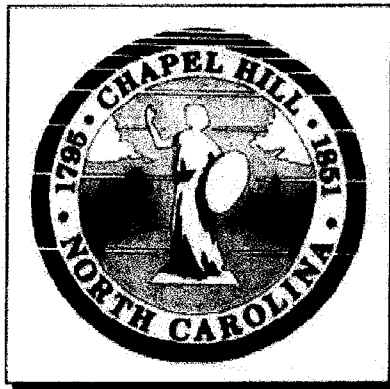


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# TRAFFIC IMPACT ANALYSIS SUMMARY

FOR THE

## ORANGE COUNTY SOUTHERN SENIOR CENTER



Prepared For  
Town of Chapel Hill  
Chapel Hill, North Carolina

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December 2004

**TRAFFIC IMPACT ANALYSIS**  
**PROPOSED ORANGE COUNTY SOUTHERN SENIOR CENTER**  
**CHAPEL HILL, NORTH CAROLINA**

**A. SUMMARY**

This document summarizes the results of the Traffic Impact Analysis (TIA) Report performed for the proposed Orange County Southern Senior Center in Chapel Hill, North Carolina.

**1. Project Overview**

The purpose of this study is to determine the potential impact on the surrounding transportation system created by traffic generated by the proposed development as well as recommend improvements to mitigate the impacts. In order to accomplish this objective, this study analyzes existing (2004) traffic conditions, future (2006) traffic conditions without the proposed development but including adjacent development traffic, and future (2006) traffic conditions with adjacent development and the proposed development during the weekday AM, mid-day and PM peak hours.

**2. Study Area**

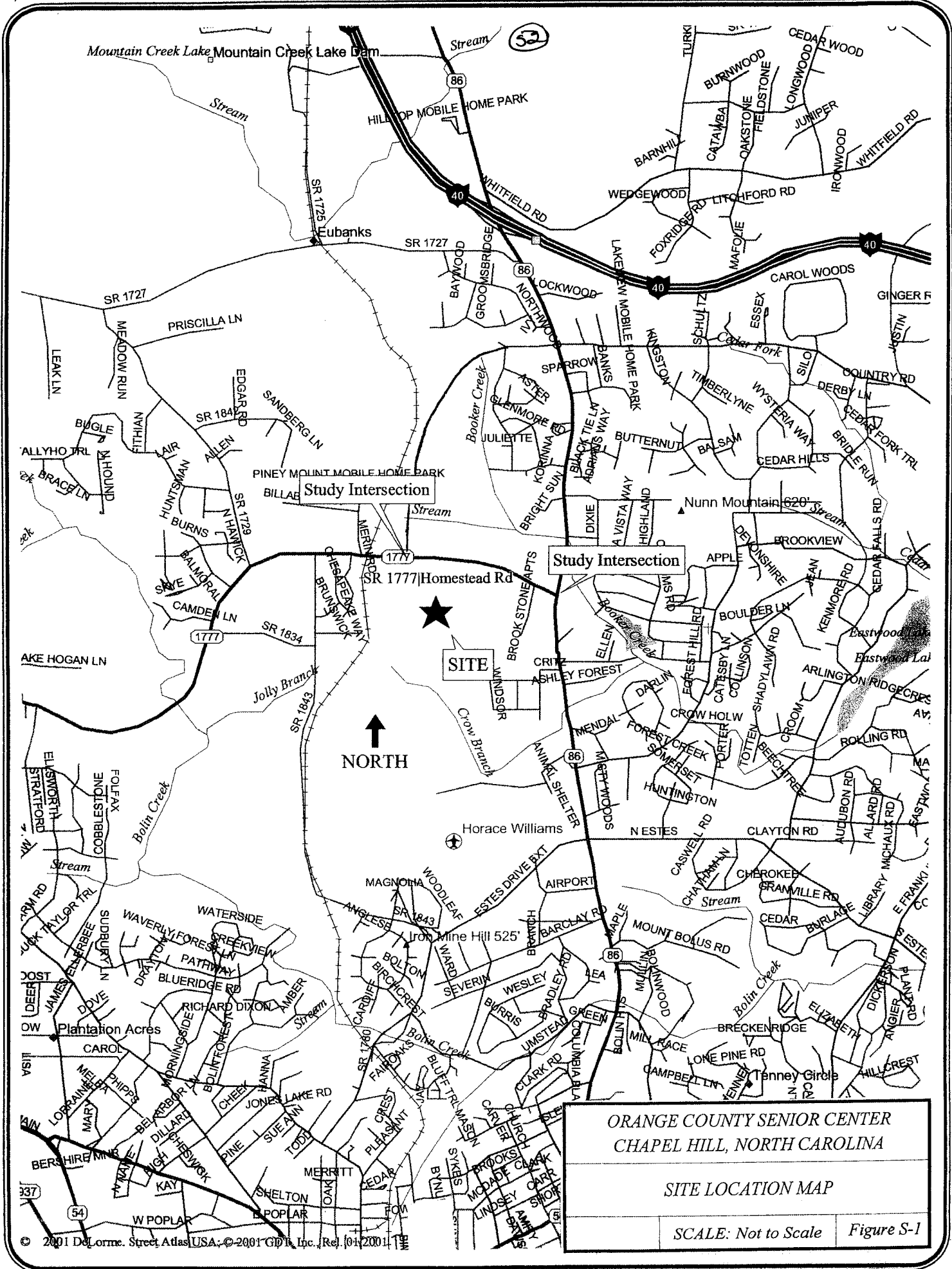
The proposed development is located at 2501 Homestead Road approximately 0.35 mile west of Airport Road in Chapel Hill. Refer to Figure S-1 for the site location map. The scope of this project was developed through coordination with the Town of Chapel Hill and consists of the following intersections:

- 1) Homestead Road and Weaver Dairy Road Extension (unsignalized)
- 2) Homestead Road and County Property Driveway (unsignalized)
- 3) Homestead Road and Airport Road (signalized)

**3. Site Traffic Generation**

The Senior Center will consist of a 25,000 square foot (sf) Senior Citizen Center, including 20,000 sf of office space, program space and meeting areas, and a 5,000 sf auditorium and meeting room. Refer to Figure S-2 for the site land use plan.

Trip generation for the proposed development is based on rates obtained from the Institute of Transportation Engineers (ITE) *Trip Generation* manual, 7<sup>th</sup> Edition for a Recreational Community Center. The independent variable is square footage. The ITE *Trip Generation* Manual does not contain trip generation information for a senior center. Therefore, several similar land uses were considered, including a Recreational Community Center (ITE Code 495), Multipurpose Recreational Facility (ITE Code 435), and General Office (ITE Code 710). Engineering judgment was used to determine that the trip generation of a Recreational Community Center would most accurately represent the trip generation of the proposed senior center. A detailed breakdown of the trip generation results can be found in Table S-1.



ORANGE COUNTY SENIOR CENTER  
CHAPEL HILL, NORTH CAROLINA

SITE LOCATION MAP

SCALE: Not to Scale      Figure S-1



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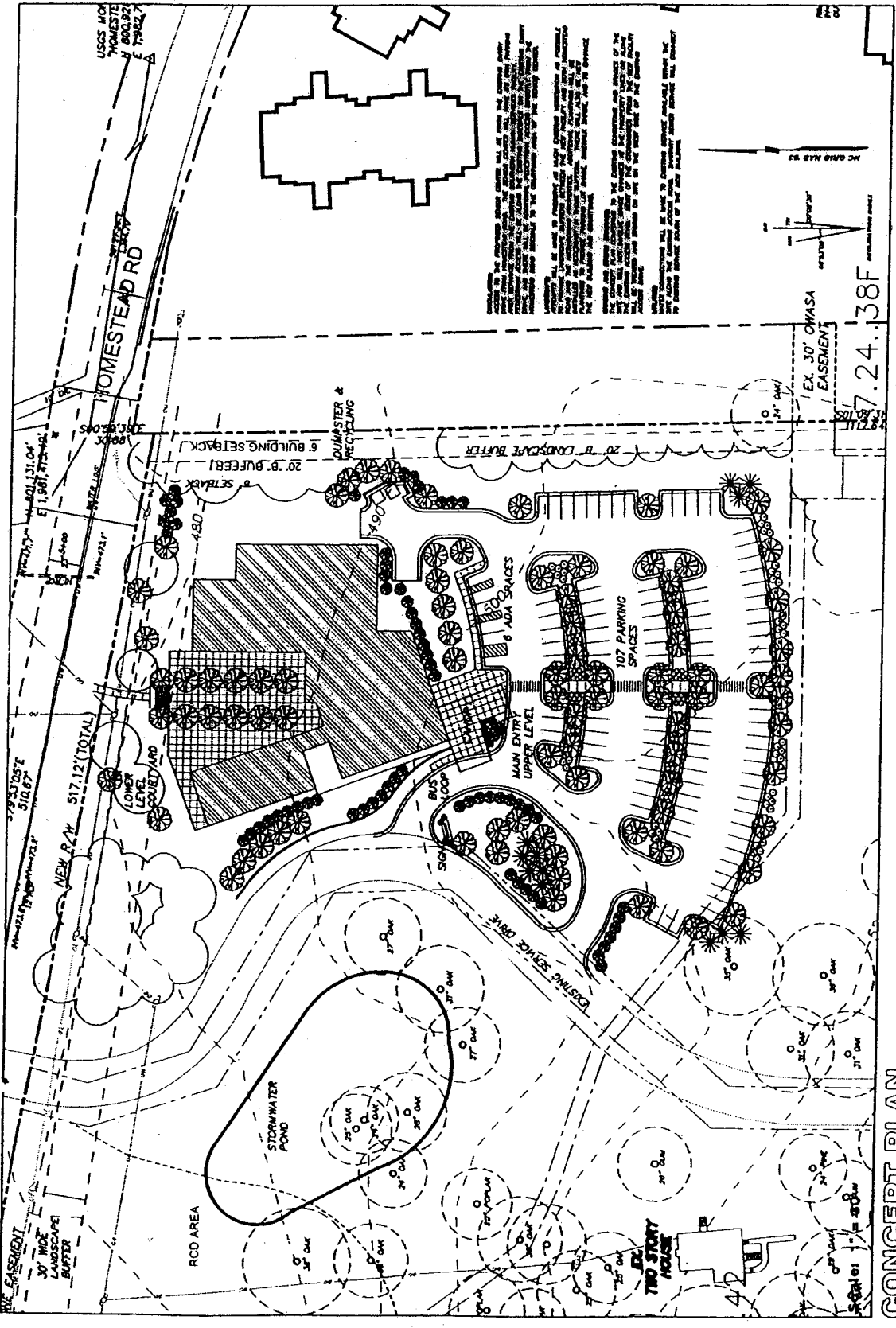
Southern  
 Orange County  
 Senior Center

APR 04 08 07  
 CONCEPT PLAN  
 NOT FOR CONSTRUCTION

December 20, 2004

CONCEPTUAL  
 PLAN  
 SHORT SERVICE DRIVE

CP-3



NOTES TO THE ARCHITECTURE: THESE NOTES SHALL BE READ IN CONJUNCTION WITH THE CONCEPT PLAN AND SHALL BE USED TO CLARIFY ANY AMBIGUOUS AREAS OF THE CONCEPT PLAN. THE ARCHITECT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND EASEMENTS FROM THE APPROPRIATE AGENCIES. THE ARCHITECT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND EASEMENTS FROM THE APPROPRIATE AGENCIES. THE ARCHITECT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND EASEMENTS FROM THE APPROPRIATE AGENCIES.

**CONCEPT PLAN**  
**SOUTHERN ORANGE SENIOR CENTER**



**Table S-1  
Trip Generation**

ITE Land Use (Code)	Density	Daily Trips (vpd)	AM Peak Hour (vph)		Mid-day Peak Hour (vph)		PM Peak Hour (vph)	
			Enter	Exit	Enter	Exit	Enter	Exit
Recreational Community Center (495) for Senior Center	25,000 square feet	572	25	16	12*	29*	12	29

\* PM peak hour trip generation assumed for Mid-day peak hour

**4. Access Analysis**

Access to the site will be provided via the existing County Property Driveway. The County Driveway is a two-lane roadway with an assumed statutory speed limit of 35 mph. The County Property Driveway is expected to provide adequate access for this development. A left turn lane is currently provided on Homestead Road for traffic turning onto the County Property Driveway.

**5. Intersection Analysis**

A signal warrant analysis was conducted for the intersection of the County Property Driveway and Homestead Road based on future (2006) peak hour traffic volumes including adjacent development and proposed development traffic. The signal warrant analysis results indicate the peak hour signal warrant (Warrant 3A) would not be met. Since trip generation data were not available for a senior center, it is possible that the development would generate more trips than is shown in this report; however, it is anticipated that the development would not generate enough trips to warrant the installation of a traffic signal at the intersection.

Crash data were provided by the NCDOT for the segment of Homestead Road from Airport Road to Seawell School Road including crash data at the intersections with Airport Road and Homestead Park Drive. Crash data was compiled between May 1, 2002 and April 30, 2004, which is the most recent three years of available data. Table S-2 presents a summary of the crash data and comparison to statewide averages for a similar type of facility.

**Table S-2  
Crash Analysis Summary**

Crash Type	# of Crashes	Crashes per 100 MVM Traveled	Statewide Rate <sup>1</sup>	Critical Rate <sup>2</sup>
Total	24	193.45	422.44	522.46
Fatal	0	0	1.18	10.28
Non-Fatal Injury	11	88.66	142.04	201.73
Night	2	16.12	94.47	143.89
Wet	5	40.30	69.02	111.85

As indicated in the crash analysis report, 24 crashes occurred over a three-year period on Homestead Road in the study area. It should be noted that this analysis does not include crashes that occurred along Airport Road upstream or downstream of Homestead Road. Ten crashes occurred at the intersection with Seawell School Road, which is not in the study area and 8 crashes occurred at Airport Road. Sixteen crashes were rear-end type crashes, which are typically the most common type of crash at signalized intersections. This segment of roadway is lower than the statewide rates for similar facilities. Further, an analysis of the crash data does not indicate a significant safety exists on Homestead Road in the study area.

## **6. Peak Hour Intersection Levels of Service**

This study included three (3) separate analysis scenarios; existing (2004) traffic conditions, future (2006) traffic conditions without the proposed development but including adjacent development traffic, and future (2006) traffic conditions with the proposed development during the weekday AM, mid-day and PM peak hours. Based on information provided by the Town of Chapel Hill, several adjacent developments will impact the study intersections. All traffic generated by these adjacent developments were included in the future (2006) traffic conditions. Refer to Table S-3 for peak hour analysis results for existing (2004) traffic conditions, future (2006) traffic conditions without the proposed development, and future (2006) traffic conditions with the proposed development.

Analysis indicates the intersection of Airport Road and Homestead Road will operate at LOS C in the AM and mid-day peak hours and LOS E in the PM peak hour without improvements. The northbound left turn and eastbound right turn movements are expected to operate at LOS E or F in the PM peak hour. Calculated 95<sup>th</sup> percentile northbound left turn queues are expected to exceed 530 feet per left turn lane, while the eastbound and southbound right queues are expected to exceed 560 feet. The intersection of Airport Road and Homestead Road was analyzed with a right turn overlap phase for the eastbound and southbound right turn movements along with modified signal timings. With these improvements, the intersection is expected to operate at an overall LOS C in the AM, mid-day, and PM peak hours. Queues on the northbound left turn, eastbound right turn, and southbound right turn are significantly reduced. The reduced phase split for the westbound movements may not allow pedestrians to cross the intersection during this phase. It is not anticipated that the timing adjustments would significantly affect operations of the signal system; however, an analysis was not completed to determine the extent of impact of the revised timings.

Without improvements, the minor street approach of Weaver Dairy Road Extension at the intersection with Homestead Road will operate at LOS F in the AM and PM peak hours. With auxiliary turn lanes on Homestead Road and separate turn lanes on Weaver Dairy Road Extension, the minor approach will continue to operate at LOS F; however, the delays are reduced.

The minor street approach of the County Property Driveway is expected to operate at LOS C or better during the peak hour periods under future conditions with the proposed site and adjacent development traffic.



Table S-3  
Level-of-Service Summary

INTERSECTION	2004 Existing			2006 Future + Adjacent Development Without Proposed Development			2006 Future With Site		
	AM	MID-DAY	PM	AM	MID-DAY	PM	AM	MID-DAY	PM
	Homestead Road and Weaver Dairy Rd. Ext. (Unsignalized)	A <sup>1</sup> -- C <sup>2</sup>	A <sup>1</sup> -- B <sup>2</sup>	A <sup>1</sup> -- D <sup>2</sup>	A <sup>1</sup> A <sup>1</sup> * -- F <sup>2</sup>	A <sup>1</sup> A <sup>1</sup> * -- B <sup>2</sup>	A <sup>1</sup> B <sup>1</sup> * -- F <sup>2</sup>	A <sup>1</sup> A <sup>1</sup> * -- F <sup>2</sup>	A <sup>1</sup> A <sup>1</sup> * -- B <sup>2</sup>
Homestead Road and County Property Driveway (Unsignalized)	-- A <sup>1</sup> C <sup>2</sup>	-- A <sup>1</sup> B <sup>2</sup>	-- A <sup>1</sup> C <sup>2</sup>	-- A <sup>1</sup> C <sup>2</sup>	-- A <sup>1</sup> B <sup>2</sup>	-- A <sup>1</sup> C <sup>2</sup>	-- A <sup>1</sup> C <sup>2</sup>	-- A <sup>1</sup> B <sup>2</sup>	-- A <sup>1</sup> C <sup>2</sup>
Homestead Road and Airport Road (Signalized)	D D B C C	E E B B C	E E D C D	D D* D D* B B* D B* C C*	E E* E E* C C* B B* C C*	E E* E E* E E* C B* E D*	D D* D D* B B* D B* C C*	E E* E E* C C* B B* C C*	E D* E E* E C* C C* E C*
<b>Overall</b>	<b>C</b>	<b>C</b>	<b>D</b>	<b>C C*</b>	<b>C C*</b>	<b>E D*</b>	<b>C C*</b>	<b>C C*</b>	<b>E C*</b>

\* Analysis results with intersection improvements

1. Level of service for left turn movement on major approach.
2. Level of service for minor approach.

## **7. Pedestrian and Bicycle Analysis**

Sections of sidewalk exist on the east side of Weaver Dairy Road and Homestead Park Drive, the north and south sides of Homestead Road, and the east and west sides of Airport Road. Currently, bicycle lanes exist on the east and west sides of Airport Road to the north of Homestead Road. No additional sidewalks or bicycles lanes are recommended as a result of this project.

## **8. Public Transportation Analysis**

Based on information obtained during field reconnaissance by RKA, there are multiple bus stops located within the study area. Specifically, two bus stops are located along Homestead Road (one on the north side and one on the south side) and two bus stops are located along Airport Road (one on the east side and one on the west side) near the intersection of Homestead Road and Airport Road. Based on information received from the Town of Chapel Hill, the A Route, T Route, and N/S Express Route access one or more of these bus stops.

## **9. Special Analysis/Issues**

A long-term link analysis was conducted on Homestead Road for the year 2025. Based on NCDOT ADT data, Homestead Road carried approximately 11,000 vehicles per day (vpd) in 2003. To determine the future ADT volume on Homestead Road, the 2003 ADT was projected to the year 2025 using a 2% compound annual growth rate. The projected 2025 ADT volume on Homestead Road in the vicinity of the site is anticipated to be approximately 17,000 vpd. Based on this estimate, it is anticipated that additional through lanes would be necessary on Homestead Road to accommodate the daily traffic volume. Since trip generation data is not available for a senior center land use, trip generation estimates are developed using a recreational community center land use. Based on this land use, the proposed development would generate approximately 570 trips per day. Approximately 80% of the trips will utilize Homestead Road east of Homestead Park Drive, while 20% will travel to/from the west on Homestead Road.

## **10. Mitigation Measures/Recommendations**

Based on the findings of this study, the following improvements are recommended at study intersections to achieve a desirable level of operation. These improvements are recommended regardless of whether the proposed development is built. Refer to Figure S-3 for an illustration of improvements.

### Intersection of Homestead Road and Weaver Dairy Road

- Provide an exclusive right turn lane on the westbound approach of Homestead Road with a full-width storage of 100 feet and a 100 foot taper.
- Provide an exclusive left turn lane on the eastbound approach of Homestead Road with a full-width storage of 200 feet and a 100 foot taper.

### Intersection of Homestead Road and Airport Road

- Provide an overlap phase for the southbound and eastbound right turn movements. This improvement will require modifications to the existing traffic signal design at this intersection. Signal timing adjustments at this intersection are also recommended for the PM peak hour signal system plans.