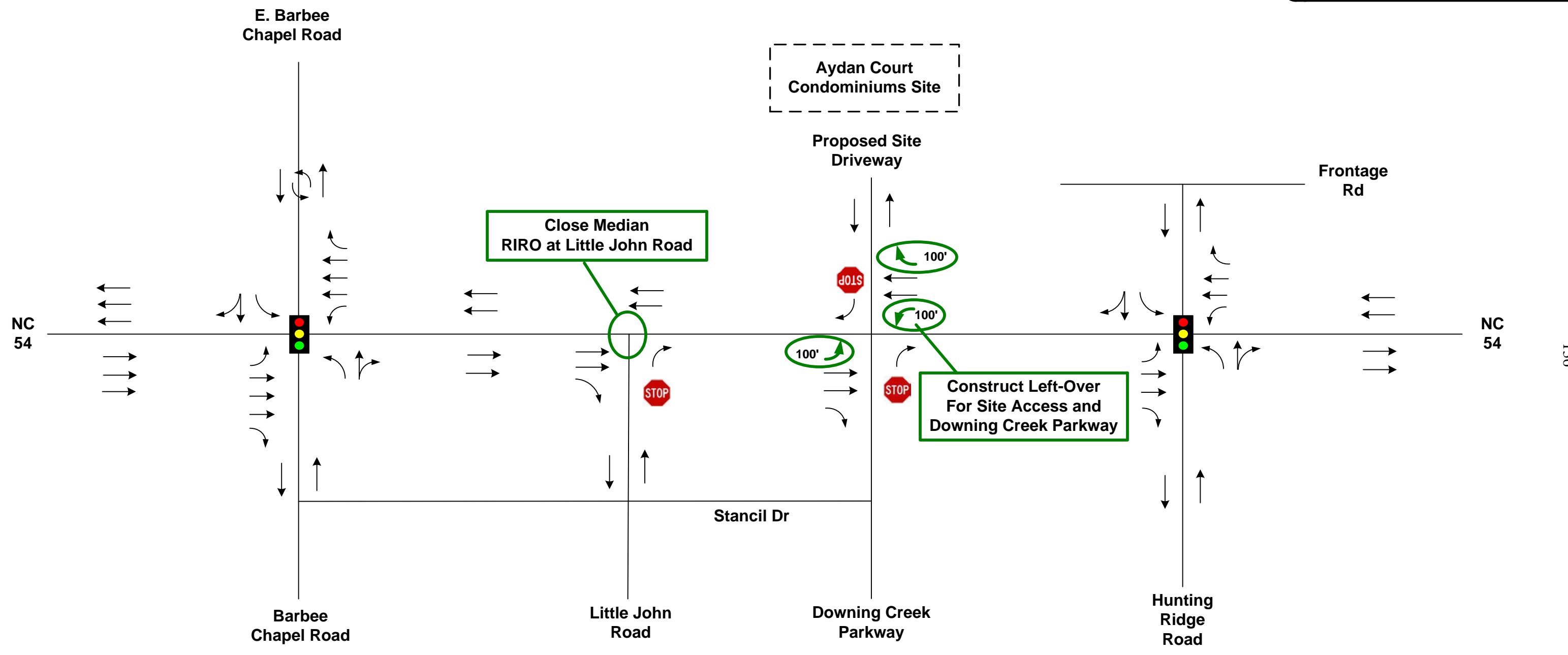
LEGEND	
XXX	= AM Peak
<XXX>	= Noon Peak
(XXX)	= PM Peak

 NOT TO SCALE	Aydan Court Condominiums Traffic Impact Study Addendum
	2011 TRAFFIC VOLUMES WITH SITE
	DATE: February, 2008
FIGURE 6	

LEGEND

-  = Laneage Improvement
-  = Signal Timing/ Phasing Improvement



NOT TO SCALE


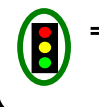
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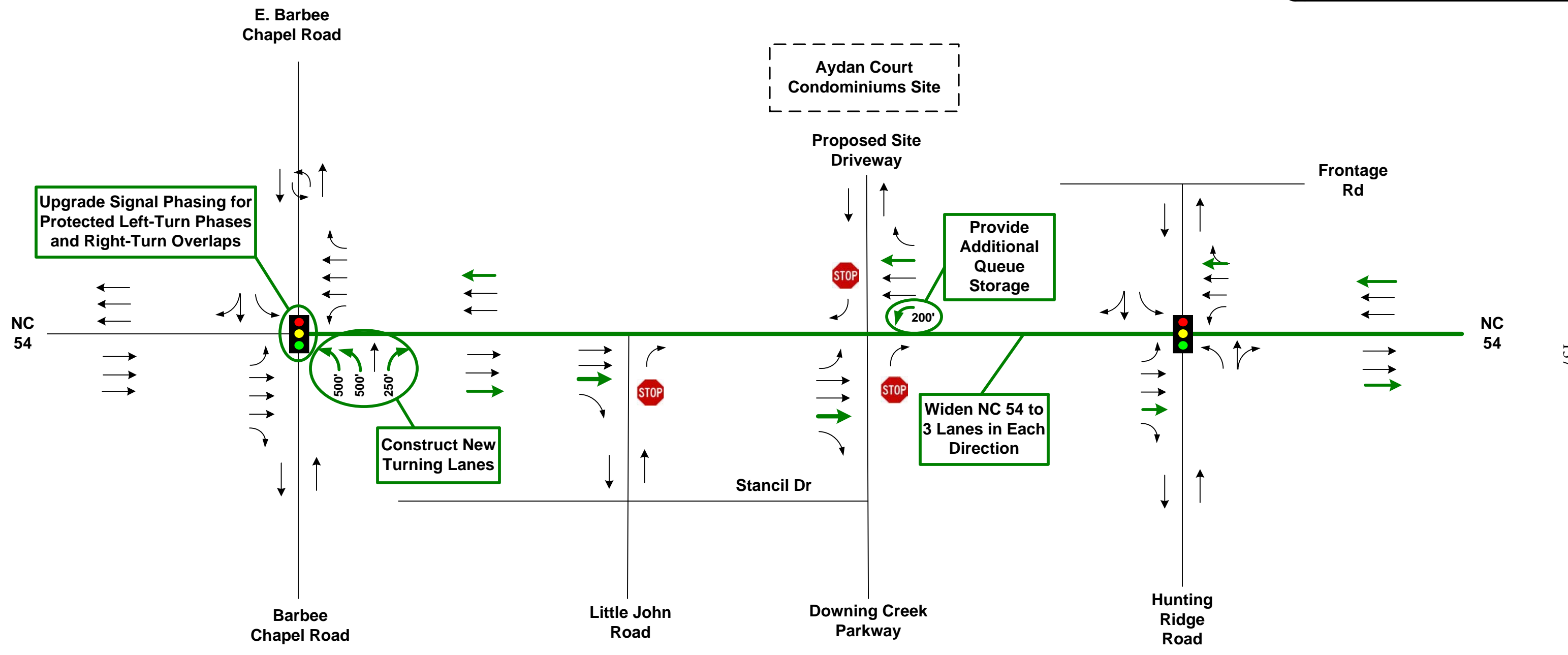
2011 BACKGROUND IMPROVEMENTS

DATE: February, 2008

FIGURE 7

LEGEND

-  = Laneage Improvement
-  = Signal Timing/ Phasing Improvement



NOT TO SCALE

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2011 RECOMMENDED IMPROVEMENTS

DATE: February, 2008

FIGURE 8