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TRAFFIC IMPACT ANALYSIS  
**HOMESTEAD TWINS SUBDIVISION**

CHAPEL HILL, NORTH CAROLINA

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Executive Summary



Prepared for:  
**THE TOWN OF CHAPEL HILL, NORTH CAROLINA**

Prepared by:

***RS&H***

*ARCHITECTS-ENGINEERS-PLANNERS, INC.*

APRIL 2005

*Juice K. Anderson*



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## Executive Summary

The proposed Homestead Road subdivision is to be located on Homestead Road between Rogers Road and Seawell School Road. This site is to be built on undeveloped land, which borders Homestead Road to the north, vacant land to the west, Resource Conservation District to the south, and Seawell School Road to the east. (See Figure 1.) Roadway access to the property will be on Homestead Road and Seawell School Road.

### 1) Project Overview

This project will consist of 72 townhouses distributed among 36 duplexes. The site is currently zoned R-2. (See Figure 2)

### 2) Study Area

The proposed residential development is located on the south side of Homestead Road west of Seawell School Road. There will be two site entrances--one entrance on Homestead Road and one entrance on Seawell School Road.

The impact area is limited to the adjacent street and the nearest intersection with a major arterial street. To determine the impacts of the proposed change in development on area roads, traffic flow conditions were analyzed at the following intersections:

- Homestead Road and Seawell School Road
- Homestead Road and Homestead Road site entrance (Subdivision Drive 1)
- Seawell School Road and Seawell School Road site entrance (Subdivision Drive 2)

### 3) Site Traffic Generation

The proposed development will generate an estimated 485 daily vehicle trips. Of these, 40 vehicle trips will occur during the morning peak hour, 46 vehicles trips midday, and 46 vehicle trips during the evening peak hour. Table 1 summarizes the trip generation for the proposed project.

### 4) Access Analysis

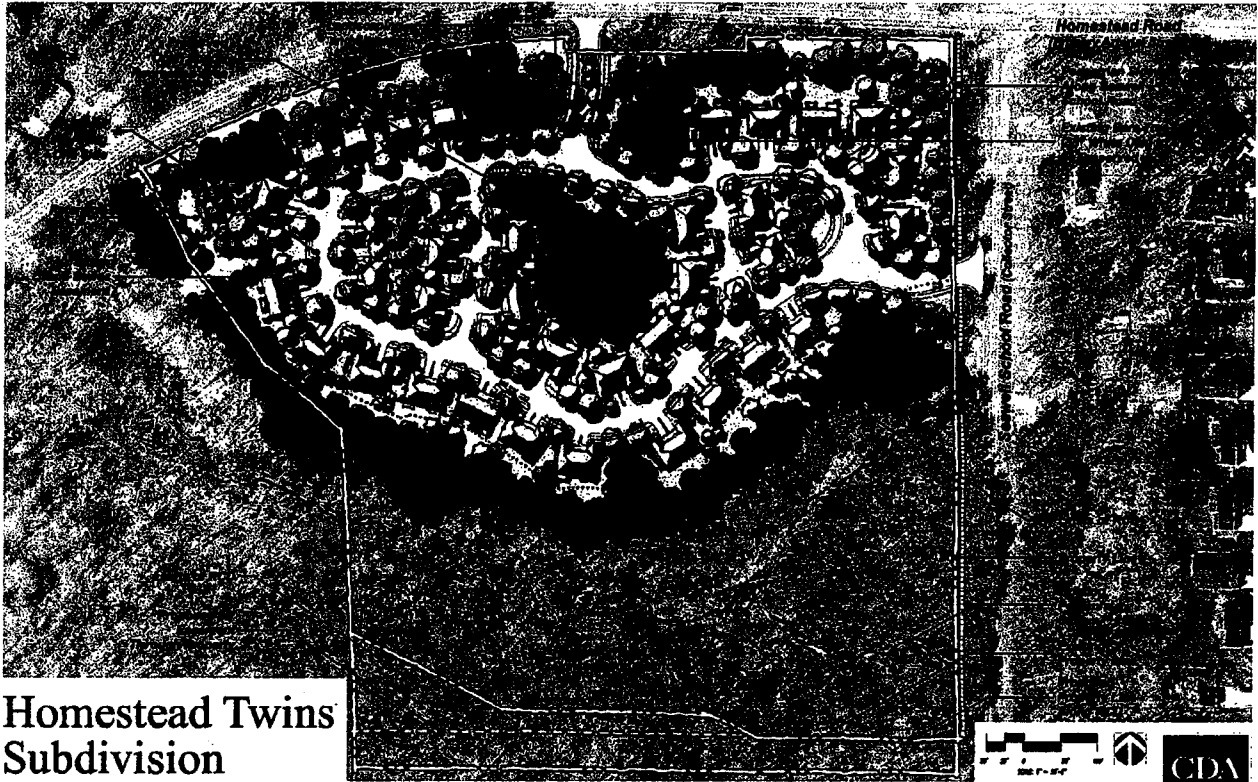
Two entrances are planned to carry traffic into and out of Homestead Road Subdivision— one entrance on Homestead Road, one on Seawell School Road. These entrances should be sufficient to accommodate the site traffic under the proposed development.

### 5) Intersection Analysis

Phasing Analysis: The intersection of Homestead Road and Seawell School Road was analyzed as a signalized intersection using traffic volumes from the 2008 No-Build and Build alternatives. Phasing for this analysis was obtained from SYNCHRO.



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**Homestead Twins  
Subdivision**

Chapel Hill, North Carolina

**Illustrative Site Plan**

This plan and/or drawing is for illustrative purposes only and is subject to change. Date 02-02-08

Prepared for  
Capkov Ventures, Inc.

**HOMESTEAD TWINS SUBDIVISION  
TOWN OF CHAPEL HILL**

RS&H ARCHITECTS-ENGINEERS-PLANNERS INC.  
CHARLOTTE, NORTH CAROLINA  
CORPORATE CERTIFICATE NO. F-0493



**PROPOSED SITE PLAN**

**FIGURE 1**

**Table 1:**  
**Site Trip Generation**  
**Homestead Twins Subdivision**

Land Use	Size	Weekday (veh. per unit per day)		AM Peak Hour (veh. per unit per day)		Mid day Peak Hour (veh. per unit per day)		PM Peak Hour (veh. per unit per day)	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Residential Condominium/ Townhouse	72 Units	3.37	3.37	0.09	0.46	0.32	0.32	0.43	0.21

**Table 2:**  
**Number of Trips from the Site**

Land Use	Size	Weekday (veh. per day)		AM Peak Hour (veh. per hour)		Mid day Peak Hour (veh. per hour)		PM Peak Hour (veh. per hour)	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Residential Condominium/ Townhouse	72 Units	243	243	7	33	23	23	31	15

Accident Analysis: Accident data was obtained from the North Carolina Department of Transportation (NCDOT) for the three-year period from September 1, 2001, to August 31, 2004, for the intersection of Homestead Road and Seawell School Road and for the intersection of Homestead Road and Rogers Road. Accident data was also obtained for the following roadway segments:

Homestead Road from Seawell School Road to Rogers Road  
 Rogers Road from Homestead Road to Tallyho Trail  
 Seawell School Road from High School Road to Homestead Road.

The highest number of accidents occurred on Homestead Road between High School Road and Seawell School Road. During the three-year period 26 crashes were reported. Of these, 15 were rear-end accidents, six were left-turn/angle collisions, and the remaining five were due to other reasons such as hitting a fixed object or an animal. The





proposed development may increase the number of accidents slightly on Homestead Road.

At the intersection of Homestead Road with Seawell School Road eight accidents were reported. The low accident rate of less than three per year indicates that there are no safety concerns at the intersection today.

On Seawell School Road between High-School Road and Homestead Road, thirteen crashes were reported. The accident rate of approximately four crashes per year indicates that Seawell School Road is relatively safe today.

Progression Analysis: For the No-Build and Build alternatives the signal at the Homestead Road and Seawell School Road intersection was analyzed as an isolated intersection using SYNCHRO.

6) Peak-Hour Intersection Level of Service

A comparison of the intersection capacity analyses for the 2005 Existing, the 2008 No-Build and the 2008 Build Alternatives is presented in Table 2.

Table 3  
 Intersection Capacity Analysis Summary

Alternative	Intersection	Controller*	Direction	Level of Service			
				AM	Noon	PM	
2005 Existing	Homestead Road at Seawell School Road	Signal	Overall Intersection	B	B	A	
			Eastbound	TR	C	B	B
			Westbound	L	A	A	A
				T	A	A	A
			Northbound	L	D	D	D
R	A	A		A			
2008 No-Build	Homestead Road at Seawell School Road	Signal	Overall Intersection	C	B	B	
			Eastbound	TR	C	B	C
			Westbound	L	D	A	A
				T	A	A	A
			Northbound	L	D	D	D
R	A	A		A			
2008 Build	Homestead Road at Subdivision Road 1	N-S Stop	Westbound	LT	A	A	A
			Northbound	LR	C	B	C
	Homestead Road at Seawell School Road	Signal	Overall Intersection	C	B	B	
			Eastbound	TR	C	C	C
			Westbound	L	D	A	A
				T	A	A	A
			Northbound	L	D	D	D
	R	A		A	A		
Seawell School Road at Subdivision Drive 2	E-W Stop	Northbound	LT	A	A	A	
		Eastbound	LR	B	A	B	
Intersection controlled by a traffic signal or a north-south or east-west stop sign							



Homestead Road at Seawell School Road: Under the 2008 Build Condition, the capacity analysis indicates that all approaches and the signalized intersection as a whole would function at Level of Service C or better throughout the day, a good rate of traffic flow and the same as under No-Build conditions.

Homestead Road at Subdivision Drive 1: Under the 2008 Build alternative, an analysis of the unsignalized intersection of Homestead Road and the proposed Subdivision Drive 1 indicates that the traffic demand at this intersection would function at Level of Service C or better throughout the day, a good rate of traffic flow.

Seawell School Road at Subdivision Drive 2: Under the 2008 Build alternative, an analysis of the unsignalized intersection of Seawell School Road and Subdivision Drive 2 indicates that the traffic demand at this intersection would function at Level of Service B or better through out the day, a good rate of traffic flow. A comparison of the traffic flow conditions of the No-Build alternative with the traffic flow conditions of the Build alternative determines the impacts of the proposed project on the surrounding roadway network.

7) Turn Lane Storage Requirements

Homestead Road currently has a left-turn lane at the Seawell School Road intersection in the westbound direction. Likewise, Seawell School Road has a left-turn lane at its intersection with Homestead Road. The capacity analysis indicates that the existing left-turn lanes are sufficient for the projected traffic demand.

8) Sight Distance

The required intersection sight distance at each of the entrances of the proposed development is 390 feet for left turns from a stopped condition and 335 feet for right turns from a stopped condition. According to the proposed site plan, the intersection sight distance at the intersection of Subdivision Drive 1 and Homestead Drive will be approximately 180 feet for viewing traffic approaching from the left. Improvements to the intersection sight distance may be achieved by moving the entrance approximately 155 feet to the east of the location shown in the site plan, which would be approximately 345 feet west of the Seawell School intersection. A second alternative would be to remove the landscaping within the sight triangle for a distance of 390 feet to the west of the proposed Subdivision Drive 1.

At the intersection of Seawell School Road and proposed Subdivision Drive 2, there appears to be no obstructions blocking the driver's view of potentially conflicting vehicles from either direction. No roadway improvements will be necessary to improve sight distance at this intersection.

9) Mitigation Measures/Recommendations

According to the North Carolina Department of Transportation (NCDOT), the 2003 Average Daily Traffic (ADT) volume on Homestead Road was 11,000 vehicles per day (vpd) west of its intersection with Airport Road. The capacity of a two-lane undivided arterial is 16,900 vpd. If the ADT is increasing on Homestead Road at a rate of five percent per year, the traffic demand on Homestead Road, including the traffic from the



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other development projects, will be 22,770 in 2008—the year in which the proposed project is to be completed and fully occupied. Traffic on Homestead Road will be beyond capacity with the increase in traffic demand. Roadway improvements should be considered to accommodate the increase in traffic demand regardless of whether the proposed subdivision is built.

At the intersection of Homestead Road and proposed Subdivision Drive 1, the intersection sight distance from a stopped position will be less than the desirable 390 feet needed for left-turning traffic and 335 feet for right-turning traffic. Improvements to the intersection sight distance may be achieved by moving the entrance approximately 155 feet to the east of the location shown in the site plan, which would be approximately 345 feet from the Seawell School intersection. A second alternative would be to remove the landscaping within the sight triangle for a distance of 390 feet to the west of the proposed Subdivision Drive 1.



**Memorandum**


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**Date:** Thursday, March 29, 2007  
**To:** Mr. Kumar Neppalli, EI  
**From:** Ms. Yolande Stover, PE  
**Subject:** **Intersection Sight Distance—Homestead Road at Subdivision Drive 1**

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The purpose of this memo is to explain the concept of intersection sight distance, specifically as it pertains to the intersection of Homestead Road and Subdivision Drive 1 of the proposed Homestead Twins development.

Intersection sight distance is based on two components: the design speed of the major road and the time gap for vehicles on the minor road to complete a turn without unduly interfering with traffic operations along the major road. According to Chapter 9 of the 2004 AASHTO "Green Book," the time gap required is 7.5 seconds for drivers making a left turn and 6.5 seconds for drivers making a right turn.

In calculating the intersection sight distance, the following assumptions are made:

- ◆ The vehicle is a passenger car.
- ◆ The major road is a two-lane, two-direction roadway with no median.
- ◆ The grade of the approach to the major road is 3% or less.

Adjustments should be made for vehicles other than passenger cars, multilane roadways, and minor road approaches with grades greater than 3%. The formula used to calculate the intersection sight distance is

$$ISD = 1.47 * V_{major} * t_g, \text{ where}$$

ISD = intersection sight distance (ft)

$V_{major}$  = the design speed of the major road (mph)

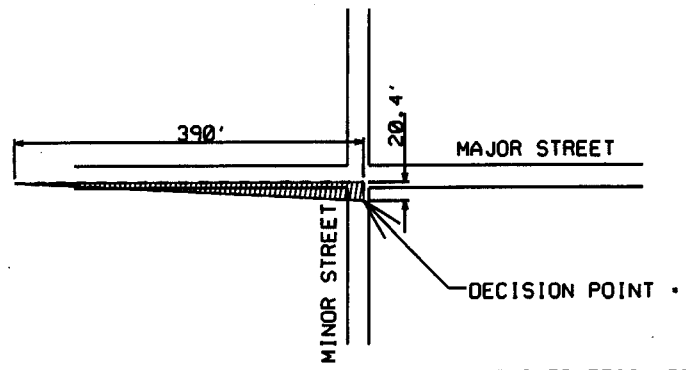
$t_g$  = the time gap for minor road vehicle to enter the major road (sec)

In the case of Subdivision Drive 1 at Homestead Road, Homestead Road is the major road. Instead of its design speed, the posted speed on Homestead Road in this area—35 miles per hour—is used in the calculation. As mentioned previously, the time gap for drivers making a left turn is 7.5 seconds, and it is 6.5 seconds for drivers making a right turn. Using the formula, the calculated intersection sight distances are 385.9 feet for left turns and 334.4 feet for right turns. For design purposes, 390 feet and 335 feet are used.

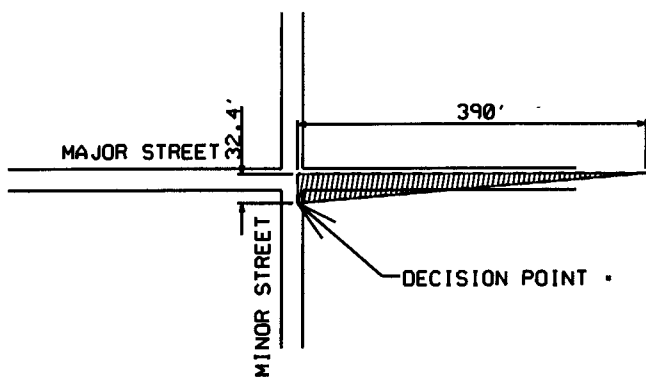
At its present location, the Subdivision Drive 1 entrance has adequate sight distance on the driver's right. However, the entrance allows for a sight distance of approximately 200 feet to the driver's left, which is less than the required distance. Beyond this point, the roadway curves beyond the driver's view. Moving the entrance to the west along the curve of the road would not provide the necessary sight distance on the driver's left. Moreover, the move would reduce the sight distance on the driver's right because the road would curve beyond the driver's view. By moving the entrance approximately 200 feet to the east, adequate sight distance at the entrance would be achieved on both the left and right sides.



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CLEAR SIGHT TRIANGLE FOR VIEWING TRAFFIC APPROACHING FROM THE LEFT



CLEAR SIGHT TRIANGLE FOR VIEWING TRAFFIC APPROACHING FROM THE RIGHT

• THE DECISION POINT IS LOCATED ALONG THE MINOR ROAD  
14.4 FEET FROM THE EDGE OF MAJOR ROAD TRAVELED WAY.

SOURCE: A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS 2004,  
5TH EDITION, 2004

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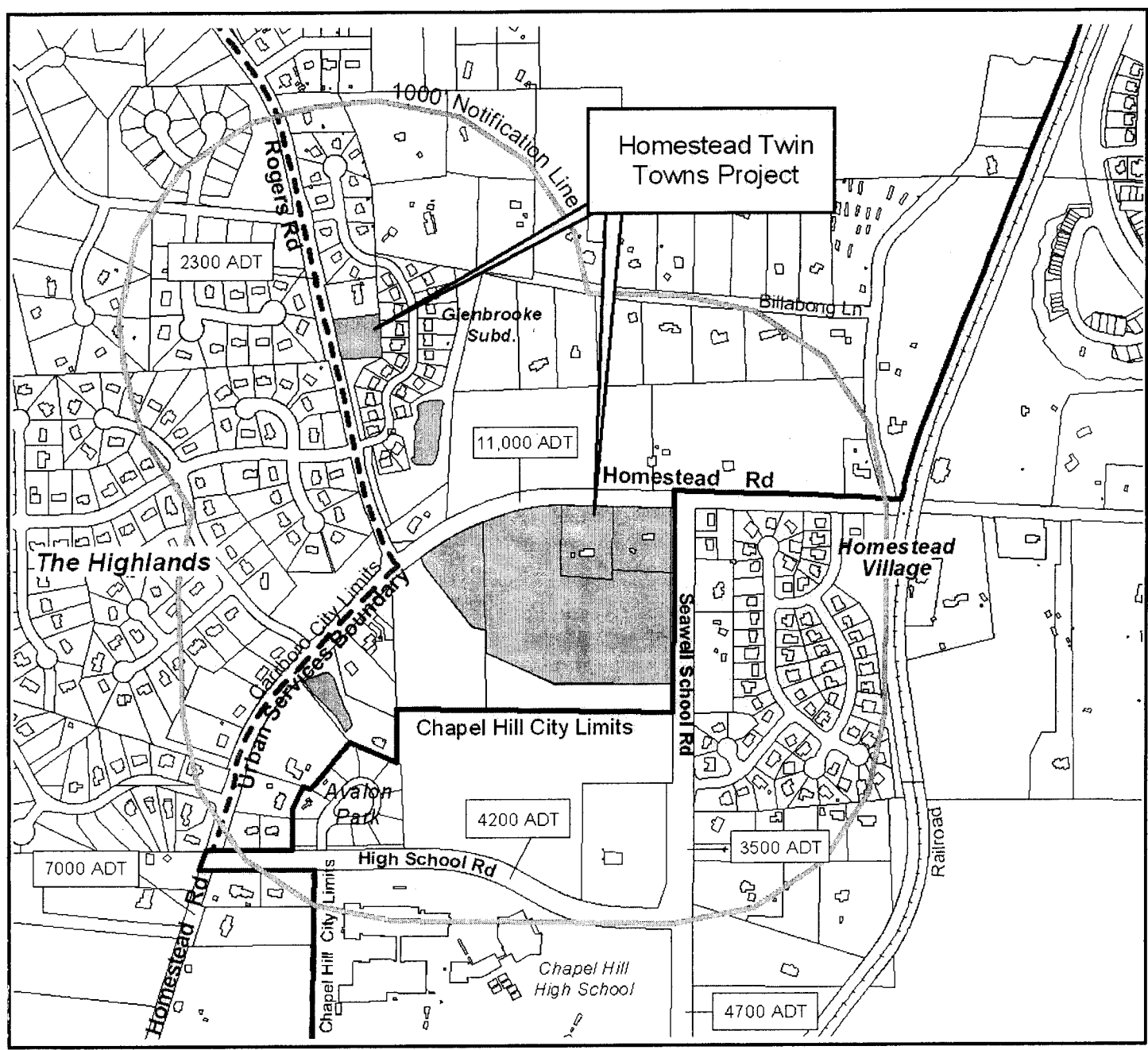








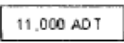
INTERSECTION SIGHT TRIANGLES

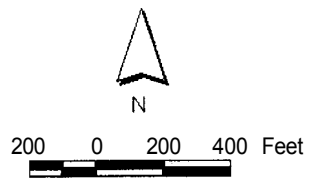
FIGURE 8

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# Area Map Homestead Twin Towns Project



-  Homestead Twin Towns Project (in two sections)
-  1000' Notification Line
-  Buildings
-  JPA
-  Chapel Hill City Limits
-  Urban Services Boundary
-  Average Daily Traffic Count (ADT)  
2003 DOT Data



GIS Map prepared by  
Chapel Hill Planning  
May, 2006