*Interim Traffic Report*

# Chapel Hill Road and Stewart Mill Road Transportation Corridor Study

## Douglas County and the City of Douglasville

*Prepared for:*

Douglas County & The City of Douglasville

# Draft

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## 1.0 EXECUTIVE SUMMARY

Kimley-Horn and Associates has been retained to perform a Transportation Corridor Study for Chapel Hill Road and Stewart Mill Road. Chapel Hill Road is a major arterial in the Douglas County that has experienced rapid growth in traffic over the last several years and is projected to continue to grow in the future. This Transportation Corridor Study project is one of the first projects that resulted from the recently adopted Special Purpose Local Options Sale Tax (SPLOST) in Douglas County. The purpose of the Transportation Corridor Study is to identify transportation deficiencies along both the corridors studied and recommend short-term (immediate) and long-term (20-year) improvements to mitigate the deficiencies identified.

The Transportation Corridor Study was divided into two sections, an Interim Report and a Final Report. This document is the Interim Report which addresses the existing 2004 traffic conditions and recommends short-term improvements that can be completed relatively quickly to provide immediate relief. The Final Report will analyze projected traffic conditions in the year 2024 and include long-term improvements for the two corridors.

In order to identify the current deficiencies, a variety of data had to be collected and analyzed. The deficiencies were determined by analyzing traffic volumes, roadway geometry, level of service, and current traffic operations of the roadway network. Additionally, four schools are located within the study area and were examined during the critical times (during the morning when the students arrive and afternoon when the students are released).

A total of ten improvements have been recommended in this report as ways to mitigate the transportation deficiencies identified. The following table is a summary of the recommended improvements and the associated opinion of probable cost of the improvements.

| Table 1<br>Summary of Recommended Interim Improvements | | | | | | |
|---|---|---|---|---|---|---|
| **Figure Number** | **Location** | **Proposed Improvement** | **Estimated R/W Cost** | **Estimated Design Cost** | **Estimated Construction Cost** | **Priority** |
| A-1 | Chapel Hill Rd Section A | **Douglas Boulevard/Timber Ridge Drive:** Add a receiving lane to make SB right a free-flow movement; improve EB approach; improve WB approach | | | | |
| - | | **All Signalized Intersections:** Coordinate the four signalized intersections | | | | |
| A-2 | Chapel Hill Rd Section C | **Central Church Road/Bomar Road:** Improve lane shift north of intersection; improve SB approach; improve EB approach; improve WB approach | | | | |
| A-2 | | **Willow Ridge Road:** Install a separate traffic signal controller for the traffic signal, and improve the lane shift south of the intersection. | | | | |
| A-3 | | **Chapel Hill Elementary & Middle School:** Add SB right-turn lane along frontage of school; install school speed limit flashers; improve lane shift south of schools; consider two stacking lanes onsite | | | | |
| A-4 | | **Anneewakee Road/Dorsett Shoals Road:** Realign intersection to the north; improve all approaches to include multiple lanes. | | | | |
| A-5 | Chapel Hill Rd. Section D | **Chapel Hill High School:** Add a NB left-turn lane along Chapel Hill Road at both site driveways and SB left turn lane for Chapel Hill Farms | | | | |
| | | **West Chapel Hill Road:** Add NB left-turn lane along Chapel Hill Road. | | | | |
| A-6 | | **State Route 166:** Install signal at intersection; improve SB approach; improve EB approach; improve WB approach | | | | |
| A-7 | Stewart Mill Road Section A | **Reynolds Road**: Install a westbound left-turn lane along Stewart Mill Road. | | | | |
| A-8 | Stewart Mill Road Section B | **Yancey Road/West Stewart Mill Road:** Adjust vertical geometry along the southbound approach, and install EB and WB left-turn lanes along Stewart Mill Road. | | | | |
| A-9 | Stewart Mill Road Section C | **Kings Highway at Central Church Road:** Improve NB approach; improve SB approach to include exclusive left-turn lanes. | | | | |
| A-10 | | **Bill Arp Road/SR 5 at Central Church Road:** Improve NB approach; improve EB approach; improve WB approach | | | | |

## 2.0 INTRODUCTION

This report evaluates the existing 2004 traffic conditions and recommends short-term improvements for select intersections that were either over capacity or operationally deficient. This report summarizes the data collection, existing conditions analysis, and conclusions from the analysis. The conclusions include the recommended interim improvements along with an opinion of probable cost for each improvement.

### *2.1 Study Area*

The study area includes two intersecting corridors located in Douglas County; Chapel Hill Road and Stewart Mill Road. Chapel Hill Road is a major north-south corridor that provides connectivity between Interstate 20 (I -20) and State Route 166. Stewart Mill Road is an east-west roadway that connects Chapel Hill Road to Central Church Road. The portion of Chapel Hill Road included in this study begins at the I-20 eastbound ramp and extends approximately 6.25 miles south to the intersection of State Route 166. Approximately 2.5 miles of Stewart Mill Road is included in the study area. This segment of Stewart Mill Road begins at Chapel Hill Road and continues west to the intersection with Central Church Road. The study also includes Central Church Road from Stewart Mill Road to Bill Arp Road (SR 5). The study area can be seen in **Figure 1**.

Chapel Hill Road is a 4-lane divided roadway in an urban setting with mostly commercial land uses north of Stewart Mill Road. It transitions to a 2-lane undivided roadway south of Stewart Mill Road and becomes a rural roadway that serves predominantly residential uses. Stewart Mill Road is a rural 2-lane undivided roadway that serves predominantly residential land uses. Along the two corridors, 12 signalized and several unsignalized intersections exist.

For the purposes of this report, the two corridors were each divided into multiple sections. Not only is this approach sensible as there are distinct differences along the two corridors, it allows future improvements to be phased if needed. The specific sections for each corridor are listed below:

Chapel Hill Road

- Section A – from I-20 eastbound ramp to Stewart Mill Road
- Section B – from Stewart Mill Road to Central Church Road
- Section C – from Central Church Road to Dorsett Shoals Road
- Section D – from Dorsett Shoals Road to State Route 166

Stewart Mill Road

- Section A – from Chapel Hill Road to Reynolds Road
- Section B – from Reynolds Road to Central Church Road
- Section C – from Central Church Road to Bill Arp Road

A detailed description of each section can be found in Section 4 of this report. Although the Stewart Mill Road corridor changes name to Central Church Road at the intersection with Central Church Road, it will continue to be referred to as the Stewart Mill Road corridor for simplification.

### *2.2 Programmed Future Projects*

According to the Atlanta Regional Commission there are numerous projects programmed in the *Atlanta Regional 2025 Regional Transportation Plan* (RTP) for the two corridors studied in this report. One project is located within the Douglasville City Limits and will provide a sidewalk on the west side of Chapel Hill Road from I-20 west to Reservoir Drive. Chapel Hill Road is programmed to be widened to 4 lanes from Stewart Mill Road to State Route 166. This widening project is divided into three separate projects which are scheduled to be completed at different times. The three projects are as follows:

- Widen Chapel Hill Road to 4 lanes from Stewart Mill Road to Central Church Road
- Widen Chapel Hill Road to 4 lanes from Central Church Road to Dorsett Shoals Road
- Widen Chapel Hill Road to 4 lanes from Dorsett Shoals Road to State Route 166

The intersections of Chapel Hill Road at West Chapel Hill Road, Chapel Hill Road at State Route 166, and Central Church Road at Kings Highway are programmed in the 25-year RTP to have intersection improvements. A roadway improvement project is scheduled along Stewart Mill Road from approximately Reynolds Road to Anneewakee Creek and is scheduled to be completed in year 2010. Lastly, the RTP includes the widening of Bill Arp Road/State Route 5 from 2 lanes to 4 lanes in the vicinity of the study area.

The *State Transportation Improvement Plan* produced by GDOT confirms the pedestrian project (sidewalks) along Chapel Hill Road from I-20 to Arbor Place Boulevard. Also, the *State Transportation Improvement Plan* includes the addition of HOV lanes along the Westside of I-20 in the vicinity of the study network. See the Appendix for additional information.

## 3.0 DATA COLLECTION

Data was colleted for the analysis of Chapel Hill Road and Stewart Mill Road. New aerial photography was obtained for the two corridors. An overall aerial of the area is included in the Appendix. Additionally, peak hour turning movement counts were conducted at all signalized intersections within the study network and at select major unsignalized intersections. Also, 24-hour automatic tube counts were conducted along Chapel Hill Road and Stewart Mill Road. All raw count data is included in the Appendix. Field observations were completed to obtain laneage, signal phasing, and observe the traffic operations in the area. **Figure 2** indicates the existing roadway laneage. Field observations are important as sometimes a traffic model does not clearly indicate how a system is operating. The schools in the study network were observed during both the morning when the students arrive and in the afternoon when the students are released. Traffic generated by schools tend to peak for short periods of time and can sometimes be difficult to analyze solely from count data and a model.

### *3.1 Traffic Volumes*

According to GDOT's historical traffic count data, the annual average daily traffic (AADT) volumes along Chapel Hill Road have experienced an average annual growth rate of about 10% from 1997 to 2002. **Table 2** summarizes the AADT volumes collected by GDOT including the GDOT count location for Chapel Hill Road. Stewart Mill Road has not experienced the same rapid growth as GDOT's historical count data indicate the AADT volumes have grown an average of 4% annually over the last several years. **Table 3** summarizes the AADT volumes collected by GDOT including the GDOT count location for Stewart Mill Road.

**Table 2**
**Annual Average Daily Traffic Volumes for Chapel Hill Road**

| GDOT Count Location | Location Description | GDOT Published Volumes | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
| **194** | South of Stewart Mill Road | 17,483 | 20,700 | 22,133 | 23,860 | 27,615 | 28,413 |
| **192** | North of Central Church | 8,573 | 9,700 | 13,236 | 12,643 | 13,704 | 13,376 |
| **189** | North of Dorsett Shoals Road | 8,494 | 9,050 | 9,676 | 11,793 | 10,679 | 14,069 |
| **187** | South of West Chapel Hill Road | 2,934 | 3,150 | 3,368 | 3,772 | 3,721 | 5,022 |

To supplement the GDOT historical traffic counts, Kimley-Horn and Associates performed 24-hour automatic tube counts at multiple locations along Chapel Hill Road and Stewart Mill Road. These daily

traffic volumes collected correspond with the growth trend determined by the GDOT counts in the tables shown above and below. The comparable 2004 counts collected for Chapel Hill Road are as follows: 30,546 just north of Stewart Mill Road, 16,192 north of Chapel Crossing, 16,117 north of Dorsett Shoals Road, and 6,284 south of West Chapel Hill Road. Not all tubes were located in the exact same location as the GDOT tubes; however the tubes were located within the general vicinity.

**Table 3**
**Annual Average Daily Traffic Volumes for Stewart Mill Road**

| GDOT Count Location | Location Description | GDOT Published Volumes | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
| **185** | West of Central Church Road | 6,175 | 6,500 | 7,295 | 6,980 | 6,458 | 7,972 |
| **218** | West of Kings Highway | 5,648 | 6,050 | 7,288 | 7,000 | 5,214 | 6,139 |

Three tube count locations were identified along the Stewart Mill Road corridor for this study. The 2004 daily traffic volumes collected for this study are as follows for Stewart Mill Road: 12,576 west of Creekwood Drive, 5,443 west of Cove Terrace, and 8,143 east of Kings Highway. An additional tube count was collected along Central Church Road just east of Stewart Mill Road and revealed a daily volume of 4,772 at this location.

In addition to the tube counts, AM and PM peak hour turning movement counts were performed at various intersections along the corridors. **Figure 3** indicates the AM peak hour volumes and **Figure 4** indicates the PM peak hour volumes. Based on the turning movement counts, the AM peak hour along Chapel Hill Road ranges from 7:00 AM to 8:00 AM at the southern end of the corridor to 7:30 AM to 8:30 AM at the northern portion of the corridor. The AM peak hour for intersections along Stewart Mill Road occurred between 7:30 AM to 8:30 AM. The PM peak hour for Chapel Hill was fairly consistent throughout the length of the corridor, 5:00 PM to 6:00 PM. The PM peak hour for Stewart Mill Road ranges from 5:00 PM to 6:00 PM at eastern end of the corridor to 5:30 PM to 6:30 PM at the western portion of the corridor.

The existing turning movement counts that were performed at the Chapel Hill Road and Dorsett Shoals Road/Anneewakee Road intersection are not fully representative due to the road closure of Dorsett Shoals. Approximately 3 miles west of the intersection, a bridge that crosses Tanyard Creek is being replaced. The volumes at Chapel Hill Road and Dorsett Shoals Road were adjusted using volumes

collected for a Traffic impact study performed in May 2003. The volumes where adjusted in order to reflect the traffic conditions when Dorsett Shoals is open to through traffic.

### *3.2 School Observations*

Four schools are located within the study area: Chapel Hill Elementary School, Chapel Hill Middle School, Chapel Hill High School, and Holly Springs Elementary School. All the schools are located along Chapel Hill Road except Holly Springs Elementary School which is located along West Chapel Hill Road about 200 feet west of the intersection of Chapel Hill Road. Chapel Hill Elementary School and Chapel Hill Middle School are located adjacent to each other and use the same site driveways. At these schools, there are two driveways; the north driveway is signed for buses and faculty only. Chapel Hill High School has two driveways, one of which is a main entrance that aligns with Chapel Hill Farms. Most motorists use this main entrance which is the south driveway, while buses were observed using the north driveway. Holly Springs Elementary School is located near the High School and has two driveways along West Chapel Hill Road.

The schools were observed during the morning when students arrive and in the afternoon when students are released. During the morning from about 7:30 AM to 8:15 AM, a police officer directs traffic at the south entrance to Chapel Hill Elementary and Middle School. For approximately twenty minutes (7:45 AM to 8:05 PM), many motorist drop-off children at the Elementary and Middle School. Traffic was observed to queue back onto Chapel Hill Road causing southbound Chapel Hill to experience congestion and long delays. During the afternoon, Chapel Hill Elementary School appeared to have minimal traffic congestion. Vehicles wanting to enter the school property during the release time for Elementary School encountered minimal delay and were not observed to queue onto Chapel Hill Road. The vehicles exiting the school property utilized the south driveway. However, it was interesting to note that in the afternoon, the buses for the elementary school did not use the dedicated bus/faculty driveway located at the north end of the school property.

For a ten-minute period when Chapel Hill Middle School released the students, severe congestion occurred in this area, especially at the school driveways. The south driveway is utilized by the majority of the vehicles exiting the school as the on-site drive aisles force motorists to exit at the south driveway. Motorists were not able to exit the south driveway during this ten minute period unless a motorist traveling northbound along Chapel Hill Road allowed a vehicle to enter the traffic stream. The buses for the middle school utilized the dedicated bus driveway (northern) and were able to exit the school

with the assistance of a police officer. Northbound Chapel Hill Road experienced queues from Willow Ridge southward to beyond the southern school driveway. However, the southbound through movement along Chapel Hill Road did not encountered significant delay. The longest queue observed for the eastbound left-turns (exiting the school) at the south driveway was approximately 30 vehicles. The eastbound right movement (exiting the school) did not experience significant delay. It should be noted that much of the congestion in the vicinity of the schools is due to the inefficient operation of the Chapel Hill Road/Central Church Road and Chapel Hill Road/Willow Ridge Road signalized intersections.

Chapel Hill High School students arrived to school in the morning over a longer period of time compared to the elementary and middle schools. Traffic entering the main school driveway queued in the southbound right-turn lane along Chapel Hill Road in the morning. A police officer was utilized during the morning to direct traffic. In the afternoon, significant congestion was experienced at Chapel Hill High School. Both the ingress and egress movements at the school driveway experienced long queues. The ingress was queued as a result of the delay encountered on site. The egress movement also experienced delays due to the large volume of traffic exiting the school. It was noted that the northern driveway was used by the school buses with very few students existing at this location.

## 4.0 EXISTING 2004 TRAFFIC CONDITIONS

A thorough evaluation of traffic operations is essential to the determination of the needs for the project corridors. Both corridors were studied during the AM and PM peak periods as this is when most of the transportation deficiencies are experienced due to the higher volumes during these times. However, the four schools located along the Chapel Hill Road corridor were evaluated and observed during the AM and early PM peak periods.

As explained in Section 2.1 of the report, both Chapel Hill Road and Stewart Mill Road were divided into multiple sections for the analysis. The existing conditions as well as the recommended improvements for each section are located below within the respective section. The recommended improvements are short-term improvements that can be completed relatively quickly to provide immediate relief.

Level of Service analyses were performed for the existing conditions during the AM and PM peak hours along the two corridors. The analyses evaluated the existing 2004 level of service at specific roadway links and key intersections. Level of service analyses (See Appendix) were performed using *Synchro Professional 5.0* software which uses methodologies contained in the *2000 Highway Capacity Manual* to determine the operating characteristics of the adjacent road network. 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 duration. The capacity is described by Level-of-Service (LOS) to indicate the operating characteristics of a road segment or intersection. LOS is defined as a qualitative measure that describes operational conditions and motorist perceptions of a traffic stream. The Highway Capacity Manual defines six levels of service, LOS A through LOS F, with A being the best and F the worst. The minimum acceptable level of service for Douglas County is a LOS "D"; anything less than a LOS "D" is considered deficient. Although the level of service is a good indicator of operation of an intersection, it could be misleading and field observations should confirm the model. In addition to intersection analyses, segment analyses were completed for each portion of the corridors.

### *4.1 Chapel Hill Road – Section A*

Section A of Chapel Hill Road begins at the I-20 eastbound ramp and extends south to the intersection of Stewart Mill Road. Most of this section falls within the Douglasville City Limits; the City Limit line is located just north of Stewart Mill Road. This section of Chapel Hill Road is characterized by urban development. Commercial and retail uses are predominant in the area as many restaurants, gas stations, banks, and retail stores are located along the corridor. A large shopping center known as the Douglasville Pavilion is located along the east side of Chapel Hill Road between Timber Ridge and Forest Trail. A sidewalk is located along the frontage of the Douglasville Pavilion Shopping Center and along the west side of the corridor between the I-20 eastbound ramps and Douglas Boulevard. In this area, Chapel Hill Road is a 4-lane divided roadway with a raised concrete median and curb and gutter. At most intersections along this section of the corridor, left and right-turn lanes are provided along Chapel Hill Road. This portion of the corridor has a posted speed limit of 45 mph. Four signalized intersections exist in this section of Chapel Hill Road. The studied intersections in Section A are as follows:

- Chapel Hill Road at I-20 eastbound Ramp (signalized)
- Chapel Hill Road at Douglas Boulevard/Timber Ridge Drive (signalized)
- Chapel Hill Road at Arbor Place Boulevard (signalized)
- Chapel Hill Road at Stewart Mill Road/Forest Trail (signalized)

### *4.1.1 Intersection/Segment Level of Service*

**Table 4** located below illustrates the existing level of service and average delay per vehicle experienced at specific intersections. **Table 5** indicates the existing level of service for individual segments between the intersections. The *Synchro* output for the intersection and segment level of service analysis is located in the Appendix.

**Table 4**
**Chapel Hill Road – Section A:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Chapel Hill Road at I-20 Eastbound Ramp | D | 39.7 | B | 13.3 |
| Chapel Hill Road at Douglas Boulevard/Timber Ridge | D | 42.6 | F | 81.6 |
| Chapel Hill Road at Arbor Place Boulevard | A | 8.5 | D | 40.4 |
| Chapel Hill Road at Stewart Mill Road | B | 16.4 | B | 16.0 |

*Delay is in seconds.

**Table 5**
**Chapel Hill Road - Section A:**
**Existing Segment Levels of Service (2004)**

| Segment | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| From | To | NB LOS | SB LOS | NB LOS | SB LOS |
| I-20 Eastbound Ramp | Douglas Boulevard | E | E | E | F |
| Douglas Boulevard | Arbor Place Boulevard | E | C | E | E |
| Arbor Place Boulevard | Stewart Mill Road | C | E | E | E |

Note: NB = northbound and SB = southbound

According to the intersection level of service analysis, the intersection of Chapel Hill Road at Douglas Boulevard and does not meet the minimum acceptable level of service during the PM peak. Although the intersection levels of service for the other three intersections in this section of Chapel Hill Road are acceptable, the segment analysis indicates that there are deficiencies along this section of the corridor.

### *4.1.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following roadway improvements are recommended:

- **Laneage Improvements at Douglas Boulevard/Timber Ridge Drive:** A second exclusive left-turn lane should be added to the eastbound approach along Douglas Boulevard. This would require the through and right turn lane to be shifted approximately 12 feet to the south, requiring an additional through lane to be added to eastbound Timber Ridge Drive. The additional eastbound through lane would then be tapered back to the existing single eastbound lane. This would make the eastbound approach dual lefts, one through, and an exclusive right-turn lane. Additionally, a westbound right-turn lane should be added along Timber Ridge Drive and the existing right-turn should be re-stripped to become a second westbound through lane. The phasing of the intersection should be changed from split-phase to consist of protected-permissive for the westbound left-turns and protected only for the eastbound dual left-turns. In addition, the exclusive southbound right-turn lane along Chapel Hill should be converted from a yield condition to a free-flow movement. This would require the removal of the yield sign and the addition of a keep moving sign. To maintain this free-flow movement (and allow two westbound through lanes across the intersection from Timber Ridge Drive), additional widening would be needed along the north side of Douglas Boulevard. All these improvements would increase the current level of service during the PM peak hour from an "F" to a "D". The proposed laneage improvements are illustrated in Figure A-1 located in the Appendix.
- **Signal Coordination:** Coordinating the four signals in a closed loop system with all loop detectors operational in this section is a key recommendation that would help relieve some delay in this area. This section is an urban area with many commercial and retail uses, and the signals are relatively close together. Without coordination between the intersections, traffic will be more likely to queue from one intersection through another intersection

## *4.2 Chapel Hill Road – Section B*

Section B of Chapel Hill Road begins at Stewart Mill Road and extends south to the intersection of Central Church Road. This section of Chapel Hill differs greatly from Section A as it is a rural section. Residential development is scattered throughout the area. Chapel Hill Golf and Country Club, Chapel Hill Water Treatment Plant, and several churches are located along the corridor in Section B. A unique element of this section is the golf cart tunnel located under Chapel Hill Road. Chapel Hill Road transitions from five lanes to two lanes immediately south of Stewart Mill Road. No sidewalks or curb and gutter exist in this section; ditches are present along both sides of the corridor. This portion of the

Chapel Hill Road has a posted speed limit of 45 mph. The studied intersection in Section B is as follows:

- Chapel Hill Road @ Chapel Crossing (signalized)

The intersections at either limit of this section were included in the other sections; (for example, the Stewart Mill Road intersection is included with Section A and the Central Church Road intersection is included with Section C). This was done because the characteristics of the intersections better correspond with those sections.

### *4.2.1 Intersection/Segment Level of Service*

**Table 6** located below illustrates the existing level of service and average delay per vehicle experienced at specific intersections. **Table 7** indicates the existing level of service for individual segments between the intersections. The *Synchro* output for the intersection and segment level of service analysis is located in the Appendix.

**Table 6**
**Chapel Hill Road – Section B:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Chapel Hill Road at Chapel Crossing | A | 7.5 | A | 6.8 |

*Delay is in seconds.

**Table 7**
**Chapel Hill Road - Section B:**
**Existing Segment Levels of Service (2004)**

| Segment | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| From | To | NB LOS | SB LOS | NB LOS | SB LOS |
| Stewart Mill Road | Chapel Crossing | A | A | A | A |
| Chapel Crossing | Central Church Road | B | D | B | C |

Note: NB = northbound and SB = southbound

According to the intersection and segment level of service analyses, Section B of Chapel Hill Road does not have any major deficiencies at this time.

#### *4.2.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, there are no immediate improvements recommended in this section of Chapel Hill Road.

### *4.3 Chapel Hill Road – Section C*

Section C of Chapel Hill Road begins at Central Church Road and extends south to the intersection of Dorsett Shoals Road. This section of Chapel Hill Road is a rural area and consist of scattered residential and some retail. A shopping center fronted with a sidewalk is located along the west side of Chapel Hill between Central Church and Willow Ridge. Numerous community resources are located along the corridor in this area; Douglas County Fire Station #5, Chapel Hill Elementary School, Chapel Hill Middle School, and several churches. Occasionally, a right-turn lane is added along Chapel Hill Road at subdivision entrances. This portion of the corridor has a posted speed limit of 45 mph. Three signalized intersections exist in this section of Chapel Hill Road. The studied intersections in Section C are as follows:

- Chapel Hill Road at Central Church Road/Bomar Road (signalized)
- Chapel Hill Road at Willow Ridge (signalized)
- Chapel Hill Road at Driveway of Chapel Hill Elementary and Middle School (unsignalized) – *Field Observed*
- Chapel Hill Road at Dorsett Shoals Road/Anneewakee Road (signalized)

#### *4.3.1 Intersection/Segment Level of Service*

**Table 8** located below illustrates the existing level of service and average delay per vehicle experienced at specific intersections. **Table 9** indicates the existing level of service for individual segments between the intersections. The *Synchro* output for the Intersection and Segment Level of Service analysis is located in the Appendix.

**Table 8**
**Chapel Hill Road – Section C:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Chapel Hill Road at Central Church Road at Bomar Road | C | 21.1 | B | 19.6 |
| Chapel Hill Road at Willow Ridge Road | A | 9.6 | A | 5.6 |
| Chapel Hill Road at Dorsett Shoals Road/Anneewakee Road | F | 94.2 | D | 51.0 |

*Delay is in seconds.

| Table 9<br>Chapel Hill Road - Section C:<br>Existing Segment Levels of Service (2004) | | | | | |
|---|---|---|---|---|---|
| Segment | | AM Peak Hour | | PM Peak Hour | |
| From | To | NB LOS | SB LOS | NB LOS | SB LOS |
| Central Church Road | Willow Ridge Road | F | E | F | C |
| Willow Ridge Road | Dorsett Shoals Road | A | E | A | C |

Note: NB = northbound and SB = southbound

According to the intersection level of service analysis, the intersection of Dorsett Shoals Road/Anneewakee Road and Chapel Hill Road does not meet the minimum acceptable level of service during the AM peak. Although the levels of service for the other two intersections in this section of Chapel Hill Road are acceptable, the segment analysis indicates that there are deficiencies along this section of the corridor especially between Central Church Road and Willow Ridge Road. These deficiencies were noted during the field observations.

### *4.3.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following roadway improvements are recommended:

- **Turn Lanes at Central Church Road:** Although the level of service at this intersection falls within an acceptable range, laneage improvements are still being recommended to help relieve some delay observed in the field and to improve the interaction of this signal with the signal at Willow Ridge Road. A right-turn lane should be added for the southbound approach along Chapel Hill Road and a left-turn lane should be added for both the eastbound and westbound approaches. The northbound lane shift along Chapel Hill Road just north of the Central Church Road should have the transition lengthened so it meets design standards.
- **Improve Transition South of Willow Ridge Road:** The northbound through lane transitions to the right just south of Willow Ridge Road. This transition presents operational concerns as it is substandard and should be lengthened to meet design standards. In addition, this intersection should have a new signal controller installed as it currently operates off the same controller as the intersection of Chapel Hill Road and Central Church Road. Traffic signal interconnect cable should be installed between these two intersections. This will provide the opportunity for improved coordination between the two signals.

- **Turn Lanes at Chapel Hill Elementary and Middle School Driveway:** A southbound right turn lane should be added along the frontage of the two schools. Speed limit flashers should be added in the vicinity of the schools, only reducing the speed limit during the morning when students arrive and the afternoon when the students are released. On-site internal circulation improvements should also be considered. One possible improvement would be to construct another internal drive such that motorist can utilize 2 lanes on-site for vehicles to queue. Additionally, the southbound lane shift along Chapel Hill Road just south of the schools should have the transition lengthened to meet design standards.
- **Intersection Improvements at Dorsett Shoals Road/Anneewakee Road:** Anneewakee Road, the westbound approach, intersects Chapel Hill Road at a skew, and does not meet the design speed. The alignment of Anneewakee Road should be shifted to the north such that a flatter curve can replace the deficient curve. Dorsett Shoals Road should be realigned to align with Anneewakee Road. All approaches should include an exclusive left-turn lane, a through lane, and an exclusive right-turn lane. These recommended improvements would increase the level of service substantially during the AM and PM peak hours.

### *4.4 Chapel Hill Road – Section D*

Section D of Chapel Hill Road begins just south of Dorsett Shoals Road/Anneewakee Road and extends south to the intersection of State Route 166. This section of Chapel Hill is a rural section serving scattered residential uses. It is the least dense section of the corridor studied as is it largely undeveloped. However, there is a new subdivision, Estates at Holly Springs that is currently being developed. The old Chapel Hill Courthouse is located just south of Dorsett Shoals and may be considered a historic property. Community resources are also present in this area as Chapel Hill High School, Holly Springs Elementary School, a cemetery, and churches are located along the corridor. This portion of the corridor has a posted speed limit of 45 mph. The intersections analyzed in this section were all unsignalized. The studied intersections in Section D are as follows:

- Chapel Hill Road at Driveway of Chapel Hill High School (unsignalized) – *Field Observed*
- Chapel Hill Road at West Chapel Hill Road (unsignalized)
- Chapel Hill Road at State Route 166 (unsignalized)

The geometry of Chapel Hill Road in this area consists of many horizontal and vertical challenges. Additionally, many of the major intersections in this section are skewed.

### *4.4.1 Intersection/Segment Level of Service*

At unsignalized intersections, the critical movement is the minor street approach and its operation with the mainline free-flow traffic**. Table 10** located below illustrates the existing level of service and delay experienced by the side street traffic at specific intersections. The *Synchro* output for the Intersection Level of Service analysis is located in the Appendix.

**Table 10**
**Chapel Hill Road – Section D**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Chapel Hill Road at West Chapel Hill Road | F | 138.6 | C | 20.3 |
| Chapel Hill Road at State Route 166 | F | 258.7 | D | 26.4 |

*Delay is in seconds.

The intersection level of service analysis indicates that both intersections in Section D of Chapel Hill Road are operating at an unacceptable level of service for side street traffic during the AM peak hour. During the AM peak hour the delay encountered at both intersections is due to motorist on the side-street having to wait to turn onto the mainline.

### *4.4.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following roadway improvements are recommended:

- **Left Turn Lane at Chapel Hill High School Driveway:** A northbound left-turn should be added along the frontage of the high school, providing a left-turn lane at both school driveways. This left-turn lane will be a continuation of the left-turn being added for West Chapel Hill Road (see recommendation below). The striping for the additional lane should be painted such to provide a left-turn into Chapel Hill Farms, the neighborhood across from the southern school driveway.
- **Left Turn Lane at West Chapel Hill Road:** A northbound left-turn should be added at the intersection of West Chapel Hill Road and Chapel Hill Road.
- **Turn Lanes at Route 166**: The addition of a traffic signal is recommended at this intersection. In addition, an eastbound left-turn lane and a westbound right-turn lane should be constructed along State Route 166. Currently, the southbound Chapel Hill Road approach is one lane and should be widened to two lanes to include an exclusive left-turn and exclusive right-turn lane.

These recommendations would increase the level of service of this intersection to a LOS B during the AM peak hour and a LOS A during the PM peak hour.

### *4.5 Stewart Mill Road – Section A*

Section A of Stewart Mill Road begins at Chapel Hill Road and extends west to the intersection of Reynolds Road. This section of Stewart Mill Road is a rural area with residential uses. This portion of the corridor has a posted speed limit of 35 mph. The studied intersections in Section A are as follows:

- Stewart Mill Road at Creekwood Drive (signalized)
- Stewart Mill Road at Reynolds Road (unsignalized)

#### *4.5.1 Intersection/Segment Level of Service*

**Table 11** located below illustrates the existing level of service and delay experienced at specific intersections. **Table 12** indicates the existing level of service for individual segments between the intersections. The *Synchro* output for the Intersection and Segment Level of Service analysis is located in the Appendix.

**Table 11**
**Stewart Mill Road – Section A:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Stewart Mill Road at Creekwood Drive (signalized) | A | 7.6 | A | 7.6 |
| Stewart Mill Road at Reynolds (unsignalized) | D ** | 25.4 | D ** | 25.7 |

*Delay is in seconds.

** Side street LOS

**Table 12**
**Stewart Mill Road - Section A:**
**Existing Segment Levels of Service (2004)**

| Segment | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| From | To | EB LOS | WB LOS | EB LOS | WB LOS |
| Chapel Hill Road | Creekwood Drive | C | B | D | C |
| Creekwood Drive | Reynolds Road | A | A | A | A |

Note: EB = eastbound and WB = westbound

According to the intersection and segment level of service analyses, Section A of Stewart Mill Road does not have any major deficiencies at this time. However, based on field observations, the Stewart Mill Road/Reynolds Road intersection presents operational deficiencies due to the horizontal and vertical alignment of Stewart Mill Road.

#### *4.5.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following improvement is recommended:

- **Left-Turn Lane at Reynolds Road**: A westbound left-turn lane should be added along Stewart Mill Road.

### *4.6 Stewart Mill Road – Section B*

Section B of Stewart Mill Road begins at Reynolds Road and extends west to the intersection of Central Church Road. Two new subdivisions are currently being development along Stewart Mill Road just east of Yancey Road. Stewarts Mill The Lakes is located along the south side and Stewarts Mill is located along the north side of the corridor. This portion of the corridor has a posted speed limit of 35 mph. The studied intersections in Section B are as follows:

- Stewart Mill Road at Yancey Road/West Stewart Mill Road (signalized)
- Stewart Mill Road at Cove Terrace/Mill Glen Drive (unsignalized)
- Stewart Mill Road at Central Church Road (unsignalized)

#### *4.6.1 Intersection/Segment Level of Service*

**Table 13** located below illustrates the existing level of service and delay experienced at specific intersections. The *Synchro* output for the intersection level of service analysis is located in the Appendix.

**Table 13**
**Stewart Mill Road – Section B:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Stewart Mill Road at Yancey Road/West Stewart Mill Rd | A | 9.5 | B | 10.4 |
| Stewart Mill Road at Cove Terrace | A | 9.3 | B | 11.1 |
| Stewart Mill Road at Central Church Road | B | 14.5 | C | 15.6 |

*Delay is in seconds.

### *4.6.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following roadway improvements are recommended:

- **Intersection Improvement at Yancey Road/West Stewart Mill Road:** An intersection improvement project is needed to raise the profile of the southbound West Stewart Mill Road approach. The sight distance for the southbound approach is limited and presents an operational concern. Additionally, an eastbound left-turn lane and a westbound left-turn lane should be added along Stewart Mill Road.

It should be noted that developer improvements are scheduled to occur along Stewart Mill Road. Based on conversations with Douglas County staff, left-turn lanes will be constructed along Stewart Mill Road to serve vehicles turning left into "The Lakes" and "The Glen" subdivisions.

## *4.7 Stewart Mill Road – Section C*

Section C of Stewart Mill Road corridor begins at Central Church Road and extends west to the intersection of Bill Arp Road. At the Stewart Mill Road and Central Church Road intersection, Stewart Mill Road ends and the east-west corridor continues as Central Church Road. This portion of the corridor has a posted speed limit of 45 mph. The studied intersections in Section C are as follows:

- Central Church Road at Kings Highway (signalized)
- Central Church Road at Bill Arp Road/SR 5 (signalized)

### *4.7.1 Intersection/Segment Level of Service*

**Table 14** located below illustrates the existing level of service and average delay per vehicle experienced at specific intersections. **Table 15** indicates the existing level of service for individual segments between the intersections. The *Synchro* output for the Intersection and Segment Level of Service analysis is located in the Appendix.

**Table 14**
**Stewart Mill Road – Section C:**
**Existing Intersection Levels of Service (2004)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | LOS | Delay* | LOS | Delay* |
| Central Church Road at Kings Highway | C | 20.9 | B | 17.5 |
| Central Church Road at Bill Arp Road/State Route 5 | C | 27.2 | D | 40.0 |

*Delay is in seconds.

| Table 15<br>Stewart Mill Road - Section C:<br>Existing Segment Levels of Service (2004) | | | | | |
|---|---|---|---|---|---|
| Segment | | AM Peak Hour | | PM Peak Hour | |
| From | To | EB LOS | WB LOS | EB LOS | WB LOS |
| Stewart Mill Road | Kings Highway | C | D | C | C |
| Kings Highway | Bill Arp Road | D | E | C | E |

Note: EB = eastbound and WB = westbound

*4.7.2 Recommended Improvements*

Based on the existing 2004 traffic conditions, the following roadway improvements are recommended:

- **Turn Lanes at Kings Highway:** Kings Highway should be widened at this intersection to include left-turn lanes on both the northbound and southbound approaches.
- **Turn Lanes at Bill Arp Road:** The eastbound Central Church Road approach should be widened to three lanes to include an exclusive left-turn and an exclusive right-turn lane. The westbound Central Church Road approach should include a left-turn lane. The addition lanes for both the eastbound and westbound approach would require the eastbound through lane on the east side of the intersection to shift to the south. The addition of a right turn lane for northbound Bill Arp Road is also recommended. The laneage improvements would reduce the offset of the eastbound and westbound approaches, allowing the signal phasing to be changed from split phase to protective-permissive for the eastbound and westbound approaches.

## 5.0 RECOMMENDATIONS

Based on the existing 2004 AM and PM peak hour analyses and the peak hour field observations, several roadway improvements are recommended along the Chapel Hill Road and Stewart Mill Road corridors to improve the overall traffic operations. The following table is a summary of the recommended improvements and the associated opinion of probable cost of those improvements.

| Table 16<br>Summary of Recommended Interim Improvements | | | | | | |
|---|---|---|---|---|---|---|
| **Figure Number** | **Location** | **Proposed Improvement** | **Estimated R/W Cost** | **Estimated Design Cost** | **Estimated Construction Cost** | **Priority** |
| A-1 | Chapel Hill Rd Section A | **Douglas Boulevard/Timber Ridge Drive:** Add a receiving lane to make SB right a free-flow movement; improve EB approach; improve WB approach | | | | |
| - | | **All Signalized Intersections:** Coordinate the four signalized intersections | | | | |
| A-2 | Chapel Hill Rd Section C | **Central Church Road/Bomar Road:** Improve lane shift north of intersection; improve SB approach; improve EB approach; improve WB approach | | | | |
| A-2 | | **Willow Ridge Road:** Install a separate traffic signal controller for the traffic signal, and improve the lane shift south of the intersection. | | | | |
| A-3 | | **Chapel Hill Elementary & Middle School:** Add SB right-turn lane along frontage of school; install school speed limit flashers; improve lane shift south of schools; consider two stacking lanes onsite | | | | |
| A-4 | | **Anneewakee Road/Dorsett Shoals Road:** Realign intersection to the north; improve all approaches to include multiple lanes. | | | | |
| A-5 | Chapel Hill Rd. Section D | **Chapel Hill High School:** Add a NB left-turn lane along Chapel Hill Road at both site driveways and SB left turn lane for Chapel Hill Farms | | | | |
| | | **West Chapel Hill Road:** Add NB left-turn lane along Chapel Hill Road. | | | | |
| A-6 | | **State Route 166:** Install signal at intersection; improve SB approach; improve EB approach; improve WB approach | | | | |
| A-7 | Stewart Mill Road Section A | **Reynolds Road**: Install a westbound left-turn lane along Stewart Mill Road. | | | | |
| A-8 | Stewart Mill Road Section B | **Yancey Road/West Stewart Mill Road:** Adjust vertical geometry along the southbound approach, and install EB and WB left-turn lanes along Stewart Mill Road. | | | | |
| A-9 | Stewart Mill Road Section C | **Kings Highway at Central Church Road:** Improve NB approach; improve SB approach to include exclusive left-turn lanes. | | | | |
| A-10 | | **Bill Arp Road/SR 5 at Central Church Road:** Improve NB approach; improve EB approach; improve WB approach | | | | |