CHAPEL HILL HIGH SCHOOL EXPANSION

TRAFFIC IMPACT STUDY

EXECUTIVE SUMMARY

Prepared for:

The Town of Chapel Hill

Public Works Department - Engineering

Prepared by:

HNTB North Carolina, PC

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Raleigh, NC 27609

NCBELS License #: C-1554

November 2017

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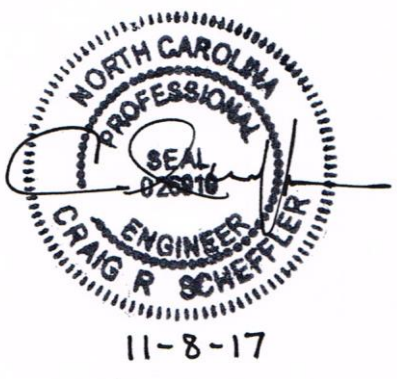


EXECUTIVE SUMMARY

Project Overview

A redevelopment of Chapel Hill-Carrboro City Schools' (CHCCS) Chapel Hill High School, located along High School Road between Homestead Road and Seawell School Road is being proposed in Chapel Hill. The project will construct new classroom space and reconfigure the existing school buildings, on-campus parking lots, and access roadway connections to the existing site parcel. **Figure ES-1** shows the general location of the site. The project is anticipated to be fully complete by 2020. This report analyzes the complete build-out scenario for the year 2021 (one year after anticipated completion), the no-build scenario for 2021, as well as 2017 existing year traffic conditions.

The proposed site concept plan shows the retention of several existing full movement access driveways along High School Road adjacent to the site. Two existing driveways will be closed and a new driveway and student parking lot created in this vicinity. Another new access point that will connect to the existing Smith Middle School parking lot and connection to Seawell School Road is also proposed. Additional roadway and parking lot reconfigurations are being proposed within the high school campus. **Figure ES-2** displays the concept plan of the Chapel Hill High School Expansion and nearby land uses and roadways. The project is expected to provide approximately 580 total parking spaces (slight increase over existing parking spaces) in on-site surface parking facilities for student drivers, visitors, faculty/staff and on-site events. This report analyzes and presents the transportation impacts that the Chapel Hill High School Expansion will have on the following intersections in the project study area:

- Homestead Road and High School Road
- High School Road and Existing Staff – Event - Bus Driveway / Celtic Circle
- High School Road and Existing Parent Unloading/Loading Entrance Driveway
- High School Road and Existing Parent Unloading/Loading Exit Driveway
- High School Road and Existing Staff Driveway
- High School Road and Student Parking - Event Driveway / Bus Facility Access
- Seawell School Road and High School Road
- Seawell School Road and Smith Middle School Access

The impacts of the proposed site at the study area intersections will be evaluated during the AM and PM school peak hours of an average weekday. The following study is based on background traffic for the existing year, 2017, the year following the estimated site build out year of 2020, as well as the estimated site-generated traffic produced by the campus redevelopment.

Existing Conditions

Study Area

The site is located in northwest Chapel Hill along High School Road bordered by Homestead Road to the west and Seawell School Road to the east. The study area contains one signalized intersection along with seven unsignalized intersections. Homestead Road and Seawell School Road are minor arterials serving areas of Chapel Hill and Carrboro. Remaining study area network roadways are local access streets or school-related access driveways.

Site Traffic Generation

With the addition of new "net" peak hour trips during the weekday school AM and PM peak hours, there are potential site redevelopment traffic impacts to the study area intersections, particularly due to the proposed reconfiguration of on-site parking facilities and designations. **Table ES-1** shows trip generation details, with generation rates and methodologies taken from actual field counted driveway data for all school driveway access points with applied growth factors for student expansion from 1,468 to 1,625 students. North Carolina Department of Transportation (NCDOT) Municipal and School Transportation Assistance (MSTA) program trip generation spreadsheet data was also used as a comparison to the field collected data and was further used for evaluation of on-site vehicular storage for parent loading operations.

Table ES-1. Weekday Peak Hour Vehicle Trip Generation Summary
Chapel Hill High School Expansion

Existing Count Data with 1.11 Growth Factor Applied	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Student Drivers	269	0	269	0	221	221
Parent Drop-Off/Pick-Up	364	364	728	125	125	250
Buses	25	25	49	0	18	18
Faculty/Staff/Visitors	161	61	221	32	114	146
Total New - Growth Over Existing Data	**819**	**450**	**1,269**	**157**	**478**	**635**
Net Growth Factor Traffic Increase Estimate	***80***	***44***	***124***	***15***	***46***	***61***

Background Traffic

In the project study area, background traffic growth for the 2021 analysis year is expected to come from an ambient regional traffic growth percentage of 2.0 percent per year applied to existing traffic volumes based on information from the historic daily traffic growth patterns in the study area (NCDOT and Town of Chapel Hill daily traffic information) and consistent with recent traffic impact studies completed near the project study area. Based on existing information, several background developments are planned to occur just beyond the project study area along Homestead Road, but are assumed to be accounted for in the ambient regional traffic growth projection.

Impact Analysis

Peak Hour Intersection Level of Service (LOS)

Analysis results indicate existing traffic operations at several study area intersections are deficient (LOS E or F) during the AM and PM peak hours analyzed. 2021 build-out year+1 background traffic growth causes delays to increase, but no additional intersection or critical movements at an intersection is projected to fall to a deficient LOS. The addition of peak hour site-generated trips and traffic redistributions in the study area to the projected 2021 background traffic volumes, result in the same study area intersections experiencing deficient traffic operations as the previous scenarios, with one additional intersection operating at a deficient LOS in the AM peak hour. All deficient intersections were tested for mitigation improvements. Per MSTA requirements, peak hour factors were applied to all site driveway intersections to account for high vehicle peaking characteristics (15 minute demands) within the defined 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 LOS is shown in **Table ES-2.**

Table ES-2. Intersection Capacity Analysis
LOS and Delay (Seconds/Vehicle) Summary

Intersections	Peak Hour	2017 Existing		2021 No-Build		2021 Build		2021 Mitigated	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Homestead Road & High School Road	AM	***F***	***100.0***	***F***	***129.3***	***F***	***109.7***	B	15.6
	PM	C	26.0	C	30.8	D	38.8	B	18.9
High School Road & Existing Staff – Event - Bus Driveway / Celtic Circle**	AM	C	22.9	D	26.7	D	32.8	N/A	N/A
	PM	D	25.0	D	29.4	D	25.2	N/A	N/A
High School Road & Existing Parent Unloading / Loading Entrance Driveway**	AM	A	5.3	A	5.9	N/A	N/A	N/A	N/A
	PM	A	1.7	A	1.8	N/A	N/A	N/A	N/A
High School Road & Existing Parent Unloading / Loading Exit Driveway**	AM	***F***	***84.2***	***F***	***139.9***	N/A	N/A	N/A	N/A
	PM	B	13.3	C	15.3	N/A	N/A	N/A	N/A
High School Road & Proposed Student Driveway**	AM	N/A	N/A	N/A	N/A	D	26.8	E	41.7
	PM	N/A	N/A	N/A	N/A	D	28.8	C	20.5
High School Road & Staff Driveway / Future Visitors Circle**	AM	C	22.4	D	27.5	B	14.5	N/A	N/A
	PM	B	12.1	B	12.6	B	12.9	N/A	N/A
High School Road & Student Parking - Event Driveway / Bus Facility Access**	AM	***F***	***136.4***	***F***	***218.7***	***F***	***57.6***	N/A	N/A
	PM	D	26.7	D	33.9	C	22.5	N/A	N/A
Seawell School Road & High School Road**	AM	***F***	***669.1***	***F***	***1017***	***F***	***1021***	D#	48.3#
	PM	***F***	***176.6***	***F***	***268.1***	***F***	***289.2***	C#	27.4#
Seawell School Rd & Middle School Access** – Future HS Parent Drop-Off / Pick-Up Drive	AM	C	21.1	C	23.3	***F***	***1246***	**C** / **C**	**24.9** / **18.5**
	PM	C	16.1	C	17.4	E	45.7	**B** / **A**	**18.3** / **7.0**

N/A – Not Applicable or No Improvements Necessary
BOLD/ITALICS – Critical Movement or Overall Intersection May Require Mitigation Per Town TIS Guidelines
** - Worst-Case LOS/Delay for Unsignalized/Stop-Controlled Critical Movement
GREEN Result = Signalized Intersection Option **BLUE** Result = Roundabout Option
- Intersection Analyzed as a Fixed-Time Traffic Signal to Emulate Operation by a Traffic Control Officer

Site Access and MSTA School Loading/Unloading Queuing Analysis

Access to the proposed campus redevelopment will utilize or reconfigure existing site driveways, with significant changes to parking lot locations and designations around the campus. Bus drop-off and pick-up locations will remain the same. Parent drop-off/pick-up operations will be moved, with access from the Middle School Driveway off Seawell School Road and an internal connection to the high school site. Student parking will be moved to a new lot and singular access point. Per MSTA requirements, an analysis of projected internal driveway queues for drop-off/pick-up operations was conducted using MSTA trip generation spreadsheet calculations and the proposed site plan and internal driveway aisles should be able to accommodate those activities.

Crash Analysis

Data from the NCDOT Traffic Safety Unit was compiled for a recent five-year period for the High School Road corridor. Results indicate that the number, frequency, and severity of crashes is less than statewide average for similar two-lane secondary roads. Six crashes along this section were recorded in the last five years.

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** are germane to the scope of this study.

Table ES-3. Other Transportation-Related Analyses

Analysis	Comment
Turn Lane Storage Requirements	Storage bay lengths at study area intersections were analyzed using Synchro and HCS 95th percentile (max) queue length estimates for the 2021 Build Scenario. The Homestead Road/High School Road intersection northbound AM peak hour queue estimate are excessive and may benefit from a right-turn lane to improve intersection efficiency and reduce queues if a minimum of 150 feet of storage is provided. An eastbound right-turn lane at the High School Road/Seawell School Road intersection will benefit operations at this location and create the need to potentially reduce the existing westbound left-turn lane on High School Road at the existing Student Parking Lot access driveway. 100 feet of storage for both these left-turn movements should be sufficient to contain queues – with the potential need to provide a traffic control officer to monitor left-turn queues at the eastbound approach to Seawell School Road. The proposed initial concept design for Middle School Access Driveway and connecting roadway to the high school was revised to provide adequate storage for exiting movements and internal access to both the middle school and high school parent drop-off/pick-up area. Egress from the high school connection requires two exiting lanes with 300 feet of storage to the west of Seawell School Road.
Appropriateness of Acceleration/ Deceleration Lanes	The site concept plan shows no specifics related to acceleration/deceleration lanes. Several auxiliary lanes for deceleration exist at major study area intersections. Based on capacity analysis results and 25 mph speed limit along High School Road, no other additional acceleration or deceleration lanes are recommended in the project study area.
Pedestrian and Bicycle Analysis	Existing pedestrian access and connectivity is adequate in the project study area adjacent to the site. Sidewalk exists along most study area facilities on at least one side of the road, with pedestrian crossings and signals at Homestead Road/High School Road. Unsignalized crosswalks exist at Seawell School Road/High School Road. Continuous sidewalk on both sides of the High School Road is recommended, with marked crosswalks at the Student Lot and Visitor/Staff/Event Driveways across High School Road. Bicycle lanes exist along both sides of Homestead Road in the vicinity of the school. One southbound bicycle lane exists along Seawell School Road along the frontage of the high school and middle school. No specific bicycle amenities are present along High School Road. The implementation of striped bicycle lanes along High School Road is recommended.
Public Transportation Analysis	Public transportation service to the study area, and to the proposed site, is adequate with multiple bus stops in the study area and the HS Chapel Hill Transit fixed bus route serving the area. Existing school bus operations are expected to remain unchanged in terms of access and operations.

Mitigation Measures/Recommendations

Planned Improvements

There are no Town of Chapel Hill, or NCDOT roadway improvement projects for study area roadway facilities within the analysis year time frame of 2017-2021.

Background Committed Improvements

There are no specific geometric or operational improvements to study area roadway intersections or facilities related to background private development projects that are expected to be completed between 2017 and 2021.

Applicant Committed Improvements

Based on the preliminary site concept plans and supporting development information provided, there are no external transportation-related improvements proposed adjacent to the Chapel Hill High School Expansion, but numerous substantive changes to existing roadways and internal circulation within the campus (see **Figure ES-2** for details).

- Staff / Bus / Event Driveway Access – to remain as currently in operation at the western-most driveway.
- Creation of student parking lot with 243 spaces and single access point located in the vicinity of the current parent drop-off/pick-up one-way loop driveway. Closure of existing parent entrance only driveway.
- Reconfiguration of existing staff parking lot to the east of current parent drop-off/pick-up one way loop. Potential conversion of this parking lot for visitor/event parking.
- Reconfiguration of internal parking lots and access driveway on south side of school. Current student parking converted to staff/visitor and event parking areas. Creation of internal parent drop-off/pickup loop.
- Modification of existing Smith Middle School access driveway to provide a direct connection to CHHS and internal parking facilities and proposed parent drop-off/pick-up circle.

Necessary Improvements

Based on traffic capacity analyses for the 2021 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) To improve overall intersection operational performance in the AM peak hour to acceptable levels and reduce projected queue issues, it is recommended that a northbound right-turn lane with a minimum of 150 feet of storage be constructed at the intersection of Homestead Road and High School Road. The traffic signal should be upgraded to include a right-turn signal overlap phase for this movement. <u>This recommendation is necessary whether or not the Chapel Hill High School redevelopment occurs.</u>

2) To reduce internal parking lot queuing and improve PM peak hour traffic operations at the High School Road intersection with the proposed Student Driveway, separate northbound left-turn and right-turn lanes should be constructed.

3) Current traffic counts from the Student Parking Lots indicate potentially 240 student vehicles accessing the existing parking facilities in the AM peak hour, with a projection of up to 270 vehicles in the 2021 Build Scenario. If current student parking permits/numbers indicate that demand exceeds the proposed 243 space capacity, additional parking spaces in the proposed Student lot may be necessary or a cap on permits may need to be implemented.

4) To provide safe access for pedestrian and bicycling trips to/from the CHHS campus, High School Road should be upgraded for connected sidewalks on both sides of the street (in areas currently not featuring sidewalk) from Homestead Road to Seawell School Road. Unsignalized

crosswalks across High School Road should be considered at the Student Lot Driveway and the Staff/Visitor/Event Driveway. Striped bicycle lanes in both directions should be constructed along High School Road, as well, allowing connections to existing bicycle facilities along Homestead Road and Seawell School Road.

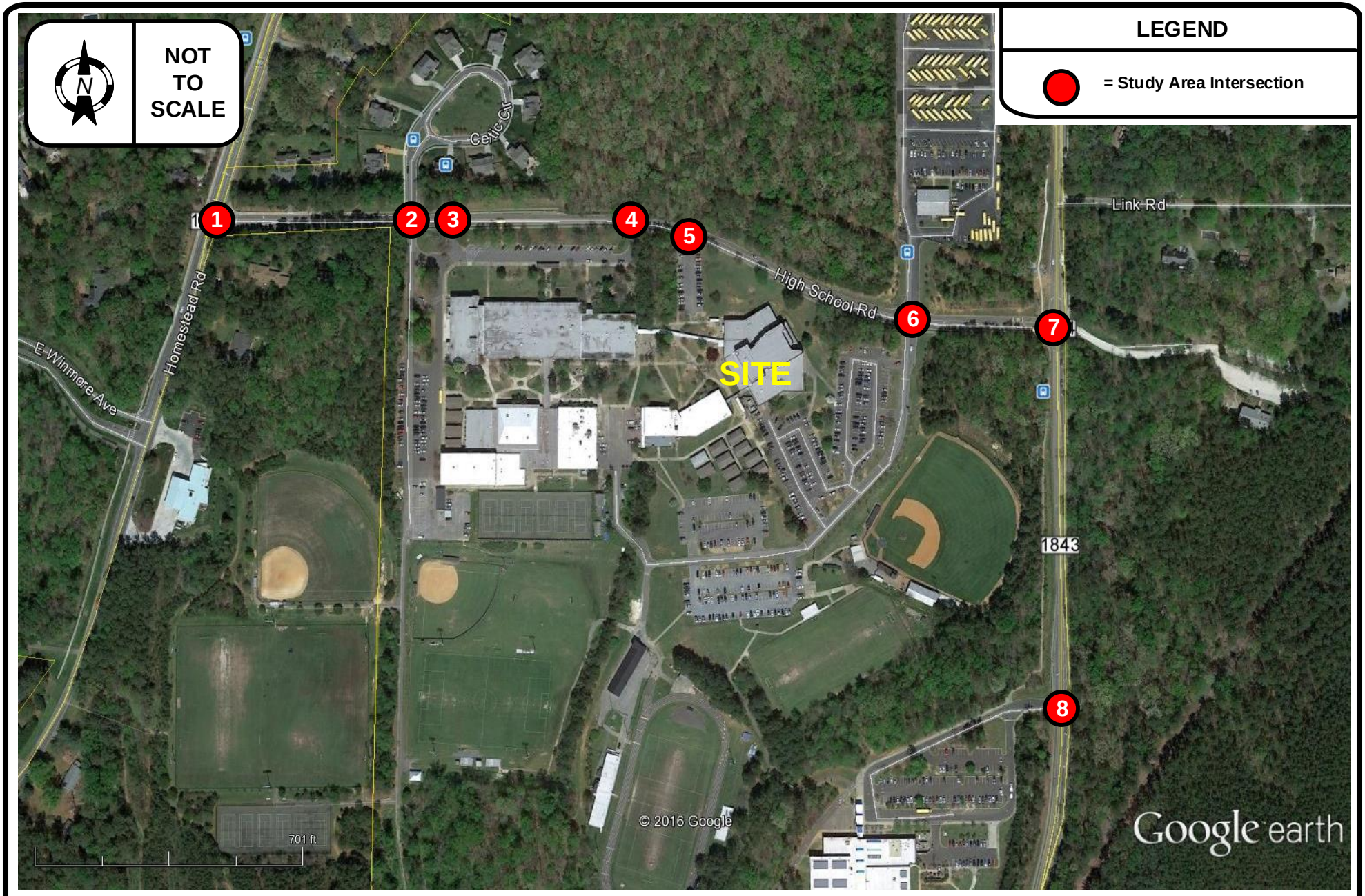
5) To mitigate deficient existing and projected eastbound stop-controlled traffic operations at the High School Road and Seawell School Road intersection, an eastbound left-turn lane with 100 or more feet of storage should be created at this intersection. A designated traffic control officer from CHHS should monitor the intersection, and queues in this left-turn lane, to interrupt traffic flow on Seawell School Road, as needed, to clear the eastbound left-turn lane queue.

6) The creation of an eastbound left-turn lane in recommendation 5) necessitates the reduction in storage length for the westbound left-turn lane accessing the proposed staff-visitor-event parking areas (currently student parking). If this westbound left-turn lane is reduced to 100 feet, 2021 Build scenario queue results indicate this should be adequate.

7) To mitigate potentially significant traffic queues and excessive stop-controlled delays in the AM peak hour, the intersection of Seawell School Road and the Middle School Driveway (future CHHS parent unloading/loading connection) should be improved with the installation of a traffic signal at this location utilizing existing laneage on Seawell School Road and improvements shown on the current concept design that would allow 300 feet of left-turn and right-turn lane storage from the existing Middle School Driveway eastbound approach, and extend the existing southbound right-turn lane at this intersection to 250 feet of full storage.

   This improvement is recommended due to the impact of the Chapel Hill High School Expansion.

8) To provide adequate access and internal queue storage for unloading/loading operations for both the high school and middle school, design changes to initial site concept plans were provided internal to the site for the roadway alignment and laneage between the Middle School Driveway access and the Parent Drop-off/Pick-up circle. **Figures ES-2 and ES-3** highlight these updated changes that increase on-site vehicle storage and provide adequate circulation for both the staggered operations between the Middle School and High School.



HNTB

TOWN OF CHAPEL HILL

Chapel Hill High School Expansion

Traffic Impact Study

PROJECT STUDY AREA

DATE: November 2017

FIGURE ES-1

SHEET C1.0, C1.2, C3.0, C3.2, C4.0, L2.0, L3.0, L4.0

HIGH SCHOOL ROAD

Staff Parking / Bus Unload & Loading / Event Parking

Student Parking

Visitor / Event Parking

Staff / Visitor / Event Parking

Unload/Load Area

SHEET C1.1, C1.3, C3.1, C3.3, C4.1, L2.1, L3.1, L4.1

Parent Unloading / Loading Access

SEAWELL SCHOOL ROAD

HNTB

TOWN OF CHAPEL HILL

LEGEND

= Specific Parking Areas and Access Points Delineated by Color

N

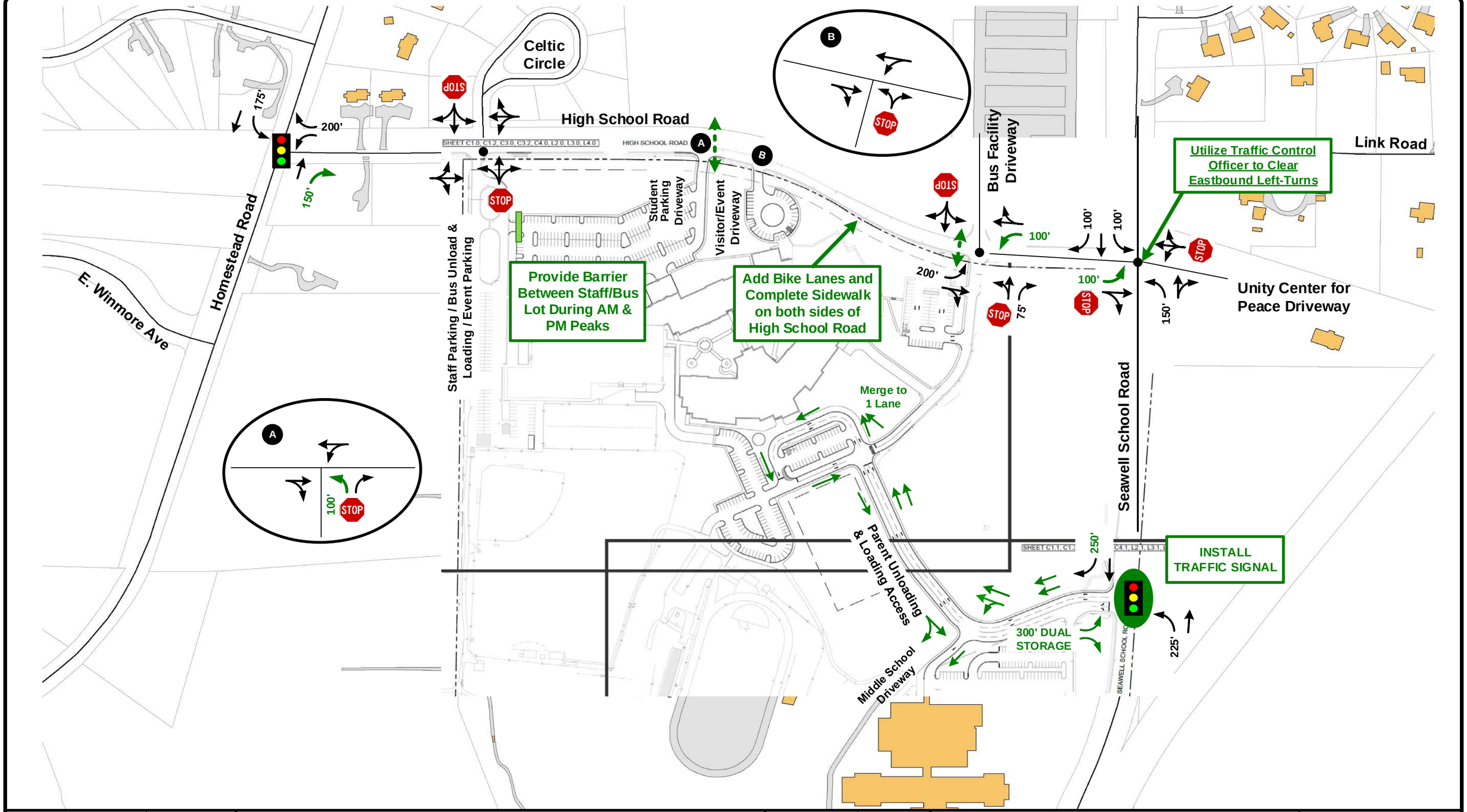
NOT TO SCALE

Chapel Hill High School Expansion
Traffic Impact Study

UPDATED SITE CONCEPT PLAN

DATE: November 2017

FIGURE ES-2



HNTB	TOWN OF CHAPEL HILL	**LEGEND** = NECESSARY INTERSECTION IMPROVEMENT = NECESSARY GEOMETRIC IMPROVEMENT WITH STORAGE DISTANCE INDICATED = PROPOSED CROSSWALK	N	NOT TO SCALE	**Chapel Hill High School Expansion** **Traffic Impact Study** **RECOMMENDED IMPROVEMENTS**	**DATE:** November 2017 **FIGURE ES-3**