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ATTACHMENT 18

CHAPEL HILL BIBLE CHURCH PARK-AND-RIDE LOT  
TRAFFIC IMPACT STUDY

EXECUTIVE SUMMARY



Prepared for:

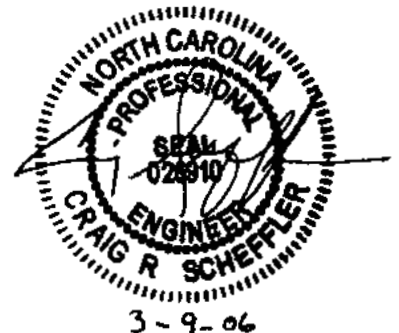
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## EXECUTIVE SUMMARY

### Project Overview

An existing parking lot in Chapel Hill, located at the Chapel Hill Bible Church near the intersection of Erwin Road and Sage Road, is being proposed for rezoning. 241 existing parking spaces for the church are planned to be converted to park-and-ride lot spaces that will be used by University of North Carolina at Chapel Hill (UNC-CH) employees. Chapel Hill Transit will provide transportation from the park-and-ride lot to the UNC-CH campus. **Figure ES-1** shows the general site location of the site. The project is anticipated to be complete by 2007. This report analyzes the full build-out scenario for the year 2008 (one year after full buildout), the no-build scenario for 2008, as well as 2006 existing year traffic conditions.

The proposed lot will have direct, full movement access to Old Sterling Road and Erwin Road, using two existing church driveways. **Figure ES-2** displays the preliminary site plan of the proposed park-and-ride lot and nearby roadways.

### Existing Conditions

The site is located on the northeast corner of the intersection of Erwin Road and Sage Road at the Chapel Hill Bible Church property. Study area roadways include; Sage Road, Erwin Road, Weaver Dairy Road, Old Sterling Road, Old Durham Road, and US 15-501.

US 15-501 provides intercity/intrastate access from the Town of Chapel Hill to I-40 and the City of Durham. Sage Road serves suburban residential and commercial developments and functions as a connector from US-15/501 to Erwin Road. Erwin Road is a minor northeast-southwest arterial that facilitates traffic from NC 751 in Durham to US 15-501 in Chapel Hill. Weaver Dairy Road is a minor arterial that connects to Martin Luther King, Jr. Boulevard west of the study area and serves numerous residential developments between MLK, Jr Boulevard and Erwin Road. Old Sterling Road is a minor collector street that services several residential and commercial developments to the south and east of the proposed project.

This report analyzes and presents the transportation impacts that the Chapel Hill Bible Church Park and Ride site will have on the following intersections in the project study area:



- Erwin Road and Sage Road
- Erwin Road and Weaver Dairy Road
- Sage Road/Old Durham Road and US 15-501
- Sage Road and Old Sterling Road
- Old Sterling Road and Bible Church Site Driveway/Existing Commercial Driveway
- Erwin Road and Bible Church Site Driveway/Covington Drive

The Erwin Road / Weaver Dairy Road and Sage Road / US 15-501 intersections are currently signalized. The Erwin Road/Sage Road intersection is currently stop-controlled for Sage Road traffic and the Sage Road/Old Sterling Road intersection is currently stop-controlled for Old Sterling Road traffic. The two site driveways are also stop-controlled for their exits onto adjacent roadways.

**Site Traffic Generation**

Since the site trips are rerouted peak-hour trips, some intersections may experience more delay with the left or right turn movements, though no new study area trips are assumed to be generated due to the facility. The *ITE Trip Generation Manual, Volume 7* was not specifically used for this analysis, due to the fact that it contains information for general-use park-and-ride facilities and underestimates the number of peak hour trips this proposed park-and-ride facility will generate. **Table ES-1A** summarizes the *ITE Trip Generation Manual* trips.

**Table ES-1A**  
**Weekday Vehicle Trip Generation Summary**  
**Park-and-Ride Lot with Bus Service (L.U. Code 090)**

Scenario	Development Density	Generation Rate	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
					IN	OUT	
Daily Traffic	241 spaces	4.50	50%	50%	543	542	1085
AM Peak	241 spaces	0.75	80%	20%	145	36	181
PM Peak	241 spaces	0.62	23%	77%	34	116	150

Since the proposed use of the Bible Church lot is different than typical studies from the *ITE Trip Generation Manual*, **Table ES-1B** shows the estimated number of trips generated by the Bible Church Park and Ride during the AM and PM peak hours of adjacent streets. A comparison of the data from **Tables ES-1A and ES-1B** indicates that expected trip-making for the Bible Church Park-and-Ride Lot will exceed peak hour estimates from other park-and-ride facilities, but may yield less daily trips, due to reduced parking space turnover.



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**Table ES-1B**  
**Weekday Vehicle Trip Generation Summary**  
**Proposed Bible Church Park-and-Ride**

Scenario	Development Density	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
				IN	OUT	
Daily Traffic	241 spaces	50%	50%	241	241	482
AM Peak	241 spaces	100%	0%	241	0	241
PM Peak	241 spaces	0%	100%	0	241	241

CHT has proposed adding an additional 26 buses per day to service the park-and-ride lot. Nine buses with 20 minute headways are proposed between 6:00 am to 9:00 am and 3:00 pm to 6:00 pm. **Table ES-1C** summarizes the new CHT bus trips during the peak hours.

**Table ES-1C**  
**Weekday Vehicle Trip Generation Summary**  
**Proposed Bus Trips for Park-and-Ride**

Scenario	Development Density	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
				IN	OUT	
Daily Traffic	26 buses	100%	100%	26	26	52
AM Peak	3 buses	100%	100%	3	3	6
PM Peak	3 buses	100%	100%	3	3	6

**Background Traffic**

Six Town of Chapel Hill approved background traffic generators are located in the study area and are listed below:

- Residence Inn
- Europa Office Building
- Erwin Road Subdivision
- Wilson Assemblage
- Advance Auto Parts
- Performance BMW Expansion

Background traffic methodologies and trip generation/distribution/assignment were made using information contained in previous traffic impact studies and existing traffic patterns. An ambient traffic growth percentage of three percent per year was applied to existing study area traffic volumes, based on information from previous traffic impact studies in the area and information obtained from the Town of Chapel Hill.

**Impact Analysis**



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**Peak Hour Intersection Level of Service**

With the addition of AM and PM peak hour site-generated trips to the projected 2008 background traffic volumes, three of the six intersections will experience some sort of operational deficiency by 2008 Build. 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 Level-of-Service (LOS) is shown in **Table ES-3** below.

**Table ES-3 LOS and Delay Summary**

Bible Church Park and Ride TIS									
Intersections	Time Period	2006 Existing		2008 No-Build		2008 Build		2008 Mitigated	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
US 15-501 and Sage Road /Old Durham Road	AM	C	31.7	D	42.2	C	32.5	N/A	N/A
	PM	D	42.1	<b>E</b>	<b>69.2</b>	E	<b>66.5</b>	N/A	N/A
Erwin Road and Weaver Dairy Road	AM	D	36.8	<b>E</b>	<b>62.2</b>	D	48.5	N/A	N/A
	PM	D	37.9	<b>E</b>	<b>71.6</b>	E	<b>75.7</b>	N/A	N/A
Erwin Road and Sage Road	AM	<b>F</b>	<b>135.0</b>	B	11.4	B	12.3	N/A	N/A
	PM	<b>F</b>	<b>262.5</b>	B	18.4	B	16.7	N/A	N/A
Sage Road and Old Sterling Road / Coleridge Drive	AM	C	15.4	C	16.4	B	13.4	N/A	N/A
	PM	C	16.5	C	18.7	E	44.4	N/A	N/A
Old Sterling Road and Bible Church Dr / Commercial Dr	AM	B	11.2	B	11.5	C	16.4	N/A	N/A
	PM	B	11.3	B	11.6	B	11.6	N/A	N/A
Erwin Road and Bible Church Dr / Covington Dr	AM	C	24.7	D	28.5	D	32.9	N/A	N/A
	PM	E	43.5	<b>F</b>	<b>58.7</b>	<b>F</b>	<b>146.7</b>	N/A	N/A

N/A – Not Applicable or No Improvements Necessary

**Access Analysis**

Vehicular site access is to be accommodated via the two existing site driveways - one that connects to Erwin Road and the other to Old Sterling Road. There is an additional driveway for the Bible Church to the east along Erwin Road, but that driveway will not provide direct and convenient access to the designated park-and-ride parking spaces, so it was not considered in this analysis. On-site vehicle queuing will extend past the parking lot aisle that connects to the main driveway near Erwin Road, since there is only 80 feet of available storage between Erwin Road and the aisle. Since some of the queue from the unsignalized left-turn may store on this aisle, the queue may not extend



the full 140 feet from the stop bar. Also, there are two separate left-turn and right-turn lanes that extend the full length of the driveway to Old Sterling Road, so the full queue can be contained in the existing parking lot. There are existing separate left-turn and right-turn lanes at the Old Sterling Road entrance also.

There is a westbound left-turn lane on Erwin Road at the Bible Church driveway that provides 100' of full storage for left-turning vehicles into the site. These vehicles will be coming from the northeast on the north side of 1-40. There is a through / right-turn lane on the eastbound approach that will provided vehicles coming from the west from Weaver Dairy Road access into the site. At the intersection of Sage Road and Old Sterling Road, there is an exclusive northbound right-turn lane for vehicles coming from US 15-501. There is a shared left / through / right-turn lane on westbound Old Sterling Road, so there will be some delays at this intersection with a possible vehicle queue length of approximately 230 feet. There is approximately 400 feet of storage between Sage Road and the Bible Church driveway along Old Sage Road.

Access for pedestrians and bicyclists is currently acceptable. As previously discussed, there is good sidewalk connectivity. The sidewalk will provide access to the existing bus stop on Old Sterling Road.

### **Signal Warrant Analysis**

Under NCDOT TIP project U-3306, the intersection of Erwin Road and Sage Road will be signalized after 2009. Based on projected traffic volumes, none of the other unsignalized intersections in the project study area would warrant the installation of a traffic signal based on the methodology found in the 2000 *Manual on Uniform Traffic Control Devices (MUTCD)*. A warrant often satisfied from the MUTCD methodology is the Peak Hour Warrant, which would have comparable data collected from this study. Based on Figure 4C-4 from the *MUTCD 2000*, no study area intersection with the additional Bible Church park-and-ride site trips added would warrant the installation of a signal based on the Peak Hour thresholds.

### **Sight Distance Analysis**

In general, sight distance issues entering and exiting the proposed driveways would be minimal. Sight distance along Erwin Road and Old Sterling Road is adequate, with little horizontal or vertical curvature present. There is a small hill between Sage Road and the Bible Church Driveway along Old Sterling Road. No additional limitations or problems due to site development or site traffic impact are expected in the study area.

### **Intersection Accident Analysis**

Data from the Town of Chapel Hill Police Department was provided for the period 1/1/2003 to 12/31/2005 for the study area intersections. Crash information for the US 15-501 and Sage Road intersection exhibits an excessive trend for rear-end crashes along US 15-501, potentially attributable to congested traffic operations and speeding. 47 total crashes were recorded at the intersection between 2003 and 2005. There were three crashes at the Sage Road and Old Sterling Road intersection over the 3 year period. There were 15 crashes at the Erwin Road and Sage Road intersection over the



3 year period, with mostly angle and rear-end crashes related to congestion along Sage Road and the lack of acceptable gaps in traffic along Erwin Road. There were eight crashes at the Erwin Road and Weaver Dairy Road intersection over the 3 year period. All of the crashes at this intersection were rear-end crashes along the southbound and eastbound approaches. Overall, the number and severity of crashes at study area intersections is high at the US 15-501 and Sage Road intersection compared to higher volume intersections around Chapel Hill.

**Other Transportation-Related Analyses**

Other transportation-related analyses relevant to the 2001 Town of Chapel Hill Guidelines for the Preparation of Traffic Impact Studies were completed as appropriate. The following topics listed in **Table ES-4** are germane to the scope of this study.

**Table ES-4. Other Transportation-Related Analyses**

<b>Analysis</b>	<b>Comment</b>
Generalized Peak Hour and/or Daily LOS Analysis	Planning-level corridor LOS Analyses are not necessary for this study. Site traffic impacts are related to redistribution of traffic, and not the addition of traffic in the long or short-term.
Signal Phasing Analysis	Signal phasing for existing and future conditions produces adequate traffic operations at the signalized intersections under study.
Progression Analysis	The two signals analyzed in this study are not currently running in coordination with each other. The US 15-501/Sage Road intersection signal is coordinated with upstream and downstream signals on US 15-501. If a signal is added at the Erwin Road/Sage Road intersection in the future, it would be beneficial to coordinate timing at this signal to the nearby Erwin Road/Weaver Dairy Road signal.
Turn Lane Storage Requirements	The queue for the southbound left-turn bay on Sage Road at US 15-501 extends into the through lane. Also the southbound left-turn bay on Weaver Dairy Road at Erwin Road is too short. NCDOT TIP project U-3306 will remedy this problem.
Appropriateness of Acceleration/Deceleration Lanes	Given the proposed configuration of site driveways, the lane geometrics, traffic patterns and posted speeds on Erwin Road and Sage Road, no special acceleration or deceleration lanes are required due to the proposed Park-and-Ride development.
Pedestrian and Bicycle Analysis	Existing pedestrian access and connectivity is good through the study area. Besides short lengths of widened outside lanes on Sage Road and Erwin Road, no roadways with specific bicycle amenities exist in the study area.
Public Transportation Analysis	Public transportation service to the site is excellent, with on-street bus stops immediately adjacent to the site and multiple routes serving the study area.

**IV. MITIGATION MEASURES / RECOMMENDATIONS**

**A.) Planned Improvements**



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The North Carolina Department of Transportation (NCDOT) TIP project U-3306 is expected to start construction in 2009 on the Weaver Dairy Road realignment to tie into the existing Erwin Road / Sage Road intersection. As part of this project, the intersection will be signalized, and will feature a temporary signal for the existing three-legged intersection.

### **B.) Background Committed Improvements**

No background improvements are committed by other study area background project developments.

### **C.) Applicant Committed Improvements**

Based on the concept plan provided, there are no transportation-related improvements to be made external to the site property. The concept plan provided shows that the development will delineate between church and park-and-ride parking spaces internal to the site. The internal circulation plan for vehicles is the same as the existing plan, two driveways on Erwin Road and one on Old Sterling Road. Park-and-ride traffic will likely only use the driveway on Erwin Road, closest to the park-and-ride spaces. The two entrances have a separate left-turn and right-turn lane exiting the site.

Since the UNC-CH employees will use the existing bus stop on Old Sterling Road, no buses will be routed through the church parking lots or access driveways.

### **D.) Necessary Improvements**

No additional external roadway improvements are necessary to due to site traffic impacts. The Applicant should provide additional signage on Erwin Road, Sage Road, and Old Sterling Road to clearly delineate that the Bible Church Lot is a Park-and-Ride facility for vehicles with UNC Permits only.

CHT will run a new transit route in the study area to provide access for the university employees. The route in this report assumes the buses will be traveling north on US 15-501, turn left on Eastowne Drive, and make another left onto Old Sterling Road heading south to the existing bus stop. After boarding/alighting is complete, the bus then will turn left on Sage Road and then right on US 15-501 to return to the university. Other routes are potentially possible – using Erwin Road down to US 15-501 or Weaver Dairy Road to Martin Luther King Jr. Boulevard, but were not evaluated for this study. The buses will have 20 minute headways starting at 6:00 am and 3:00 pm for the employees. There will be some service between 9:00 am and 3:00 pm on 45 minute headways.

Even though the intersection of Erwin Road and Weaver Dairy Road operate at LOS E during the PM peak for Condition 3, the NCDOT TIP project U-3306 will realign Weaver Dairy Road to tie into Erwin Road at Sage Road. This condition is only temporary until the NCDOT project is complete. At the intersection of Erwin Road and Bible Church Driveway, the left-turn and right-turn lanes are separated, so the right-turning vehicles are not delayed. The expected left-turn queue length is 140 feet, which can be contained within the site.