

**SOUTHERN VILLAGE  
HOTEL & APARTMENTS/OFFICE DEVELOPMENT  
DRAFT TRAFFIC IMPACT STUDY**

***EXECUTIVE SUMMARY***



Prepared for:

The Town of Chapel Hill  
Engineering Department

***Prepared by:***

***HNTB North Carolina, PC***

*343 East Six Forks Road  
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Raleigh, NC 27609*

*NCBELS License #: C-1554*

December 2012

**HNTB**

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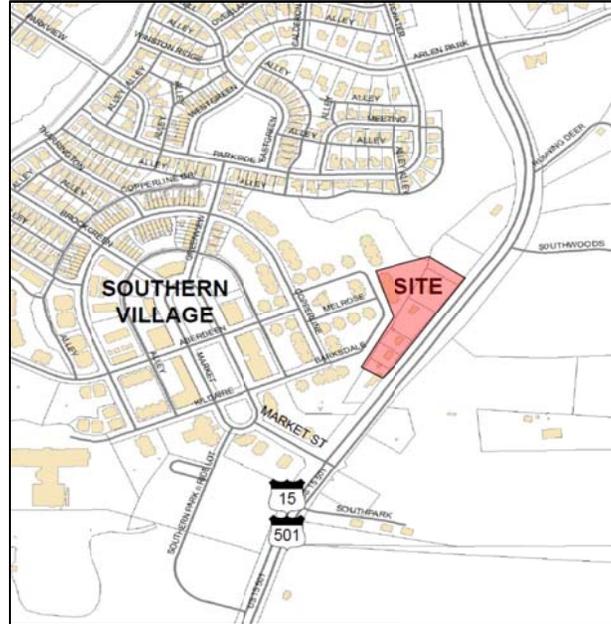
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**EXECUTIVE SUMMARY - DRAFT**

**Project Overview**

A new development tentatively named Southern Village Hotel and Apartments/Office, to be located along US 15-501 just north of Market Street, is being proposed in Chapel Hill. The project will be a redevelopment of several existing single family residential parcels along US 15-501 into a hotel and either residential apartments or general office space.



**Figure ES-1** shows the general location of the site. The project is anticipated to be fully complete by 2015. This report analyzes the full build-out scenario for the year 2016 (one year after anticipated completion), the no-build scenario for 2016, as well as 2012 existing year traffic conditions. The proposed site concept plan shows one direct limited access driveway to US 15-501.

*Hotel/Apartments/Office Site Near Southern Village*

No other new vehicular access connections are proposed. Some site-related traffic is expected to use existing internal roadways within Southern Village for parking and access. **Figure 2** displays the preliminary concept plan and nearby land uses and roadways. The current plan includes a 115 unit hotel and either 64 apartment units (40 one-bedroom and 24 two-bedroom) or 48,000 square feet of general office space. 177 on-site and 77 off-site (leased or on-street) surface parking spaces will also be provided, along with 40 on-site bicycle parking spaces.

**Existing Conditions**

**Study Area**

The site is located adjacent to the Southern Village neighborhood along US 15-501 in south Chapel Hill. The study area contains three signalized intersections along US 15-501 from Market Street to Culbreth Road/Mt. Carmel Church Road. Site traffic is expected use either a new limited access (right-turn in/right-turn out only) site driveway along US 15-501 or potentially access on-street or leased off-site parking spaces within Southern Village on Barksdale Drive. Internal driveways on the preliminary site plan will circulate site traffic to designated parking areas.

US 15-501 is a major north-south arterial providing connectivity between downtown Chapel Hill, east and south Chapel Hill, the I-40 corridor and into Chatham County. The remaining study area network roadways are either suburban collector streets or local neighborhood/commercial access streets.



**Site Traffic Generation**

With the addition of new peak hour trips during the weekday AM, noon, and PM peak hours, there are potential site traffic impacts to the study area intersections. **Table ES-1** shows the site trip generation details, with generation rates taken from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, Version 9* and averaged between the AM and PM peak hour data to develop noon hour estimates, as no noon peak hour data is currently available in the ITE publication. Raw ITE trip generation data was modified for anticipated vehicular trip reductions on the study area transportation network due to internal trips made within the Southern Village development and for the effect of proximal Chapel Hill Transit service. The basis for the assumed percentages of trips captured internally and/or using transit were taken from study data and conclusions made in the 2004 North Carolina State University / University of North Carolina research report “Traditional Neighborhood Development Trip Generation Study”, which focused specifically on Southern Village.

**Table ES-1. Southern Village Hotel & Apartments/Office  
 Weekday Trip Generation Summary**

**Scenario A**

Time Period	Development Density Information	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
				IN	OUT	
Daily Traffic	Hotel (115 Rooms) Apartments (64 Units)	50%	50%	675	675	1,350
AM Peak		49%	51%	45	47	92
Noon Peak	Internal Capture to Southern Village + Transit/Ped/Bike Reduction = 20% for Apartments	52%	48%	55	50	105
PM Peak		58%	42%	63	46	109

**Scenario B**

Time Period	Development Density Information	% Traffic Entering	% Traffic Exiting	TRIPS		Trips Generated
				IN	OUT	
Daily Traffic	Hotel (115 Rooms) General Office Building (48,000 sq ft)	50%	50%	811	811	1,622
AM Peak		77%	23%	122	37	159
Noon Peak	Internal Capture to Southern Village + Transit/Ped/Bike Reduction = 10% for Office Building	51%	49%	90	85	175
PM Peak		30%	70%	57	131	188

**Background Traffic**

Background traffic growth for the 2016 analysis year is expected to come from two sources - ambient regional traffic growth and specific development-related traffic growth. Town staff provided information for development-related traffic growth for three Town-approved and County-approved sites that are expected to contribute to traffic growth in the project study area, though their locations are beyond the study area. These include Carolina North Phase 1, UNC Main Campus Development Plan, and the Chatham County Wal-Mart.

An ambient area-wide traffic growth percentage of 1.0 percent per year was applied to existing traffic volumes based on information from the historic daily traffic growth patterns in the project study (NCDOT and Town of Chapel Hill daily traffic information) and consistent with recent traffic impact studies completed in the project study area.



## Impact Analysis

### Peak Hour Intersection Level of Service

Existing traffic operations at study area intersections are acceptable during all three peak hours analyzed. The projected ambient and background development traffic growth will increase impacts by 2016 and cause one intersection, at US 15-501 and Culbreth Road/Mt. Carmel Church Road, to operate over capacity in the AM peak hour.

With the addition of peak hour site-generated trips to the projected 2016 background traffic volumes, no additional intersections will experience deficient traffic operations in any peak hour. 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-2**.

**Table ES-2. Southern Village Hotel & Apartments/Office LOS and Delay Summary**

Intersections	Peak Hour	2012 Existing		2016 Without Site		2016 Build Scenario A		2016 Build Scenario B		2016 Mitigated*	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
US 15-501 and Culbreth Road / Mt. Carmel Church Rd	AM	D	49.2	<b>E</b>	<b>70.0</b>	<b>E</b>	<b>73.2</b>	<b>E</b>	<b>71.9</b>	D	36.6
	NOON	C	20.2	C	25.4	C	26.3	C	26.9	B	15.1
	PM	C	30.5	D	44.2	D	45.8	D	53.2	C	30.2
US 15-501 and Arlen Park Drive / Bennett Road	AM	B	13.9	B	14.2	B	14.5	B	14.7	N/A	N/A
	NOON	A	6.0	A	5.8	A	5.8	A	6.0	N/A	N/A
	PM	A	8.5	A	8.8	A	8.9	B	10.6	N/A	N/A
US 15-501 and Proposed Site RIRO Driveway <sup>#</sup>	AM	N/A	N/A	N/A	N/A	B <sup>#</sup>	11.5 <sup>#</sup>	B <sup>#</sup>	11.6 <sup>#</sup>	N/A	N/A
	NOON	N/A	N/A	N/A	N/A	B <sup>#</sup>	11.7 <sup>#</sup>	B <sup>#</sup>	12.1 <sup>#</sup>	N/A	N/A
	PM	N/A	N/A	N/A	N/A	B <sup>#</sup>	14.7 <sup>#</sup>	C <sup>#</sup>	16.5 <sup>#</sup>	N/A	N/A
US 15-501 and Market Street	AM	C	21.3	C	21.8	C	22.3	C	22.2	N/A	N/A
	NOON	B	13.7	B	13.6	B	14.2	B	14.8	N/A	N/A
	PM	C	28.9	C	31.1	C	31.6	C	31.8	N/A	N/A

N/A – Not Applicable or No Improvements Necessary

**BOLD/ITALICS** – Critical Movement or Overall Intersection Requires Mitigation Per Town TIS Guidelines

# - Worst-Case LOS/Delay for Unsignalized/Stop-Controlled Critical Movement

\* - Results for Scenario A (Worst-Case AM Peak Hour)

### Access Analysis

Vehicular site access is to be accommodated with a single restricted movement (RIRO) access driveway connecting to US 15-501, along with the use of existing internal local streets in the Southern Village development that connect to Market Street, which also accesses US 15-501. Specific laneage and geometric details of the proposed RIRO intersection are shown on the concept plan. A defined driveway access system internal to the site is also shown on the concept plan, showing internal connectivity to surface parking areas and access to adjacent existing parking areas and on-street parking along local streets.



The proposed access concept would provide about 100 feet of driveway throat length in a single exiting lane, which is more than adequate for anticipated driveway queues in the 2016 peak analysis hours. The minimum storage distances was estimated to be approximately 25 feet, representing a maximum capacity analysis software result of less about one queued vehicle (PM peak hour). Driveway separation distances along US 15-501 from the signalized intersections at Market Street and Arlen Park Drive/Bennett Road are acceptable, based on recommendations of 100 foot minimum corner clearance as set forth in the 2003 *NCDOT Policy on Street and Driveway Access to North Carolina Highways* and the 250 foot minimum along arterials specified in the 2005 *Town of Chapel Hill Design Manual*.

Access for pedestrians and bicyclists is currently adequate in the project study area. Sidewalk is present on the west side of US 15-501 throughout the study area and connectivity is available throughout the Southern Village development from the site location along Barksdale Drive. Crosswalk exists along US 15-501 at only one location (across Culbreth Road). A striped bicycle lane is present along US 15-501 and the proposed site frontage for bicyclists.

### **Sight Distance Analysis**

In general, sight distance issues entering the proposed site would be minimal, considering the fact that US 15-501 has no horizontal curvature in the vicinity of the proposed project access driveway along southbound US 15-501 and vertical curvature is currently minimal in this area.

### **Crash Analysis**

Data from the NCDOT Traffic Safety Unit was provided for the three-year period 11/1/2009 to 10/31/2012 for the segment of US 15-501 in the vicinity of the proposed site and for all existing major study area intersections. There were 23 crashes reported along the US 15-501 study area corridor between Market Street and Culbreth Road/Mt. Carmel Church Road over the three year period. Primary crash types included angle crashes and rear end crashes. Overall, the number and severity of crashes along US 15-501 in the project study area is considerably lower than state-wide averages for similar facilities. The Culbreth Road/Mt. Carmel Church Road intersection exhibit the highest crash rates of the three study area intersections, likely due to more congested conditions during peak travel periods.

### **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-3** on the following page are germane to the scope of this study.



**Table ES-3. Other Transportation-Related Analyses**

Analysis	Comment
Generalized Peak Hour and/or Daily V/C Analysis	Daily Volume/Capacity Ratio and generalized planning-level peak hour roadway link LOS analyses were not conducted for this study, as the proposed site is not expected to generate a significant amount of daily vehicular trips (1,350 – 1,622 new trips) compared to existing daily vehicular trips along US 15-501 (20,000+ AADT) and other study area roadways.
Turn Lane Storage Requirements	Storage bay lengths at study area intersections were analyzed using Synchro and HCS 95 <sup>th</sup> percentile (max) queue length estimates for the 2016 Build Scenario. Recommendations for improvements to storage bays were made in one case at Mt. Carmel Church Road where existing storage bay lengths are likely to be deficient due to background traffic impact.  From a capacity perspective, existing u-turn storage bays on US 15-501 and the proposed site driveway right-turn deceleration lane bay is adequate. Additional confirmation with AASHTO and NCDOT standards may be required for the proposed storage bay length and taper distance.
Appropriateness of Acceleration/Deceleration Lanes	The site concept plan shows specific geometrics for the southbound US 15-501 deceleration lane and the proposed storage and taper distances need to be reviewed for consistency with NCDOT and AASHTO design standards. No other specific acceleration/deceleration lane issues were analyzed in the project study area.
Pedestrian and Bicycle Analysis	Existing pedestrian and bicycle access and connectivity is adequate along the US 15-501 corridor adjacent to the site, and provides connectivity for these modes to other locations in the project study area, though no pedestrian amenities currently exist on the east side of US 15-501. Pedestrian facilities are present internal to the Southern Village development to/from the proposed site. A striped pavement designation provides delineation for bicyclists along US 15-501 in the project study area.  Only one crosswalk with pedestrian signals across any of the study area intersection is present.
Public Transportation Analysis	Public transportation service to the study area, and to the proposed site is excellent, with stops along US 15-501 site parcel frontage and a nearby park-and-ride facility is present in Southern Village.

**Mitigation Measures/Recommendations**

**Planned Improvements**

There are no planned transportation improvements in the project study area that are committed by NCDOT, the Town of Chapel Hill, or private developers. Several programmed improvements to US 15-501 (S. Columbia Street) and to nearby greenway trail systems are expected to occur by 2016, but these are outside the analyzed project study area.

**Background Committed Improvements**

There are no committed background improvements expected to be complete by the 2016 analysis year for project study area transportation facilities. The proposed Chatham County Wal-Mart project will feature intersection and access improvements along US 15-501 to the south of the project study area.



### **Applicant Committed Improvements**

Based on the preliminary site plan and supporting development information provided, there is one study area roadway improvement – the proposed right-turn in/right-turn out access driveway along US 15-501. This access point will also involve the usage of upstream/downstream u-turn bays at Arlen Park Drive and at Market Street.

The Applicant is also seeking to lease underutilized surface parking spaces in adjacent apartment developments and to utilize existing curb space on Barksdale Drive for on-street parking. No improvements are shown on the site plan in conjunction with site traffic utilizing these facilities. This traffic would be expected to use the Market Street entrance/exit to Southern Village for access to US 15-501.

### **Necessary Improvements**

Based on traffic capacity analyses for the 2016 design year, and analyses of existing study area turning bay storage lengths and site access, the following improvements are recommended as being necessary for adequate transportation network operations (see **Figure ES-3**).

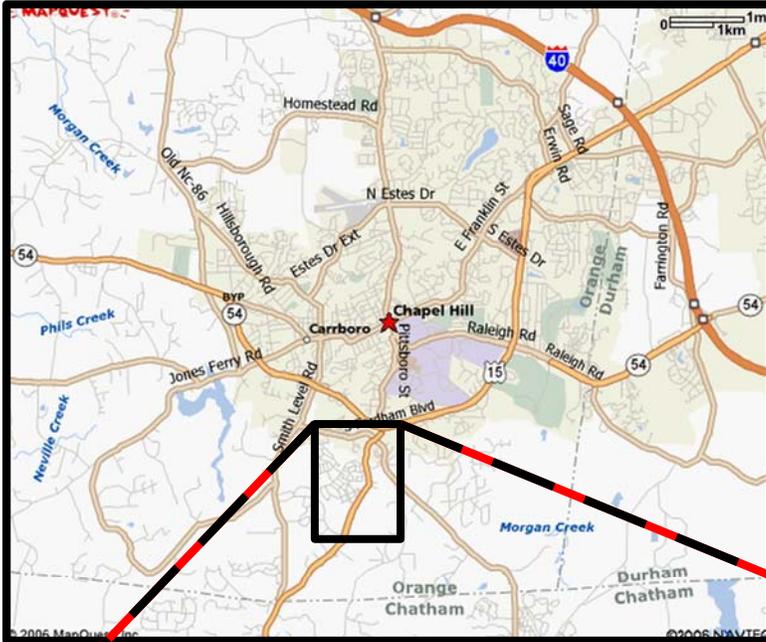
1. Monitor the intersection of US 15-501 and Culbreth Road/Mt. Carmel Church Road and adjust traffic signal timings to meet changing traffic patterns along the US 15-501 corridor due to projected background traffic volume increases by 2016. Study results indicate that this intersection may be over capacity in the 2016 AM peak hour with or without the proposed Southern Village Hotel and Apartments/Office development. This improvement is recommended whether or not the Southern Village Hotel and Apartments/Office site is developed.
2. Beyond the reoptimization of the signal, a potential capacity improvement (the addition of a second westbound right-turn lane on Mt. Carmel Church Road with 300 feet of vehicle storage was analyzed. From a capacity analysis and operations standpoint, this improvement would alleviate AM peak hour delays and queuing for this intersection approach and improve overall intersection conditions considerably. However, the constructability of the improvement may be difficult due to topography and the existing US 15-501 bridge structure immediately in the vicinity of the improvement.

No other signal phasing or minor turn lane improvement was found to have significant impact or would be feasible without larger capacity upgrades (additional through travel lanes on either US 15-501, Culbreth Road or Mt. Carmel Church Road). This improvement is only for future consideration and not recommended as part of mitigation for site traffic impacts from the Southern Village Hotel and Apartments/Office development.

3. The proposed design of the southbound right-turn deceleration lane and driveway should adhere to AASHTO, NCDOT, and Town standards with respect to geometrics and minimum storage and taper distances.

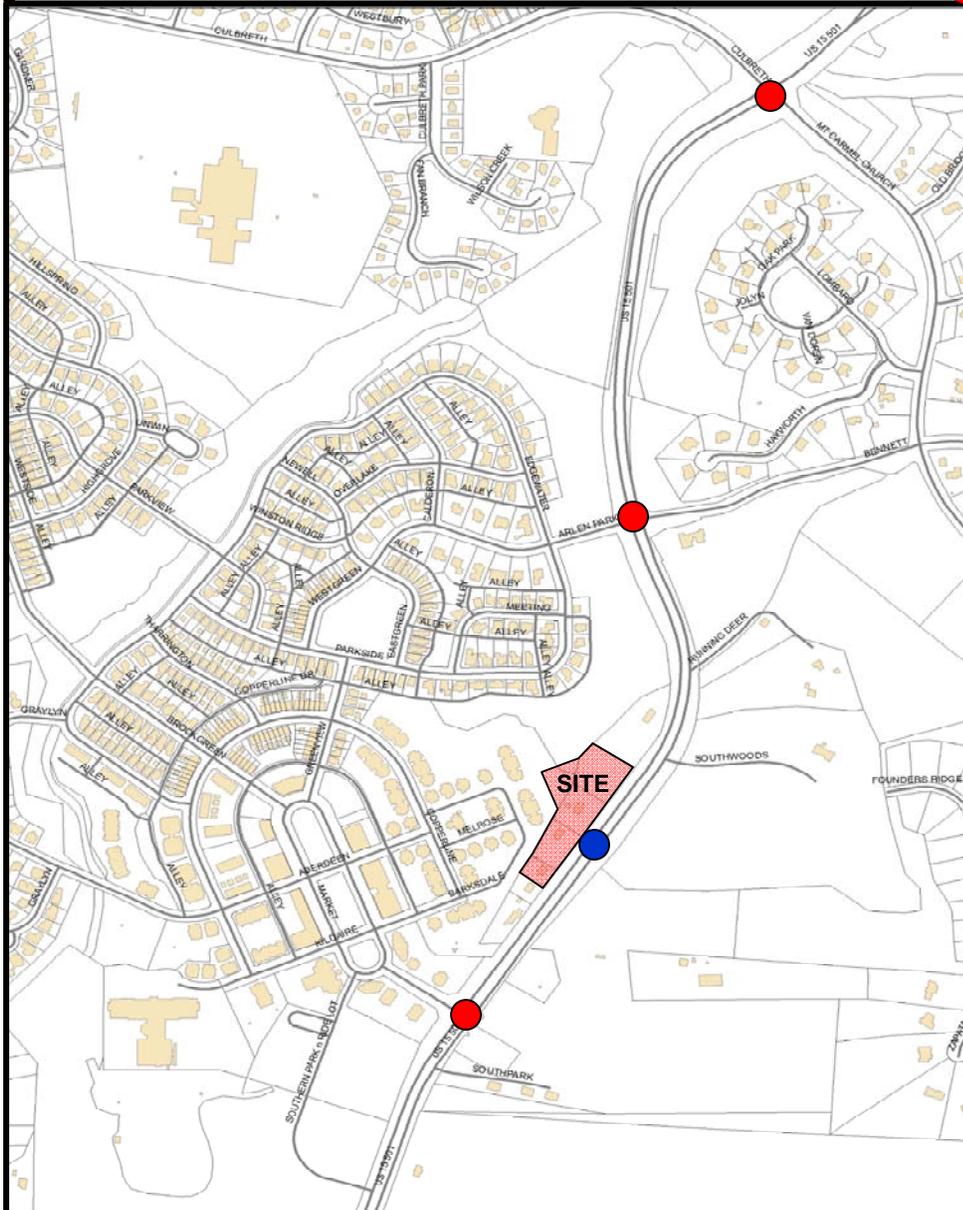
**Southern Village Hotel & Apartments/Office  
Traffic Impact Study**

**PROJECT LOCATION MAP**



**LEGEND**

-  = Proposed Site Location
-  = Existing Study Area Intersection
-  = Proposed Site Driveway



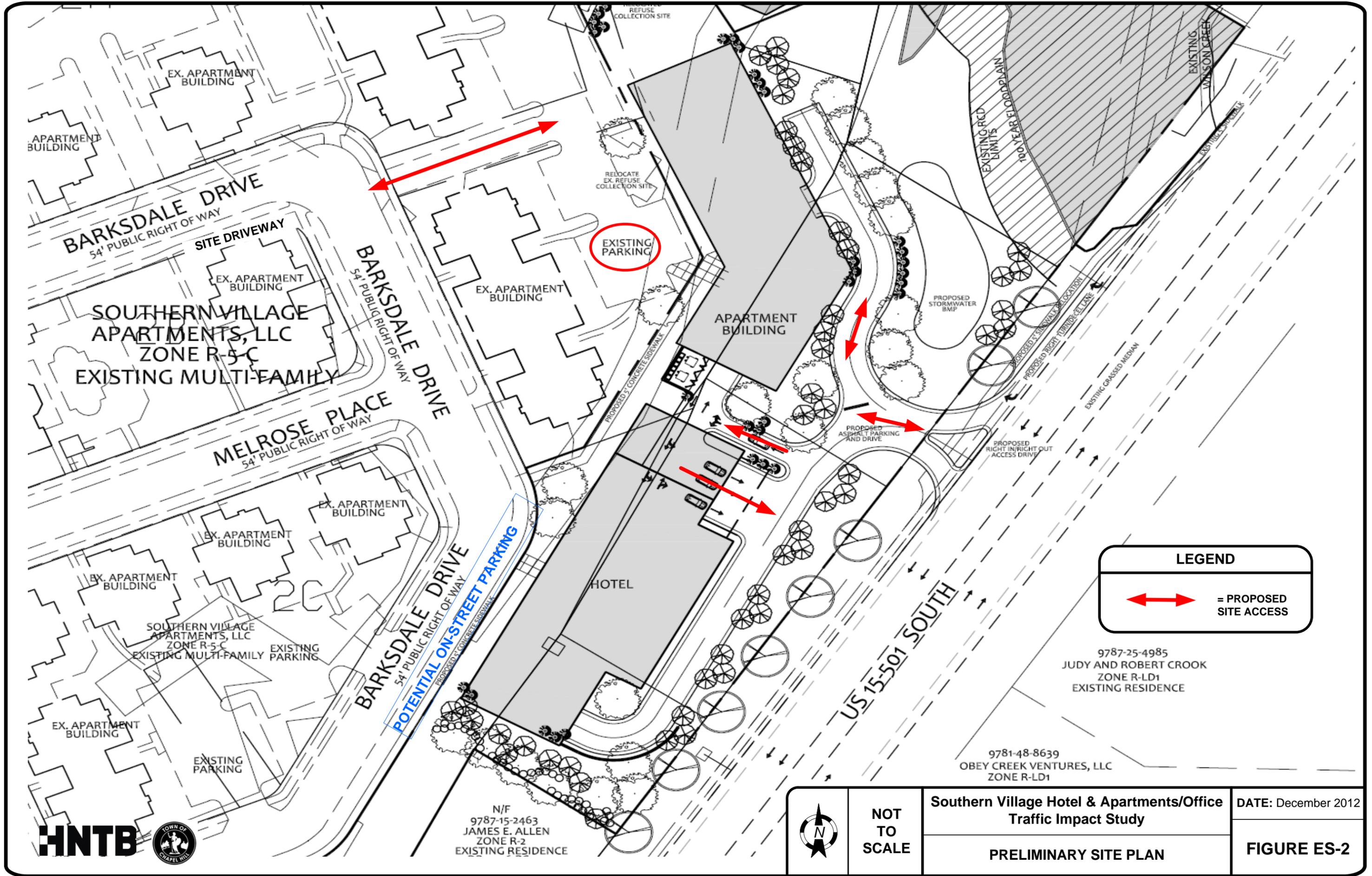
**NOT  
TO  
SCALE**

**DATE:** December 2012

**FIGURE ES-1**

**HNTB**





**LEGEND**

 = PROPOSED SITE ACCESS

9787-25-4985  
 JUDY AND ROBERT CROOK  
 ZONE R-LD1  
 EXISTING RESIDENCE

9781-48-8639  
 OBEY CREEK VENTURES, LLC  
 ZONE R-LD1

N/F  
 9787-15-2463  
 JAMES E. ALLEN  
 ZONE R-2  
 EXISTING RESIDENCE



**NOT TO SCALE**

**Southern Village Hotel & Apartments/Office  
 Traffic Impact Study**

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**PRELIMINARY SITE PLAN**

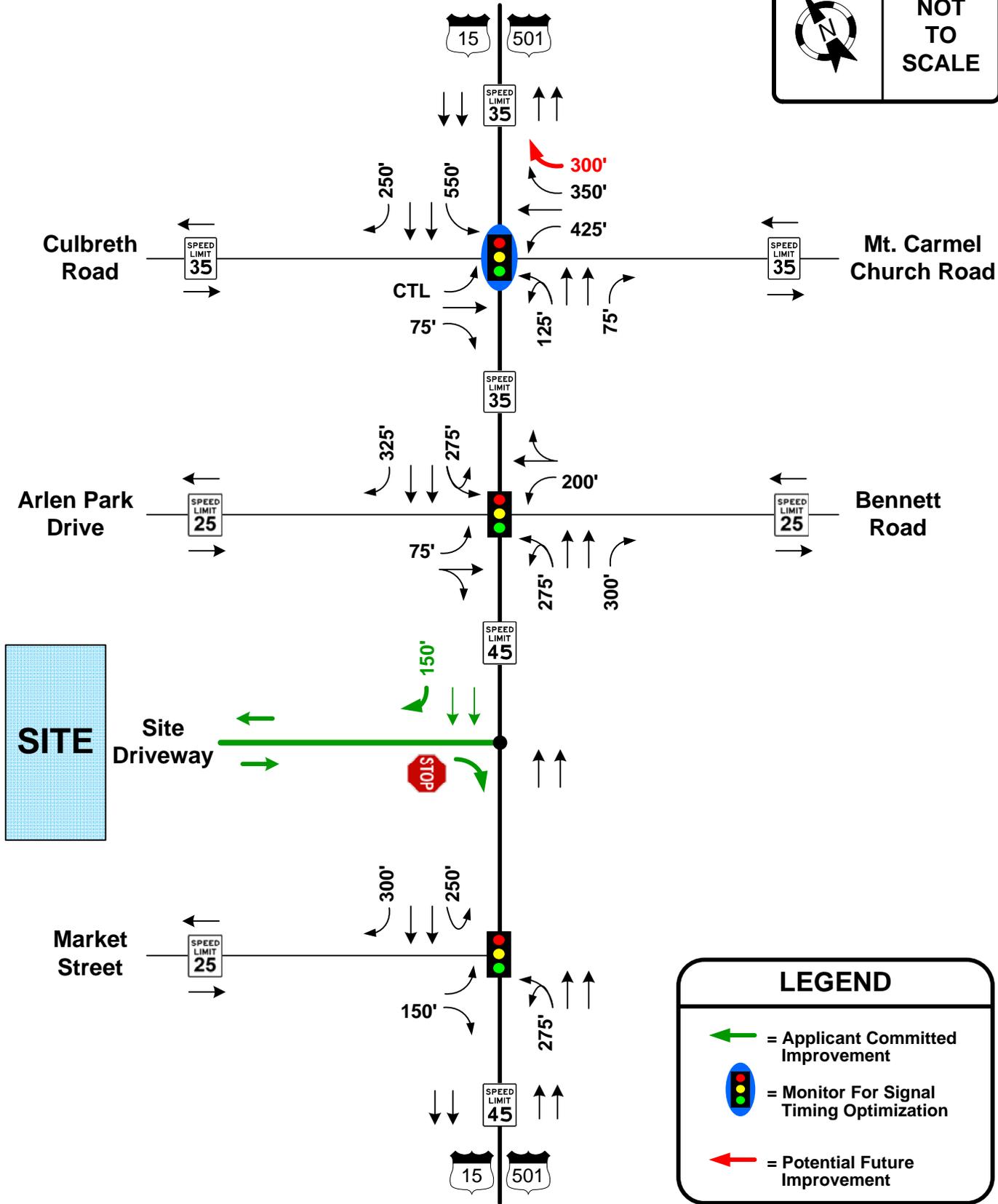
**FIGURE ES-2**



S. Columbia Street



**NOT TO SCALE**



**Southern Village Hotel & Apartments/Office  
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**COMMITTED AND RECOMMENDED  
IMPROVEMENTS**

**FIGURE ES-3**