

UNC HEALTH CARE EASTOWNE PROPERTY

MASTER PLAN

TRANSPORTATION IMPACT ANALYSIS

TECHNICAL MEMORANDUM #1 **DRAFT** EXISTING CONDITIONS ANALYSIS



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I. EXISTING CONDITIONS

A. Project Overview

The Town of Chapel Hill has contracted with HNTB North Carolina, PC to produce a multi-modal transportation impact analysis for the proposed UNC Health Care Eastowne Campus Master Plan. This technical memorandum provides detailed information on existing conditions within the Eastowne Campus study area related to all modes of transportation and serves as a baseline for detailed studies of future development/redevelopment scenarios on the UNC Health Care Eastowne property and broader TIA study area. The analyses and methodologies provided in this document were performed in accordance with the Town’s approved guidelines and after consultation with Town staff, as directed by the Town Council.

UNC Health Care is developing a Master Plan to develop the 50-acre Eastowne UNC Health Care property, envisioned as a campus for the next generation of health care services for region. Over the last year, Chapel Hill Town Council, Advisory Boards and Committees, and the community have been reviewing the proposal in preparation for the Town Council’s approval of a final Development Agreement. As part of the process, the transportation impact analysis for this project will provide evaluations of future conditions with and without the proposed development. This Existing Conditions Technical Memorandum document serves as a “base line” for understanding current mobility issues in the project study area and as a means to compare projected changes to transportation in the broad area surrounding the UNC Health Care Eastowne Campus in the future.



In 2018, HNTB conducted a traffic impact analysis for the first phase of the UNC Health Care property, known as Medical-Office Building (MOB) Phase 1. This study was primarily focused on the roadway network adjacent to and nearby the current UNC Health Care Eastowne campus and contained a number of local transportation improvement recommendations. The MOB Phase 1 building is currently under construction as of Fall 2019.

The UNC Health Care Eastowne Campus and overall project study area are located on the east side of Chapel Hill and parts of southwest Durham, with the project study area encompassing almost 35 intersections along major transportation corridors. **Figure 1**, found in **Appendix A**, shows the general location of the site and the project study area defined for this report and agreed-upon by Town of Chapel Hill staff, with public input at a project scoping meeting held in October 2019.

B. Site Location and Study Area

This technical memorandum defines and analyzes the existing transportation system in the UNC Health Care Eastowne Campus project study area, encompassing both areas local and adjacent to the Eastowne property as well as the US 15-501 and nearby roadway corridors extending into Durham to the north/east and through Chapel Hill to the south/west to Manning Drive. The following 34 intersections are part of the project study area:

- 1) US 15-501 (Durham-Chapel Hill Boulevard) & SW Durham Drive
- 2) US 15-501 (Durham-Chapel Hill Boulevard) & Mount Moriah Road
- 3) US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Westbound Ramps



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- 4) US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Eastbound Ramps
- 5) US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive/Lakeview Drive
- 6) US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive/Service Road – SECU Access
- 7) US 15-501 (Durham-Chapel Hill Boulevard) & Sage Road/Old Durham Road
- 8) US 15-501 (Fordham Boulevard) & Erwin Road/Europa Drive (4 intersection superstreet)
- 9) US 15-501 (Fordham Boulevard) & Ephesus Church Road
- 10) US 15-501 (Fordham Boulevard) & Elliott Road
- 11) US 15-501 (Fordham Boulevard) & Willow Drive
- 12) US 15-501 (Fordham Boulevard) & Estes Drive
- 13) US 15-501 (Fordham Boulevard) & Cleland Road
- 14) US 15-501 (Fordham Boulevard) & Brandon Road
- 15) US 15-501 (Fordham Boulevard) & NC 54 Westbound Ramps
- 16) US 15-501 (Fordham Boulevard) & NC 54 Eastbound Ramps
- 17) US 15-501/NC 54 (Fordham Boulevard) & Old Mason Farm Road
- 18) US 15-501/NC 54 (Fordham Boulevard) & Manning Drive
- 19) Raleigh Road and US 15-501 (Fordham Boulevard) Southbound Ramps
- 20) NC 54 (Raleigh Road) & US 15-501 (Fordham Boulevard) Northbound Ramps
- 21) E. Franklin Street & Eastgate Crossing
- 22) E. Franklin Street & Elliott Road
- 23) E. Franklin Street & Estes Drive
- 24) Sage Road & Erwin Road
- 25) Sage Road & Old Sterling Drive
- 26) Sage Road & Cosgrove Road / Lowe's Entrance
- 27) Scarlett Drive & Old Durham Road
- 28) Scarlett Drive & Legion Road
- 29) Eastowne Drive & Dobbins Drive
- 30) Eastowne Drive & Old Sterling Drive
- 31) Eastowne Drive & Providence Road (west)
- 32) Eastowne Drive & Providence Road (east)
- 33) Old Chapel Hill Road & Lakeview Drive
- 34) Old Chapel Hill Road & Pope Road

These intersections were selected for detailed study through input from Town staff, previous public involvement efforts and public input. Additional engineering judgement was used to assess the relative impact of the proposed future UNC Health Care Eastowne Property study area growth patterns on the regional transportation system and to include intersections and transportation facilities in the broader project study area that might be impacted by future long-term growth in the UNC Health Care Eastowne Property and in other areas of future development in Town that might also contribute to trip-making activities to and from the UNC Health Care Eastowne Property.

The impacts of the proposed development scenarios for the UNC Health Care Eastowne Property at the study area intersections and transportation facilities will be primarily evaluated during the AM, noon, and PM peak hours of an average weekday, so all 2019 base year analyses include these three peak time periods, as well as a planning-level evaluation of daily traffic flows and capacities on study area roadway segments, and general quantitative and qualitative evaluations of transit, pedestrian and bicycle operations.



C. UNC Health Care Eastowne Property Description

The UNC Health Care Eastowne Property is located along US 15-501 just south of the I-40 interchange. Current development utilizes surface parking lots and on-street parking along Eastowne Drive for connectivity to US 15-501. There are four existing buildings and three primary surface parking lots located within the Eastowne Drive circle between its two access points with US 15-501. Remaining lands both within the circle and the northern portion of the Campus (near the I-40 corridor) are undeveloped and heavily forested.



The Campus exists within the general Eastowne Office Park area, which features several commercial office buildings along Eastowne Drive and Providence Road and a mixture of multi-family residential, office, commercial and institutional development just beyond the site to the east, south and west. **Figure 2** shows an aerial schematic of the UNC Health Care Eastowne Campus, existing roadway connections, existing land uses and building footprints, and locations of existing surface parking facilities and study area intersections.

D. Existing and Proposed Land Uses in the Vicinity of the Property

The land uses and development in the broad project study area vary from higher density commercial, office and institutional development along the study area high volume thoroughfares (US 15-501, NC 54, E. Franklin Street) to lower density single-family residential neighborhoods and undeveloped wooded tracts and watersheds nearby or adjacent to the highly developed corridors. There are several parks and schools located within the project study area, as well.



The land uses and development in the area immediately surrounding the Eastowne site along US 15-501 and Eastowne Drive are a mixture of multi-family residential uses, with low to medium density commercial office development along Eastowne Drive and primarily commercial development along the US 15-501 (Durham-Chapel Hill Boulevard) corridor. The Existing Land Use Plan shown in the 2020 *Town of Chapel Hill Comprehensive Plan* and adopted November 25, 2012,

indicates that the existing site is designated as “Office” inside the Eastowne Drive circle and “Undeveloped Land” for the northern tract near I-40. In the Future Land Use Plan, that is also a part of the Town Comprehensive Plan, the entire property has the designation “Mixed-Use with Office Emphasis”. It also is located in the “US 15-501 North Future Focus Discussion Area”. The site is currently zoned “MU-OI 1”, designated as “Mixed-Use – Office and Institutional”, with a portion zoned “OI-2”, designated as “Office and Institutional - 2”.

E. Existing and Committed Surface Transportation Network

i.) Roadways

The UNC Health Care Eastowne Property project study area features several major arterial roadways serving areas throughout the Town of Chapel Hill, City of Durham, and points beyond, as well as a



number of collector and local access streets. **Table 1** summarizes pertinent information on the study area roadway facilities. Categorical information was compiled from field and/or aerial mapping review of each roadway facility.

Annual Average Daily Traffic (AADT) data was taken from 2017 AADT GIS shapefiles produced by the NCDOT Traffic Survey Unit and updated for most areas in the project study area from traffic data collection completed for this analysis. **Figures 3A through 3D** show the existing lane configuration, traffic control, and speed limits for these study area roadways.

Intersections

Table 2 summarizes all 34 existing study area intersections, traffic control features, and pedestrian amenities at each. Laneage details and intersection turn bay lengths are also detailed on **Figure 3A through 3D**.



The project study area features a mixture of signalized and unsignalized intersections. Several arterial corridors feature coordinated signal operation for weekday peak hours in separate control zones. Control zones include the US 15-501 corridor from Garrett Road through Estes Drive, the E. Franklin Street area, NC 54 (Raleigh Road), and the US 15-501 corridor in the vicinity of Manning Drive. Several study area signalized intersections currently

operate in “free-run” uncoordinated operation where the signal’s cycle length and timings vary throughout the day. Most intersections in urbanized areas feature crosswalks and pedestrian signal heads, which are features listed in the table.

ii.) Bicycle Routes and Sidewalks

Pedestrian sidewalk is found throughout the broader UNC Health Care Eastowne study area with some connectivity to the UNC Health Care Eastowne Property existing buildings and future potential site locations. There is a lack of connectivity and facilities directly along the US 15-501 corridor throughout the entire study area, but some of the paralleling surface streets and 15-501 Service roads have some crosswalk and pedestrian signal crossings. Some upgrades to signalized intersections along the 15-501 corridor near the Eastowne site are planned in the near future to improve pedestrian access across the major arterial facility. **Figures 4A through 4C** display schematics of existing pedestrian and bicycle facilities in the project study area.

Specific bicycle facilities are present in the broader UNC Health Care Eastowne project study area, with striped bicycle lanes in both directions along Sage Road and Old Sterling Drive nearby the proposed site location. Additionally, paved greenways extend along Booker Creek and along Bolin Creek and Battle Branch in the central and southern portions of the broad study area. The Fordham Boulevard corridor also has widened paved shoulders (to four feet from edge of travel) that potentially permit bicycling though high volumes and traffic congestion along the corridor are not conducive to cycling activities. No other existing facilities specifically prohibit bicycling, but none of these facilities have specific bicycle amenities, other than some roadway curb-and-gutter cross-sections may have some existing lane widths slightly greater than the standard 12 foot wide travel lanes.



Table 1. Existing Study Area Roadways

Road Name	Functional Classification*	Study Area Cross-Section	Recent AADT	Speed Limit	Sidewalk	On-Street Parking	Bicycle Facilities	Bus Stops
Interstate Highway 40	Interstate	4-6 lane median divided limited access	82,100 - 97,900	65	N	N	N	N
US 15-501 (Durham-Chapel Hill Boulevard)	Other Freeway	4-lane median divided	53,200 - 54,800	45	N	N	N	N
US 15-501 (Fordham Boulevard)	Other Freeway	4-lane median divided	31,900 - 49,700	45	S	N	N	N
US 15-501/NC 54 Bypass (Fordham Boulevard)	Other Freeway	4-lane median divided	46,100 - 55,300	45	S	N	N	Y
NC 54 (Raleigh Road)	Other Principal Arterial	6-lane median divided	51,200	35	Y	N	Y	Y
E. Franklin Street (SR 1010)	Other Principal Arterial	5-lane undivided with TWLTL & 4-lane undivided	16,200 - 23,300	35	Y	N	N	Y
Manning Drive (SR 1902)	Other Principal Arterial	4-lane undivided	16,700	25	Y	N	N	Y
Old Durham Road (SR 1838)	Minor Arterial	3-lane undivided with TWLTL	5,700	35	S	N	S	Y
Sage Road (SR 1741)	Minor Arterial	3-lane undivided with TWLTL	10,000 - 13,700	35	Y	N	Y	Y
Estes Drive (SR 1750)	Minor Arterial	2-lane undivided & 3-lane undivided with TWLTL	11,700 - 16,700	35	Y	N	N	Y
Raleigh Road (SR 2048)	Minor Arterial	4-lane undivided and median divided	19,800	35	Y	N	N	Y
Erwin Road (SR 1734)	Minor Arterial / Major Collector	2-lane undivided & 3-lane undivided with TWLTL	6,700 - 11,200	35	S	N	S	Y
SW Durham Drive (SR 1110)	Major Collector	4-lane median divided	7,600	45	S	N	N	Y
Ephesus Church Road (SR 1742)	Major Collector	3-lane undivided with TWLTL / 2-lane undivided	6,400 - 10,600	35	S	N	N	Y
Pope Road (SR 1113)	Minor Collector	2-lane undivided	3,900	35	N	N	N	N

S – Some Sidewalk/On-Street Parking/Bicycle Facilities Present Along Certain Sections

TWLTL – Two-Way Left-turn Lane

* - Functional Classification taken from NCDOT State-wide Functional Classification GIS information



Table 1. Existing Study Area Roadways (Continued)

Road Name	Functional Classification*	Study Area Cross-Section	Recent AADT	Speed Limit	Sidewalk	On-Street Parking	Bicycle Facilities	Bus Stops
Mount Moriah Road (SR 2294)	Local	4-lane median divided / 4-lane with TWLTL	15,700 - 22,800	35	Y	N	N	Y
Eastowne Drive	Local	2-lane undivided	1,500 - 4,700	25	Y	Y	N	Y
Lakeview Drive	Local	2-lane undivided	2,600	35	N	Y	N	Y
Cosgrove Road	Local	2-lane undivided	900	25	Y	N	N	N
Scarlett Drive	Local	2-lane undivided	2,600	35	S	Y	N	Y
Legion Road	Local	2-lane undivided	1,800 - 4,200	35	S	N	S	Y
Europa Drive	Local	2-lane undivided	3,300	25	Y	N	N	Y
US 15-501 Service Road	Local	2-lane undivided	N/A	25	S	N	N	Y
Elliott Road	Local	3-lane undivided with TWLTL/2-lane undivided	4,800 - 6,900	25	Y	S	N	Y
Eastgate Drive	Local	2-lane undivided	3,800 - 6,200	25	Y	N	N	N
Willow Drive	Local	2-lane undivided	2,400 - 6,100	25	Y	S	N	Y
Cleland Road	Local	2-lane undivided	1,700	25	N	N	N	N
Brandon Road	Local	2-lane undivided	1,400	25	Y	Y	N	Y
Carmichael Drive	Local	2-lane undivided	500	25	S	Y	N	N

S – Some Sidewalk/On-Street Parking/Bicycle Facilities Present Along Certain Sections

TWLTL – Two-Way Left-turn Lane

* - Functional Classification taken from NCDOT State-wide Functional Classification GIS information



Table 2. Existing Study Area Intersection Details

ID #	Intersection	Traffic Control	Signal Inv #	Signal Phases	Signal Operation	Crosswalk	Ped Signal
1	US 15-501 (Durham-Chapel Hill Boulevard) & Garrett Road	Signal	05-0384	8	Coordinated	Yes (3)	Yes (2)
2	US 15-501 (Durham-Chapel Hill Boulevard) & SW Durham Drive	Signal	05-2212	6	Coordinated	No	No
3	US 15-501 (Durham-Chapel Hill Boulevard) & Mt. Moriah Road	Signal	05-0789	8	Coordinated	Yes (3)	Yes (2)
4	US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Westbound Ramps	Signal	05-0959	4	Coordinated	No	No
5	US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Eastbound Ramps	Signal	05-0958	4	Coordinated	No	No
6	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive/Lakeview Drive	Signal	07-1011	5	Coordinated	No	No
7	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive/US 15-501 Service Road	Signal	07-0211	5	Coordinated	Yes (1)	Yes (1)
8	US 15-501 (Durham-Chapel Hill Boulevard) & Sage Road/Old Durham Road	Signal	07-0370	8	Coordinated	No	No
9	US 15-501 (Fordham Boulevard) & Erwin Road/Europa Drive (4 intersection superstreet)	Signal	07-0382,2065, 2066,2067	2-3	Coordinated	Yes (1)	Yes (1)
10	US 15-501 (Fordham Boulevard) & Ephesus Church Road	Signal	07-0530	6	Coordinated	Yes (1)	Yes (1)
11	US 15-501 (Fordham Boulevard) & Elliott Road	Signal	07-0547	5	Coordinated	No	No
12	US 15-501 (Fordham Boulevard) & Willow Drive	Signal	07-0506	5	Coordinated	Yes (2)	Yes (2)
13	US 15-501 (Fordham Boulevard) & Estes Drive	Signal	07-0529	6	Coordinated	Yes (1)	Yes (1)
14	US 15-501 (Fordham Boulevard) & Cleland Road	Two-Way Stop	N/A	N/A	No	No	N/A
15	US 15-501 (Fordham Boulevard) & Brandon Road	Two-Way Stop	N/A	N/A	No	No	N/A
16	US 15-501 (Fordham Boulevard) & NC 54 Westbound Ramps	Signal/Yield	07-1696	2	Free-Run	No	N/A
17	US 15-501 (Fordham Boulevard) & NC 54 Eastbound Ramps	Two-Way Stop	N/A	N/A	No	No	N/A
18	US 15-501/NC 54 (Fordham Boulevard) & Old Mason Farm Road/Carmichael Drive/Fern Lane	Signal - 5 Leg	07-1709	7	Coordinated	Yes (5)	Yes (4)
19	US 15-501/NC 54 (Fordham Boulevard) & Manning Drive	Signal	07-0505	6	Coordinated	Yes (2)	Yes (2)
20	Raleigh Road and US 15-501 (Fordham Boulevard) Southbound Ramps	Two-Way Stop	N/A	N/A	No	No	N/A
21	NC 54 (Raleigh Road) & US 15-501 (Fordham Boulevard) Northbound Ramps	Two-Way Stop	N/A	N/A	No	No	N/A
22	Estes Drive & E. Franklin Street	Signal	07-0527	8	Coordinated	Yes (4)	Yes (4)
23	Elliott Road & E. Franklin Street	Signal	07-0531	8	Coordinated	Yes (4)	Yes (4)
24	Eastgate Crossing & E. Franklin Street	Signal	07-0590	2	Coordinated	Yes (2)	Yes (2)
25	Sage Road & Erwin Road	Signal	07-2099	8	Free-Run	Yes (4)	Yes (4)
26	Sage Road & Lowes Entrance/Cosgrove Drive	Signal	CH 1501	2	Coordinated	Yes (4)	Yes (4)
27	Old Durham Road & Scarlett Drive	Two-Way Stop	N/A	N/A	No	No	N/A
28	Scarlett Drive & Legion Road	Two-Way Stop	N/A	N/A	No		
29	Eastowne Drive & Dobbins Drive	Two-Way Stop	N/A	N/A	No		
30	Eastowne Drive & Old Sterling Drive	Two-Way Stop	N/A	N/A	No		
31	Eastowne Drive & Providence Road (west)	Two-Way Stop	N/A	N/A	No		
32	Eastowne Drive & Providence Road (east)	Two-Way Stop	N/A	N/A	No		
33	Old Chapel Hill Road & Lakeview Drive	Two-Way Stop	N/A	N/A	No		
34	Old Chapel Hill Road & Pope Road	roundabout	N/A	N/A	No		

Crosswalk/Ped Signal (X) = Number of Quadrants with Crosswalk and Pedestrian Signal



iii.) Transit Routes

Current Chapel Hill Transit (CHT) Routes CL and D directly serve the UNC Health Care Eastowne Property with transit service that is within walking distance from the site. Additional CHT and Go Durham routes serve various corridors in the broader project study area with weekday local bus service but would not likely be effected by proposed site development. Numerous bus stops, with a range of amenities (shelters, benches), are also present in the overall study area, with two designated stops on the CHT D Route currently adjacent to the UNC Health Care Eastowne Property. **Table 3** details the two current CHT routes serving the immediate study area near the site, along with GoTriangle Routes 400 and 405 that serve the UNC Health Care Eastowne Property along US 15-501 with regional service to Durham and downtown Chapel Hill.

Figures 5A and 5B displays transit routes that currently exist in the project study area, along with park-and-ride facilities that are in the project study area. There are no park-and-ride facilities currently proximate to the Ephesus Church-Fordham District. Information shown on the figures were taken from the CHT 2019 Fall Ride Guide.

Table 3. Current Study Area Weekday Transit Service

Route	Headways (minutes)			Broad Study Area Stops	UNC Health Care Eastowne Property Adjacent Stops	Destinations
	AM Peak	PM Peak	Off Peak			
CHT Fixed-Route Local Service*						
CL	60	70	N/A	<ul style="list-style-type: none"> E. Franklin Street Old Oxford Road Dobbins Drive Legion Road 	<ul style="list-style-type: none"> Old Durham Road Sage Road 	<ul style="list-style-type: none"> Colony Lake Downtown Chapel Hill UNC Main Campus/Hospitals
D	20	20	40-50	<ul style="list-style-type: none"> E. Franklin Street Blue Hill District Legion Road 	<ul style="list-style-type: none"> Eastowne Drive Old Sterling Road Old Durham Road 	<ul style="list-style-type: none"> Culbreth Road Downtown Chapel Hill UNC Main Campus/Hospitals
GoTriangle Service*						
400/405	30	30	30	<ul style="list-style-type: none"> US 15-501 	<ul style="list-style-type: none"> Eastowne Drive / Lakeview Drive 	<ul style="list-style-type: none"> Durham Downtown Chapel Hill

* - Sources: Chapel Hill Transit 2019 Fall Ride Guide, TT System Map (January 2020)

iv.) Surface Transportation Improvement Projects Under Construction in Fall 2019

There were no NCDOT Transportation Improvement Program (STIP) or Town of Chapel Hill roadway projects in the study area that were under construction in the fall of 2019 when the existing conditions analysis was conducted. Several notable private development roadway network improvement projects were observed in the project study area in fall 2019, primarily related to utility work and minor roadway improvements along the US 15-501 corridor that were not affecting traffic operations except for temporary road closures/detours for short-term construction activities within the roadway right-of-way. **Table 4** summarizes these projects.



Table 4. Fall 2019 Project Study Area Road Construction Projects

Project Location	Description	Project ID	Completion Date
US 15-501 & Service Road / Old Durham Road	<ul style="list-style-type: none"> Roadway and Sidewalk Improvements to Eastowne Drive and US 15-501 Intersection 	Developer (UNC Health Care – Phase 1)	Spring 2020
	<ul style="list-style-type: none"> Roadway and Sidewalk Improvements to Old Durham Road and Scarlett Drive Improvements to US 15-501 Service Road and Access Location to Signalized Intersection with US 15-501 	Developer (Wegmans)	Summer 2020
US 15-501 and Elliott Road	<ul style="list-style-type: none"> Utility and Roadway Work along 15-501 Frontage 	Developer (Franklin Street Apartments)	On-Going
US 15-501 and Brandon Road	<ul style="list-style-type: none"> Utility Work 	Developer (Glen Lennox)	On-Going

Figure 6 displays a schematic of the location of the current roadway improvement projects identified in the table above.

II. DATA COLLECTION

A. Traffic Count Data Compilation

Traffic volume data for this study was collected from a variety of sources all within the one-year calendar time frame of April 2019 – November 2019. The counts used to determine these volumes for study area intersections were collected for a continuous 13 hours on a “typical” weekday from 6:00 AM to 7:00 PM or for the weekday periods 7:00 - 9:00 AM, 11:30 AM – 1:30 PM, and 4:00 – 6:00 PM. Recent counts were taken from the following sources:

- *Wegmans Supermarket -State Employees Credit Union (SECU) Property Access Driveway Traffic Impact Study* (HNTB, November 2019, 8 intersections)
- *Erwin Road Mixed-Use Traffic Impact Study* (HNTB, April 2019, 2 intersections)
- *University Mall Redevelopment Traffic Impact Study* (VHB, Currently Ongoing – 2020, 5 intersections)

To augment this existing information, additional 13 hour and weekday peak period turning movement counts were collected at all remaining study area intersections, with 13 hour counts completed at higher volume signalized intersections (see **Figure 7** for specific count locations). Counts were collected in early December 2019 with UNC and Chapel Hill-Carrboro schools in session, and all counts included intersection pedestrian, bicycle and truck percentage information. 13 Hour count data were extrapolated (using NCDOT Transportation Planning Branch and Traffic Survey Unit standards) at those high volume intersections to estimate Average Annual Daily Traffic (AADT) for roadway segments connecting to each intersection.

In addition to turning movement count and pedestrian/bicycle count data, HNTB collected 48-hour vehicle classification and volume (tube count) data at seven locations along several major study area thoroughfares. This information was used to compare to and update NCDOT AADT data for the project



study area for use in making comparisons of planning level daily traffic demand/capacity in the study area and for baseline comparisons to travel demand model network development. This data, along with all turning movement count output is found in **Appendix B**. The tube count information was collected in December 2019 and was adjusted by daily and seasonal factors, per information from NCDOT Transportation Planning Branch (TPB), in estimating roadway segment AADTs. **Tables 5 and 6** provide a detailed listing of each count type, peak hour, and count date. Count data is summarized schematically on study area mapping for the following:

- **Figures 8A through 8D** show the existing 2019 balanced AM peak hour traffic volumes for the study area intersections.
- **Figures 9A through 9D** show the existing 2019 balanced noon peak hour traffic volumes for the study area intersections.
- **Figures 10A through 10D** show the existing 2019 balanced PM peak hour traffic volumes for the study area intersections.
- **Figures 11A through 11C** show the existing 2019 estimated 24 hour AADT estimates for study area roadway links, as developed through the procedure described previously.

Traffic count information shows traffic flows on the major study area arterials (US 15-501, NC 54, and E. Franklin Street, Estes Drive) were heavy during the AM and PM peak count periods, with southbound flows from US 15-501/E. Franklin Street to downtown Chapel Hill/UNC Campus areas heaviest in the AM peak and northbound return flows heaviest in the PM peak. Similarly, westbound traffic on NC 54 inbound to UNC Main Campus was heaviest in the AM Peak and eastbound return traffic was prominent in the PM peak. Noon peak flows were primarily evenly balanced along most corridors. Generally, flow along the 15-501 corridor in Durham north of I-40 were fairly balanced, as well, throughout all three peak periods. Traffic on other minor arterials such as Estes Drive, Ephesus Church Road, Sage Road, and Manning Drive was moderate to heavy during the peak periods, with directional variation depending on whether these facilities were radial (like the major arterials) or circumferential (distributing traffic in an east-west pattern). Traffic flows were light to moderate on the remaining study area roadways that function as collector or local access streets.

Volume Balancing

For the intersection capacity analyses and microsimulation model development, volume balancing was done for through movements along major arterial facilities and some turning movements at high volume intersections, due to variability in turning movement counts at several locations as well as variability due to midblock local streets and private development driveways throughout the study area network. Additional variability also resulted from traffic count data being taken at different time periods over the course of 2019 and because the peak hour (in 15 minute increments) varied between individual intersections. Flows were generally balanced to within 100 vehicles upstream/downstream for each intersection, with acknowledgement of variability due to driveways and local midblock streets.

B. Field Data Collection/Observation

Field reviews of existing conditions in the project study area, including review of existing traffic signal operations, verification of study area transportation network and facilities, and field observation of existing transportation system operations and areas of traffic congestion/safety concerns were conducted in December 2019 and early January 2020. Information from the field observations were added/modified to inputs to the microsimulation models developed for the project, as relevant, to verify results regarding intersection operations, general traffic flow and travel speeds and areas of peak hour congestion in the study area transportation network. Field travel time studies along the US 15-501 corridor were also conducted for the AM, noon, and PM peak time periods to make general comparisons with the microsimulation model output data.



Table 5. Traffic Count Information – Intersection Turning Movements

ID #	Traffic Count Location	Count Type	Peak Hour Starts			Count Date
			AM	Noon	PM	
1	US 15-501 & Garrett Road	13 HR TMC	7:30	12:00	5:00	12/3/19
2	US 15-501 & SW Durham Drive	6 HR TMC	7:30	12:00	4:45	12/3/19
3	US 15-501 & Mt Moriah Road	13 HR TMC	7:45	12:30	4:45	12/3/19
4	US 15-501 & I-40 Westbound Ramps	6 HR TMC	7:30	12:15	4:45	9/17/19
5	US 15-501 & I-40 Eastbound Ramps	6 HR TMC	7:30	12:00	4:45	9/17/19
6	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive North/Lakeview Drive	6 HR TMC	7:30	12:00	4:45	9/17/19
7	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive South/Service Road	6 HR TMC	7:30	12:15	4:45	9/17/19
8	US 15-501 (Fordham Boulevard) & Sage Road	6 HR TMC	7:45	12:15	4:45	9/17/19
9a	US 15-501 (Fordham Boulevard) & Erwin Road	6 HR TMC	7:45	11:45	4:45	4/3/19
9b	US 15-501 (Fordham Boulevard) & Europa Drive	6 HR TMC	7:45	12:30	5:00	4/3/19
10	US 15-501 (Fordham Boulevard) & Ephesus Church Road /Eastgate Crossing	6 HR TMC	7:30	12:00	4:30	9/25/19
11	US 15-501 (Fordham Boulevard) & Elliot Road	6 HR TMC	7:30	12:00	4:15	10/8/19
12	US 15-501 (Fordham Boulevard) & Willow Drive	6 HR TMC	7:30	12:00	4:15	10/8/19
13	US 15-501 (Fordham Boulevard) & Estes Drive	6 HR TMC	8:00	12:00	4:45	9/25/19
14	US 15-501 (Fordham Boulevard) & Cleland Road	6 HR TMC	7:30	12:30	4:15	12/3/19
15	US 15-501 (Fordham Boulevard) & Brandon Road	6 HR TMC	7:30	12:30	4:30	12/3/19
16a	US 15-501 (Fordham Boulevard) & NC 54 North	13 HR TMC	7:30	12:30	4:30	12/3/19
16b	US 15-501 (Fordham Boulevard) & NC 54 West	13 HR TMC	7:30	12:15	4:30	12/3/19
16c	US 15-501 (Fordham Boulevard) & NC 54 East	13 HR TMC	7:30	12:00	4:45	12/3/19
17	US 15-501/NC 54 & Old Mason Farm Road / Carmichael Drive / Fern Lane	6 HR TMC	7:45	12:15	4:30	12/3/19
18	US 15-501/NC 54 (Fordham Blvd) & Manning Drive	13 HR TMC	8:00	11:45	4:45	12/3/19
19	E. Franklin Street & Eastgate Crossing	6 HR TMC	8:00	11:45	5:00	12/3/19
20	E. Franklin Street & Elliot Road	6 HR TMC	8:00	12:15	5:00	12/3/19
21	E. Franklin Street & Estes Drive	6 HR TMC	7:45	11:45	5:00	11/21/19
22	Sage Road & Erwin Road	6 HR TMC	8:00	11:45	4:45	12/3/19
23	Sage Road & Old Sterling Drive	6 HR TMC	8:00	11:45	4:45	12/3/19
24	Sage Road & Cosgrove Road	6 HR TMC	8:00	12:00	4:45	12/3/19
25	Scarlett Drive & Old Durham Road	6 HR TMC	8:00	12:00	4:30	9/17/19
26	Scarlett Drive & Legion Road	6 HR TMC	8:00	12:15	5:00	9/17/19
27	Eastowne Drive & Dobbins Drive	6 HR TMC	7:45	11:45	4:15	12/3/19
28	Eastowne Drive & Old Sterling Drive	13 HR TMC	8:15	12:00	4:15	12/3/19
29	Eastowne Drive & Providence Road West	6 HR TMC	8:00	12:00	4:15	12/3/19
30	Eastowne Drive & Providence Road East	6 HR TMC	8:00	12:00	4:15	12/3/19
31	Lakeview Dr & Durham Road /Old Chapel Hill Road	6 HR TMC	7:45	12:15	5:00	9/17/19
32	Pope Road & Old Chapel Hill Road	6 HR TMC	7:45	12:30	4:45	12/3/19

Table 6. Traffic Count Information – 48 Hour Volume/Speed/Classification Counts

ID #	Traffic Count Location	Count Data	24 Hour AADT*	Peak Hour Starts**			Count Date
				AM	Noon	PM	
1	US 15-501 South of Garrett Road	50,364	53,200	7:00	12:00	5:00	12/3-12/4/19
2	US 15-501 South of Mt Moriah Road	48,037	59,400	8:00	1:00	6:00	12/3-12/4/19
3	US 15-501 North of Eastowne Drive /Lakeview Drive	40,967	46,100	8:00	1:00	5:00	12/3-12/4/19
4	US 15-501 North of Sage Road	42,456	44,100	7:00	1:00	5:00	12/3-12/4/19
5	US 15-501 South of Ephesus Church Road	35,070	33,700	8:00	1:00	4:00	12/3-12/4/19
6	US 15-501 South of Estes Drive	40,517	38,500	8:00	1:00	4:00	12/3-12/4/19
7	E Franklin St North of Eastgate Drive	23,209	21,300	8:00	12:00	5:00	12/3-12/4/19
8	Estes Drive East of E Franklin Street	14,685	15,700	8:00	12:00	5:00	12/3-12/4/19

* - NCDOT Seasonal and Daily Factor Applied to Averaged 24 Hour Raw Data

** - Data Collected in One Hour Bins



C. Triangle Regional Model

HNTB staff coordinated with the Town of Chapel Hill, Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO), and the Institute for Transportation Research and Education (ITRE) to obtain the most current, approved version of the Triangle Regional Travel Demand Model (TRM). Based on these discussions, TRM Version 6, Build 403 (created 5/24/2019) was provided by ITRE for use in the study.

D. Current Transportation Studies and Data Sources

The latest versions of all appropriate and applicable Town-related planning documentation in the project study area, along with any private development plans and plans/studies previously completed or on-going by NCDOT, the Durham-Chapel Hill-Carrboro MPO or any other public agency were requested and compiled for use in the current existing operations analysis or for use in the future year analyses. **Table 7** shows a list of the planning documentation.

Table 7. Current Transportation Plans, Studies and Information

Document/Information	Mode	Year	Agency	Status
CHT Routes/Schedules/ Ride Guide	Transit	2019 Fall	CHT	Used in 2019 Existing Conditions Analysis
CHT Ridership Data	Transit	2019 Fall	CHT	Used in 2019 Existing Conditions Analysis
GoTriangle Ridership Data	Transit	2019	GoTriangle	Used in 2019 Existing Conditions Analysis
GoTriangle Routes/Schedules	Transit	2019	GoTriangle	Used in 2019 Existing Conditions Analysis
CHT & GoTriangle Long-Range Transit (Bus) Plans	Transit	Current	CHT/GoTriangle	Will be reviewed and used, as applicable, in Future Year Analyses
Connect 2045 Metropolitan Transportation Plan (MTP)	All	2019	Triangle Region MPOs	
Triangle Regional Travel Demand Model	Vehicle/ Transit	2019	DCHC MPO	Will be used in 2019 and Future Year Analyses
NCDOT 2019-2029 STIP	All	2019	NCDOT	Will be reviewed and used, as applicable, in 2019 Existing Year and Future Year Analyses
US 15-501 Corridor Study (STIP U-5304)	Vehicle	Current	NCDOT/ Town of Chapel Hill	
Blue Hill District TIA	All	2018	Town of Chapel Hill	
Chapel Hill Mobility and Connectivity Plan	All	2017	Town of Chapel Hill	
Traffic Signal Plans	Vehicle	Current	NCDOT/Town of Chapel Hill	Used in 2019 Existing Conditions Analysis Traffic Modeling
Synchro Models – latest signal timing information	Vehicle	Current	Town of Chapel Hill – Traffic Engineering	
Individual Development / Site Plans	N/A	Current	Town of Chapel Hill – Planning Department	To be used in Future Year Analyses (See Table 8)

E. Current Background Development Information

In addition to public agency planning efforts, individual site plans and current development plan status was compiled for the project study area. This information will be utilized in the development of background traffic growth inputs in the Future Year No-Build and Build scenario modeling processes for the project, both for regional travel demand model adjustment and/or traffic microsimulation model



addition of specific development parcels to the model. A current schematic of locations of private development projects (whether approved or under construction as of Fall 2019) is shown in **Figure 12** and highlighted in **Table 8**.

Table 8. Background Development Plans

Development Name	Status	Update in Future Year Travel Demand Model?	Include in Future Year Simulation Model as Specific Development?	Include as Ambient Background Traffic Growth in Future Modeling?
Glen Lennox	Completed TIA 2014 – In Phase 1 development	Yes	Yes	No
Obey Creek	Completed TIA 2015 – No current development	Yes	No	No
Carolina North	2009 TIA and Devlpmt Agreement – No major current activities	Yes – will review status and assumptions	No	No
American Legion	No Current Activity	Potentially – Discuss with Town Staff	No	No
UNC Health Care – Eastowne MOB Phase 1	Under Construction	Yes – assume built-out	Yes	No
Wegmans	Under construction	Yes - assume built-out	Yes	No
Blue Hill – Hillstone	Under construction	Yes – assume built-out	Yes	No
Blue Hill – University Inn	Concept Plan	Yes – assume built-out	Yes	No
Blue Hill – The Park at Chapel Hill	Concept Plan	Yes – assume built-out	Yes	No
Blue Hill – Fordham Blvd Apartments	Under Construction	Yes – assume built-out	Yes	No
Former DOLRT Gateway Station Area	No Current Activity	Potentially – Discuss with Town Staff		No
SECU Data Center	No Current Activity	Potentially – Discuss with Town Staff		No
Dual Language Learning Ctr	These developments, whether planned or under construction or currently on hold, will be considered to be background traffic generators captured under growth rates between 2019 Base Year Model and Future Year models.	No	No	Yes
Erwin Road Mixed-Use		No	No	Yes
Christ Community Church		No	No	Yes
Greenfield Place		No	No	Yes
Signature Health Care Expansion		No	No	Yes
Chapel Hill Retirement Residences		No	No	Yes
N. Estes Mixed-Use Center		No	No	Yes
UNC Development Plan – Main Campus	Previous Plans Nearly Complete	No	No	Possibly



III. 2019 EXISTING CONDITIONS ANALYSIS

A. Regional Model Utilization

The TRM is the official regional travel demand model that was developed by the Triangle Regional Model Service Bureau at ITRE, in partnership with the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO), the Capital Area MPO (CAMPO), GoTriangle Transit and the North Carolina Department of Transportation (NCDOT). This model is run on Caliper Corporation's TransCAD software platform, with which TransModeler integrates very well, since it is a companion software product from Caliper.

The TRM is used to provide highway, transit and land use information as a basis for TransModeler microsimulation model evaluation of peak hour traffic operations. This provides the required data exchange capabilities through various utilities in both software packages. The current version of TRM is Version 6, Build 403 (created 5/24/2019) and is calibrated to the base year model of 2013. It can provide traffic volumes for weekday AM peak period (4 hours), PM peak (4 hours) and off-peak period (rest of the day). In addition, the peak period assignments can be further broken in 3 periods in each AM and PM peak periods. These 3 periods include peak hour and two shoulder periods of 1.5 hours each.

The TRM model setup included the base year model of 2013 and future year model of 2045. For the Eastowne TIA, daily traffic counts were collected at various locations within the region in the year 2019. Since the base year TRM model is 2013, it was necessary to develop 2019 model volume estimates and compare the estimated volumes with the 2019 traffic counts at those locations. The 2019 model volumes were developed using 2013 and 2045 models, which were linearly interpolated to estimate that 2019 daily volume estimates. **Table 9** displays a comparison of estimated 2019 TRM volumes to 2019 Average Annual Daily Traffic (AADT) data.



Table 9. 2019 Triangle Regional Model Daily Assignment Versus Existing AADT

Roadway Facility	Segment ID	Segment Limit		2019 AADT (vpd)	Modeled Volume	% Difference
		From	To			
US 15-501 (Fordham Boulevard – Durham / Chapel Hill Boulevard)	1	US 15-501 NB Ramp	Garrett Rd	60,700	70,502	16%
	2	Garrett Rd	SW Durham Dr	61,200	75,446	23%
	3	SW Durham Dr	Mt Moriah Rd	57,200	68,394	20%
	4	Mt Moriah Rd	I-40 EB Ramp	59,400	75,003	26%
	5	I-40	Eastowne/Lakeview Drive	41,800	63,413	52%
	6	Lakeview Drive	Eastowne/Service Road	36,300	59,140	63%
	7	Eastowne/Service Road	Sage Road/Old Durham Road	35,700	52,365	47%
	8	Sage Road/Old Durham Road	Erwin Road/Europa Drive	45,000	57,554	28%
	9	Erwin Road/Europa Drive	Ephesus Church Road	56,500	62,908	11%
	10	Ephesus Church Road	Elliott Road	31,100	32,309	4%
	11	Elliott Road	Willow Drive	32,500	34,589	6%
	12	Willow Drive	Estes Drive	29,100	33,550	15%
	13	Estes Drive	Cleland Road	36,000	38,438	7%
	14	Cleland Road	Brandon Road	35,100	36,818	5%
	15	Brandon Road	NC 54 (Raleigh Road)	34,200	33,488	-2%
	16	NC 54 (Raleigh Road)	Old Mason Farm Rd/Carmichael Dr	41,600	53,106	28%
	17	Old Mason Farm Rd/Carmichael Dr	Manning Drive	43,700	54,486	25%
	18	Manning Drive	Mason Farm Road	46,800	42,116	-10%
Garrett Rd	19	Pickett Rd	US 15-501 (Durham-CH Blvd)	18,200	11,283	-38%
SW Durham Dr	20	US 15-501 (Durham-CH Blvd)	Old Chapel Hill Rd	16,000	8,462	-47%
Mt Moriah Rd	21	US 15-501 (Durham-CH Blvd)	Old Chapel Hill Rd	10,000	14,808	48%
	22	Sunlight Dr	US 15-501 (Durham-CH Blvd)	22,500	21,081	-6%
I-40	23	US 15-501 (Durham/Chapel Hill Boulevard)	Old Chapel Hill Rd	15,700	14,326	-9%
	24	NC 86 Interchange	US 15-501 (Fordham Boulevard - Durham/Chapel Hill Boulevard)	82,100	85,222	4%
Eastowne Drive (East)	25	US 15-501 (Fordham Boulevard - Durham/Chapel Hill Boulevard)	NC 54 Interchange	97,900	101,823	4%
	26	Providence Drive	US 15-501 (Fordham Boulevard)	4,700	1,690	-64%
Lakeview Drive	27	US 15-501 (Fordham Boulevard)	Old Durham Road	2,600	7,502	189%
Eastowne Drive (West)	28	US 15-501 (Fordham Boulevard)	Pinegate Road	2,400	15,010	525%
	29	Pinegate Road	Old Sterling Drive	1,500	294	-80%
Service Road	30	US 15-501 (Fordham Boulevard)	Performance Motors	200	n/a	n/a



Table 9 (Continued). 2019 Triangle Regional Model Daily Assignment Versus Existing AADT

Roadway Facility	Segment ID	Segment Limit		2019 AADT (vpd)	Modeled Volume	% Difference
		From	To			
Sage Road / Old Durham Road	31	Weaver Dairy Road	Erwin Road	9,950	6,715	-33%
	32	Erwin Road	Old Sterling Drive	11,300	13,005	15%
	33	Old Sterling Drive	US 15-501 (Durham CH Blvd)	10,400	12,080	16%
	34	US 15-501 (Durham-CH Blvd)	Scarlett Drive	6,600	14,404	118%
	35	Scarlett Drive	Lakeview Drive	5,500	12,750	132%
Old Sterling Drive	36	Sage Rd	Providence Glen Dr (West)	3,400	4,637	36%
	37	Providence Glen Dr (West)	Eastowne Drive	2,900	1,146	-60%
Scarlett Drive	38	Old Durham Road	Legion Road	2,600	3,451	33%
Erwin Road	39	Covington Drive	Sage Road	8,900	11,800	33%
	40	Sage Road	Weaver Dairy Road	5,800	9,754	68%
	41	Weaver Dairy Road	US 15-501 (Fordham Boulevard)	7,600	11,464	51%
Europa Drive	42	US 15-501 (Fordham Boulevard)	Legion Road	3,300	5,528	68%
Ephesus Church Road/Eastgate	43	E. Franklin Street	US 15-501 (Fordham Boulevard)	3,800	19,094	402%
	44	US 15-501 (Fordham Boulevard)	Legion Road	8,500	11,033	30%
Elliott Road	45	Old Oxford Road/Velma Drive	E. Franklin Street	4,700	3,949	-16%
	46	E. Franklin Street	US 15-501 (Fordham Boulevard)	6,900	6,439	-7%
Willow Drive	47	Estes Drive	US 15-501 (Fordham Boulevard)	6,100	1,482	-76%
	48	US 15-501 (Fordham Boulevard)	Spruce Drive	2,400	n/a	n/a
Estes Drive	49	Caswell Drive	E. Franklin Street	14,300	16,088	13%
	50	E. Franklin Street	Willow Drive	11,900	12,787	7%
	51	Willow Drive	US 15-501 (Fordham Boulevard)	8,400	15,874	89%
E. Franklin Street	52	US 15-501 (Fordham Boulevard) Split	Eastgate Crossing	20,400	20,243	-1%
	53	Eastgate Crossing	Elliott Road	23,800	32,125	35%
	54	Elliott Road	Estes Drive	22,400	30,186	35%
	55	Estes Drive	Meadowbrook Drive	17,500	29,473	68%
Cleland Drive	56	US 15-501 (Fordham Boulevard)	Hamilton Road	1,700	2,041	20%
Brandon Road	57	US 15-501 (Fordham Boulevard)	Flemington Road	1,400	4,977	256%
NC 54 (Raleigh Road)	58	Greenwood Drive	US 15-501 (Fordham Boulevard)	19,800	28,525	44%
	59	US 15-501 (Fordham Boulevard)	Hamilton Road	51,200	58,815	15%
Old Mason Farm Road/Carmichael Drive	60	NC 54 (Raleigh Road)	Prestwick Drive	3,200	1,288	-60%
	61	US 15-501 (Fordham Boulevard)	E of Highland Woods Road	3,500	1,288	-63%
	62	US 15-501 (Fordham Boulevard)	Fern Lane	1,100	n/a	n/a
Manning Drive	63	US 15-501 (Fordham Boulevard)	Skipper Bowles Drive	16,400	14,450	-12%

Red = Model/AADT differences greater than 50% **Orange** = Model/AADT differences between 30 and 50%



B. 2019 Existing Peak Hour Traffic Operations Analysis

i.) TransModeler Model Development Methodology

Evaluation of traffic operations on suburban arterials and local street networks is most effective through the determination of level of service (LOS) criteria. The concept of level of service correlates qualitative aspects of traffic flow to quantitative terms. This enables transportation professionals to take the qualitative issues, such as congestion and substandard geometrics, and translate them into measurable quantities, such as operating speeds and vehicular delays. The 2016 *Highway Capacity Manual (HCM Version 6)* characterizes level of service by letter designations A through F. Level of service A represents ideal low-volume traffic operations, and level of service F represents over-saturated high-volume traffic operations. Level of service is measured differently for various roadway facilities, but in general, level of service letter designations are described by the following in **Table 10**. TransModeler MOE data produced in this study will be used to develop an equivalent LOS for study area intersections from simulation model results.

Table 10. Level of Service (LOS) Characteristics

Level of Service Description	Per Vehicle Delay at Signal	Per Vehicle Delay at Stop Sign
LOS A > Free flow > Freedom to select desired speed and to maneuver is extremely high > General level of comfort and convenience for motorists is excellent	< 10.0 sec	< 10.0 sec
LOS B > Stable flow > Other vehicles in the traffic stream become noticeable > Reduction in freedom to maneuver from LOS A	10.0 – 20.0 sec	10.0 – 15.0 sec
LOS C > Stable flow > Maneuverability/operating speed significantly affected by other vehicles > General level of comfort and convenience declines noticeably	20.0 – 35.0 sec	15.0 – 25.0 sec
LOS D > High density but stable flow > Speed/freedom to maneuver are very restricted > General level of comfort / convenience is poor > Small increases in traffic will generally cause operational problems	35.0 – 55.0 sec	25.0 – 35.0 sec
LOS E > Unstable flow > Speed reduced to lower but relatively uniform value > Volumes at or near capacity level > Comfort and convenience are extremely poor > Small flow increases or minor traffic stream disturbances will cause breakdowns	55.0 – 80.0 sec	35.0 – 50.0 sec
LOS F > Forced or breakdown flow > Volumes exceed roadway capacity > Formation of unstable queues > Stoppages for long periods of time because of traffic congestion	> 80.0 sec	> 50.0 sec

The minimum acceptable peak hour overall intersection level of service established for this project is LOS D for signalized intersections or LOS E for critical movements at unsignalized intersections, or no increase in delay for signalized intersections operating below LOS D or unsignalized intersection



critical movements operating below LOS E without the inclusion of UNC Health Care Eastowne Property “build” scenario traffic. These conditions and thresholds will be further analyzed, and mitigation recommendations made for future scenarios that account for No-Build and Build development scenarios for the UNC Health Care Eastowne Property area.

TransModeler Version 5.0 Build 7255 (current approved NCDOT version) was utilized for peak hour traffic operations microsimulation. Base model network information for a majority of the overall UNC Health Care Eastowne TIA study area was imported from previous TransModeler files developed in 2016 by HNTB for the *Blue Hill District TIA*. Network information included the following features and was updated for any changes between 2016 and 2019:

- Link and intersection geometrics
- Traffic signal control information and coordinated signal timings
- Traffic volume data

A schematic of the TransModeler network and changes from the 2016 Blue Hill District TIA study are shown in **Figure 13**. Additional modification within the TransModeler network was necessary for the following microsimulation model parameters:

- Roadway characteristics (NCDOT default road classes and speed distributions)
- Vehicle mix (truck percentage information taken from 2019 traffic count data)
- Set run control for 10 runs and 15 minute model seeding period.
- Set volume distributions (per NCDOT guidelines) to distribute peak hour volume in 15 minute increments to emulate a 0.90 peak hour factor for traffic flow variation within the peak hour
- Pedestrian crossing locations and signal group assignments
- Pedestrian volumes

The methodology of evaluating the 2019 Existing Conditions and future year analysis scenarios for signalized intersections is to use current Town of Chapel Hill data for the cycle length and splits of individual signalized intersections and report LOS and delay values from TransModeler run results. There are several traffic signals in the project study area that operate as “free-run” signals at all times. These were analyzed as such in all scenarios.

Appendix C contains the raw TransModeler output for the three peak hours analyzed for all signalized and unsignalized intersections in the project study area.

ii.) TransModeler Measures-of-Effectiveness Results

After coding/updating the TransModeler 2019 Existing Conditions network with AM, noon, and PM peak hour data, measures-of-effectiveness (MOE) statistics were produced for the study area network “system”, US 15-501 corridor, and all intersections in the project study area. 10 runs were conducted of each model peak period and results averaged for the following MOEs:

Project Study Area System MOEs

Project study area system-wide MOEs were collected from the Trip Statistics output in TransModeler. MOEs were collected for each peak hour to include the following, for the entire model network:

- Vehicle Miles Traveled (VMT)
- Vehicle Hours Traveled (VHT)
- Mean System Speed



- Total System Delay/Delay Per Vehicle

In addition to these output statistics, the simulation runs also tallied system-wide trips completed and trips queued as measures of system total throughput and an indicator of system congestion (if the number of trips queued outside the network unable to get in is high relative to the trips completed).

Table 11 shows the network MOE results. The highest numbers of trips completed and queued were in the PM peak hour, which also had correspondingly the highest VMT and VHT. Network speed, delay and delay per vehicle shows that all three peak hours have fairly similar results. The value of the 2019 existing year network MOE statistics will be found in comparison made during the No-Build and Build future scenario tests to compare the amount of degradation additional growth and traffic demands place on the Eastowne study area transportation network.

Table 11. Study Area System-wide MOE Results

MOE	AM Peak Hour	Noon Peak Hour	PM Peak Hour
Trips Completed	23,926	23,264	27,631
Trips Queued	140	108	196
Vehicle Miles Traveled (VMT)	44,233	38,736	45,859
Vehicle Hours Traveled (VHT)	1,645	1,432	1,844
Network Speed (mph)	30.9	33.2	30.2
Network Delay (Hours)	778	681	939
Delay Per Vehicle (Seconds)	31	34	29

Corridor-Level MOEs

Corridor-Level MOEs were compiled through the use of sensors placed in the study area TransModeler networks that record vehicular travel times and speeds between pairs of sensors over specified durations. MOE data was collected from TransModeler output matrices for each existing 2019 peak hour simulation to include the following:

- Average Travel Time/Speed between selected points on US 15-501 (Fordham Boulevard)
- Number of vehicles making a complete trip between the two points for each segment

The choice of segmentation for US 15-501 into four areas allows existing and future scenario comparisons for the southern portion of the study area, the portion of the six-mile corridor through the UNC Health Care Eastowne Property itself, and the northern portion of the study area. The four segment boundaries are:

- Manning Drive to Estes Drive (2.0 miles)
- Estes Drive to Franklin Street (1.1 miles)
- Franklin Street to I-40 (1.5 miles) – through the UNC Health Care Eastowne Property
- I-40 to Garrett Road (1.4 miles)

Aggregated corridor MOE data is shown in **Table 12** for all three existing 2019 peak hour simulation runs. Speed and travel time results are fairly consistent between the two directions. Northbound speeds through the middle corridor segment and southbound speeds on the northern end of the corridor are, overall, the lowest of the three sections. No time period experiences marked differences in overall end-to-end corridor speeds. Without true origin-destination information available, the ODME created in TransModeler assigns in the neighborhood to 200 northbound and southbound



“through” trips that begin on one end of the network and end on the other end of the network. These results may be different from the O-D trip table produced by the TRM, or by a field verified O-D survey.

Table 12. US 15-501 Corridor MOE Results

Travel Direction	Segment	MOE								
		Through Trips Completed			Travel Time (min)			Speed (mph)		
		AM Peak	Noon Peak	PM Peak	AM Peak	Noon Peak	PM Peak	AM Peak	Noon Peak	PM Peak
US 15-501 Fordham Boulevard Northbound	Manning Dr to Estes Dr	867	524	631	3.73	3.55	3.61	32.5	34.1	33.6
	Estes Dr to Franklin St	770	680	771	1.94	2.00	2.22	34.6	33.6	30.3
	Franklin St to I-40 Ramps	706	718	960	3.16	2.50	3.00	26.8	33.8	28.2
	I-40 Ramps to Garrett Rd	841	530	791	3.32	2.94	3.46	26.2	29.6	25.1
	Manning Dr to Garrett Rd	117	38	62	12.15	10.99	12.29	29.6	32.8	29.3
US 15-501 Fordham Boulevard Southbound	Garrett Rd to I-40 Ramps	1,368	808	1,084	2.62	2.46	2.97	32.5	34.6	28.7
	I-40 Ramps to Franklin St	920	675	793	2.99	2.82	2.89	30.1	31.9	31.1
	Franklin St to Estes Dr	907	489	609	2.11	2.98	2.73	31.3	22.1	24.2
	Estes Dr to Manning Dr	503	585	811	3.45	3.59	3.83	36.5	35.1	32.9
	Garrett Rd to Manning Dr	69	36	48	11.17	11.85	12.42	32.9	31.0	29.6

Intersection MOEs

Intersection MOEs were collected through the use of delay and queue reports produced by the TransModeler software. The Delay-by-Lane and Spillback Queue reports were utilized to produce the following MOE data.

- Average Queue Length for each intersection movement/approach
- Maximum Queue Length for each intersection movement/approach
- Average vehicular delay and Equivalent Level-of-Service (LOS) for each intersection

Table 13 presents the averaged per vehicle delay results for the 2019 existing year peak hour traffic conditions as compiled from the 10 simulation runs for each peak period. The table lists overall intersection delay as an average for all movements and approaches at each signalized intersection. It also lists data for the worst-case individual movements encountering delay at the stop-controlled intersections, per similar methodologies that would be employed by empirical HCM calculations. **Figures 14A through 14D** present a summary intersection LOS for each peak period.



AM Peak Hour Analysis

Of the 32 intersection locations analyzed, only four currently experience deficient overall peak hour LOS in the AM peak period, based on averaged 10 run TransModeler simulation results. The specific intersections and issues that contribute to the deficient LOS E or LOS F operation include the following:

- **US 15-501 (Fordham Boulevard) and Cleland Road**
Overall LOS F results reported are caused by high traffic volume demand on US 15-501 coupled with moderate demand on both minor street approaches that are also stop-controlled. This intersection is also over capacity in the Noon and PM peak hours.
- **US 15-501 (Fordham Boulevard) Northbound & Brandon Road**
Overall LOS F results reported are caused by high traffic volume demand on US 15-501 coupled with moderate demand on both minor street approaches that are also stop-controlled. This intersection is also over capacity in the PM peak hour.
- **US 15-501 (Fordham Blvd) & NC 54 (Raleigh Road) Northbound Ramps**
Overall LOS F results reported are caused by high traffic volume demand on US 15-501 coupled with a stop-controlled merge onto US 15-501 from the ramps.
- **Old Durham Road & Scarlett Drive**
Overall LOS F results for the AM peak hour (and subsequent Noon and PM peak hours) are caused by the location of this intersection being too close to the major US 15-501/Sage Road/Old Durham Road signalized intersection. Queues on Old Durham Road prevent gaps for Scarlett Drive traffic to enter this intersection.

All other remaining signalized and unsignalized intersections in the project study area feature acceptable LOS, as determined by Town of Chapel Hill thresholds (LOS D overall for signalized intersections or LOS E for critical movements for unsignalized intersections).

Noon Peak Hour Analysis

Of the 32 intersection locations analyzed, no signalized intersections currently experience a deficient peak hour LOS in the noon peak period, based on averaged simulation run results. Two unsignalized intersection critical movements experience operational LOS issues. Noon peak traffic flows in the project study area are generally lower and more directionally balanced than AM and PM peak flows.



Table 13. Capacity Analysis Results for Study Area Intersections - 2019 Existing Traffic

ID	Intersection Name	Average Control Delay (sec/veh)			Equivalent LOS		
		AM	Noon	PM	AM	Noon	PM
1	US 15-501 (Durham-Chapel Hill Boulevard) & Garrett Road	49.9	43.0	53.0	D	D	D
2	US 15-501 (Durham-Chapel Hill Boulevard) & SW Durham Drive / Service Road	20.9	22.2	25.7	C	C	C
3	US 15-501 (Durham-Chapel Hill Boulevard) & Mt Moriah Road	25.4	41.4	45.2	C	D	D
4	US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Westbound Ramps	35.2	26.0	24.8	D	C	C
5	US 15-501 (Durham-Chapel Hill Boulevard) & I-40 Eastbound Ramps	34.2	24.2	23.7	C	C	C
6	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive / Lakeview Drive	16.6	12.3	17.9	B	B	B
7	US 15-501 (Durham-Chapel Hill Boulevard) & Eastowne Drive / Service Road	21.4	10.7	10.9	C	B	B
8	US 15-501 (Durham-Chapel Hill Boulevard) & Sage Road / Old Durham Road	45.0	41.5	47.2	D	D	D
901	US 15-501 Southbound & Northbound U-Turn (US 15-501/Erwin Rd Superstreet)	19.4	16.1	15.4	B	B	B
903	Erwin Road & US 15-501 Southbound (US 15-501/Erwin Rd Superstreet)	21.3	18.6	15.5	C	B	B
904	US 15-501 Northbound & Europa Drive (US 15-501/Erwin Rd Superstreet)	10.6	13.0	15.6	B	B	B
906	Northbound U-Turn – Service Road Connector & US 15-501 Northbound (US 15-501/Erwin Rd Superstreet)	5.9	13.3	7.1	A	B	A
10	US 15-501 (Fordham Boulevard) & Ephesus Church Road	30.5	47.1	40.7	C	D	D
11	US 15-501 (Fordham Boulevard) & Elliott Road	6.2	13.4	10.5	A	B	B
12	US 15-501 (Fordham Boulevard) & Willow Drive	10.4	21.7	22.6	B	C	C
13	US 15-501 (Fordham Boulevard) & Estes Drive	22.8	31.5	32.7	C	C	C
14	US 15-501 (Fordham Boulevard) & Cleland Road	98.4	129.7	137.4	F	F	F
15	US 15-501 (Fordham Boulevard) & Brandon Road	84.0	46.8	169.9	F	E	F
1601	US 15-501 (Fordham Boulevard) & NC 54 Westbound Ramps (signal)	14.3	17.4	16.1	B	B	B
1602	US 15-501 (Fordham Boulevard) & NC 54 Eastbound Ramps	25.7	21.3	47.0	D	C	E
1603	Raleigh Road and US 15-501 (Fordham Boulevard) Northbound Ramps	52.4	25.3	41.5	F	D	E
1604	NC 54 (Raleigh Road) & US 15-501 (Fordham Boulevard) Southbound Ramps	19.0	18.4	106.9	C	C	F
17	US 15-501/NC 54 (Fordham Boulevard) & Old Mason Farm Road /Carmichael Drive / Fern Lane	45.1	36.3	58.0	D	D	E

BOLD/ITALIC – Movement or Overall Intersection is over capacity per Town of Chapel Hill TIS Guidelines



Table 13 (Continued). Capacity Analysis Results for Study Area Intersections - 2019 Existing Traffic

ID	Intersection Name	Average Control Delay (sec/veh)			Equivalent LOS		
		AM	Noon	PM	AM	Noon	PM
18	US 15-501/NC 54 (Fordham Boulevard) & Manning Drive	38.2	22.8	42.2	D	C	D
19	Eastgate Crossing & E. Franklin Street	9.0	11.5	13.5	A	B	B
20	Elliott Road & E. Franklin Street	20.4	28.8	61.7	C	C	E
21	Estes Drive & E. Franklin Street	35.0	37.2	52.2	D	D	D
22	Sage Road & Erwin Road	23.2	19.2	26.5	C	B	C
23	Sage Road & Old Sterling Drive / Coleridge Drive	18.8	11.1	16.9	C	B	C
24	Sage Road & Lowes Entrance / Cosgrove Drive	21.3	13.9	12.7	C	B	B
25	Old Durham Road & Scarlett Drive	114.5	110.6	180.2	F	F	F
26	Legion Road & Scarlett Drive	7.0	6.9	6.6	A	A	A
27	Eastowne Drive & Dobbins Drive	17.0	10.8	11.9	C	B	B
28	Eastowne Drive & Old Sterling Drive	6.1	6.5	6.8	A	A	A
29	Eastowne Drive & Providence Road South	7.1	7.5	6.9	A	A	A
30	Eastowne Drive & Providence Road North	8.1	7.1	7.9	A	A	A
31	Old Durham Road & Lakeview Drive	12.9	13.1	17.1	B	B	C
32	Old Durham Road & Pope Road	11.2	11.0	12.2	B	B	B

BOLD/ITALIC – Movement or Overall Intersection is over capacity per Town of Chapel Hill TIS Guidelines



PM Peak Hour Analysis

Of the 32 intersection locations analyzed, two signalized intersections currently experience deficient overall peak hour LOS in the PM peak period, based on traffic simulation results.

- **US 15-501 / NC 54 (Fordham Blvd) & Old Mason Farm Rd / Carmichael Drive / Fern Lane**
PM peak hour LOS E results are caused by high traffic volumes on US 15-501 / NC 54 and existing geometrics that feature shared through-left-right or through-right turn lanes on side street approaches coupled with high turning movement (left and right-turns) at several approaches.
- **E. Franklin Street & Elliott Road**
PM peak hour LOS E results are caused by high traffic volumes on E. Franklin Street and Elliott Road and existing geometrics that feature shared through-right turn lanes on all approaches coupled with high turning movement (left and right-turns) at several approaches.

Several unsignalized intersections have critical stop-controlled movements that operate at LOS E or F in the PM peak hour due to their location relative to traffic signals where queues on minor street approaches block these intersections during the simulation run or the intersections are located along high volume arterials that have limited gaps for stop-controlled traffic.

Peak Hour Queue Results Discussion

Using the TransModeler lane and spillback queue reports, an evaluation of existing peak hour maximum queue information was made for all study area intersections. Evaluation of the queue report data was made by identifying intersection links where spillback rate (percentage) was greater than zero and assessing maximum queue lengths reported for the 10 simulation runs compared to existing link lengths and separation between existing intersections.

Figure 15 shows a graphical schematic of the queue analysis results, identifying both links upstream of study area intersections where there is queue spillback potential and the approximate distance of the maximum queue in these areas for at least one peak hour.

The figure highlights the following queue spillback areas:

- **US 15-501/Eastowne Drive (North)** – model results for multiple peak hours indicate minor queue issues in this area along the US 15-501 corridor, due to congestion at the signalized intersection. Eastowne Drive does experience minor congestion during all peak hours.
- **US 15-501/Sage Road/Old Durham Road** – model results indicate some significant queuing in multiple peak hours for the Sage Road and Old Durham Road/Scarlett Drive approaches that extend past upstream intersections away from the major US 15-501 intersection.
- **US 15-501/Manning Drive to Old Mason Farm Road** – model results that there are noticeable recurring congestion issues at and between these two intersections in the southern portion of the study area network in the AM and PM peak hours.
- **Estes Drive and E. Franklin Street** – model results indicate multiple approaches at this intersection can exhibit lengthy queues and spillback from turn lanes in the noon and PM peak hours.



C. Daily Planning-Level Volume/Capacity (v/c) Analysis

A capacity analysis for daily traffic volumes and estimated capacities was conducted for existing planning-level conditions. Data for this analysis was taken from the latest version of the TRM used for this study and current or recent Annual Average Daily Traffic (AADT) data on selected study area network roadway segments. Daily volume/capacity link analyses are more applicable to long range future conditions but were used as a baseline in this report to compare to future projected traffic growth in subsequent analyses for the UNC Health Care Eastowne Property. Study area traffic operations are usually better explained by peak hour intersection LOS methodologies, in most cases, when current and short-range data are available.

The TRM data includes estimated peak hour link capacities for roadway facilities in the study area. These capacities account for existing roadway characteristics (number of lanes, operating speeds, access control, presence of traffic signals) and were extrapolated to a daily capacity estimation by applying a factor of 10 to the link capacity estimate, which is general assumption used in traffic forecasting activities accounting for the likelihood that 10 percent of daily traffic/capacity is found within the highest weekday peak hour.

As shown in **Table 14** on the following page, five roadway segments currently exhibit daily traffic volumes that exceed estimated daily capacities (v/c ratio > 1.0) with the input AADT values and three segments are approaching daily capacity thresholds (v/c ratio 0.90 or greater), meaning they are approaching their daily capacity limit and likely experience periods of congested traffic conditions. The locations of the congested segments are as follows:

- **US 15-501 from Garrett Road to I-40** – this corridor is above daily capacity for four segments, as overall daily AADT values are near or above existing roadway characteristics used to calculate the capacity values. This area currently experiences peak hour congested conditions.
- **US 15-501 from Erwin Road to Ephesus Church Road** – this corridor location is nearing daily capacity, as overall daily AADT values are near existing roadway characteristics used to calculate the capacity values. The area experiences existing peak hour traffic congestion stemming from the intersection at Erwin Road.
- **US 15-501 from Manning Drive to NC 86** – this section of US 15-501 has current daily traffic demands nearing daily capacity. The area experiences existing peak hour traffic congestion stemming from the intersection at Manning Drive.
- **I-40 west of US 15-501** – this section of I-40 is near daily capacity, as high traffic volumes on I-40 are constrained to a four-lane roadway cross-section.
- **Mt Moriah Road south of US 15-501** - this section of Mt Moriah Road has current daily traffic demands exceeding daily capacity. The area experiences existing peak hour traffic congestion stemming from the intersection at US 15-501.



Table 14. 2019 Daily Volume/Capacity Analysis for Selected Study Area Road Segments

Roadway Facility	Segment ID	Segment Limit		2017 NCDOT AADT (vpd)	2019 Field AADT (vpd)	2019 Capacity (vpd)	V/C Ratio*
		From	To				
US 15-501 (Fordham Boulevard - Durham/Chapel Hill Boulevard)	1	US 15-501 NB Ramp	Garrett Road	54,000	60,700	55,200	1.10
	2	Garrett Road	SW Durham Drive	52,000	61,200	55,200	1.11
	3	SW Durham Drive	Mt Moriah Road	-	57,200	55,200	1.04
	4	Mt Moriah Road	I-40 EB Ramp	-	59,400	55,200	1.08
	5	I-40	Eastowne Drive / Lakeview Drive	45,000	41,800	55,200	0.76
	6	Lakeview Drive	Eastowne Drive / Service Road	-	36,300	55,200	0.66
	7	Eastowne Drive / Service Road	Sage Road / Old Durham Road	-	35,700	55,200	0.65
	8	Sage Road / Old Durham Road	Erwin Road/Europa Drive	43,000	45,000	55,200	0.82
	9	Erwin Road / Europa Drive	Ephesus Church Road	49,000	45,000	43,200	0.96
	10	Ephesus Church Road	Elliott Road	-	31,100	51,800	0.60
	11	Elliott Road	Willow Drive	-	32,500	51,800	0.63
	12	Willow Drive	Estes Drive	31,000	29,100	51,800	0.56
	13	Estes Drive	Cleland Road	38,000	36,000	51,800	0.69
	14	Cleland Road	Brandon Road	-	35,100	51,800	0.68
	15	Brandon Road	NC 54 (Raleigh Road)	-	34,200	51,800	0.66
	16	NC 54 (Raleigh Road)	Old Mason Farm Road / Carmichael Drive	54,000	41,600	51,800	0.80
	17	Old Mason Farm Road / Carmichael Drive	Manning Drive	-	43,700	51,800	0.84
	18	Manning Drive	Mason Farm Road	-	46,800	51,800	0.90
Garrett Road	19	Pickett Road	US 15-501 (Durham-Chapel Hill Boulevard)	4,600	18,200	21,400	0.85
	20	US 15-501 (Durham-Chapel Hill Boulevard)	Old Chapel Hill Road	11,000	16,000	21,400	0.75
SW Durham Drive	21	US 15-501 (Durham-Chapel Hill Boulevard)	Old Chapel Hill Road	7,500	10,000	21,400	0.47
Mt Moriah Road	22	Sunlight Drive	US 15-501 (Durham-Chapel Hill Boulevard)	5,300	22,500	21,400	1.05
	23	US 15-501 (Durham-Chapel Hill Boulevard)	Old Chapel Hill Road	6,300	15,700	21,400	0.73
I-40	24	NC 86 Interchange	US 15-501 (Durham-Chapel Hill Boulevard)	81,000**	82,100	90,500	0.91
	25	US 15-501 (Durham-Chapel Hill Boulevard)	NC 54 Interchange	96,500**	97,900	143,000	0.68
Eastowne Drive (East)	26	Providence Drive	US 15-501 (Fordham Boulevard)	-	4,700	14,500	0.32
Lakeview Drive	27	US 15-501 (Fordham Boulevard)	Old Durham Road	-	2,600	17,300	0.15
Eastowne Drive (West)	28	US 15-501 (Fordham Boulevard)	Pinegate Road	-	2,400	14,500	0.17
	29	Pinegate Road	Old Sterling Drive	-	1,500	14,500	0.10
Service Road	30	US 15-501 (Fordham Boulevard)	Scarlett Drive	-	200	13,000	0.02

vpd = vehicles per day

Data Sources: 2017 AADT Counts from NCDOT Traffic Survey Group and 2019 Field Data, Daily capacity data from the TRM Version 6.0 (Hourly Capacity Divided by Assumed DHV = 0.10)

* - V/C Ratio for Highest Demand Between 2017 NCDOT and 2019 Field-Collected Data

** - 2018 AADT Counts from NCDOT Traffic Survey Group



Table 14 (Continued). 2019 Daily Volume/Capacity Analysis for Selected Study Area Road Segments

Roadway Facility	Segment ID	Segment Limit		2017 NCDOT AADT (vpd)	2019 Field AADT (vpd)	2019 Capacity (vpd)	V/C Ratio*
		From	To				
Sage Road / Old Durham Road	31	Weaver Dairy Road	Erwin Road	-	9,950	21,400	0.46
	32	Erwin Road	Old Sterling Drive	9,900	11,300	21,400	0.53
	33	Old Sterling Drive	US 15-501 (Durham-Chapel Hill Boulevard)	-	10,400	21,400	0.49
	34	US 15-501 (Durham-Chapel Hill Boulevard)	Scarlett Drive	-	6,600	21,400	0.31
	35	Scarlett Drive	Lakeview Drive	5,600	5,500	21,400	0.26
Old Sterling Drive	36	Sage Road	Providence Glen Drive (West)	-	3,400	17,300	0.20
	37	Providence Glen Drive (West)	Eastowne Drive	-	2,900	17,300	0.17
Scarlett Drive	38	Old Durham Road	Legion Road	-	2,600	10,900	0.24
Erwin Road	39	Covington Drive	Sage Road	-	8,900	17,300	0.51
	40	Sage Road	Weaver Dairy Road	-	5,800	17,300	0.34
	41	Weaver Dairy Road	US 15-501 (Fordham Boulevard)	7,200	7,600	21,400	0.36
Europa Drive	42	US 15-501 (Fordham Boulevard)	Legion Road	-	3,300	13,000	0.25
Ephesus Church Road / Eastgate	43	E. Franklin Street	US 15-501 (Fordham Boulevard)	-	3,800	14,000	0.27
	44	US 15-501 (Fordham Boulevard)	Legion Road	11,000	8,500	17,300	0.49
Elliott Road	45	Old Oxford Road / Velma Drive	E. Franklin Street	5,400	4,700	14,700	0.32
	46	E. Franklin Street	US 15-501 (Fordham Boulevard)	9,500	6,900	14,700	0.47
Willow Drive	47	Estes Drive	US 15-501 (Fordham Boulevard)	7,900	6,100	17,300	0.35
	48	US 15-501 (Fordham Boulevard)	Spruce Drive	2,400	2,400	13,000	0.18
Estes Drive	49	Caswell Drive	E. Franklin Street	17,000	14,300	17,300	0.83
	50	E. Franklin Street	Willow Drive	16,000	11,900	34,700	0.34
	51	Willow Drive	US 15-501 (Fordham Boulevard)	12,000	8,400	34,700	0.24
E. Franklin Street	52	US 15-501 (Fordham Boulevard) Split	Eastgate Crossing	21,000	20,400	42,800	0.48
	53	Eastgate Crossing	Elliott Road	-	23,800	42,800	0.56
	54	Elliott Road	Estes Drive	23,000	22,400	42,800	0.52
	55	Estes Drive	Meadowbrook Drive	16,000	17,500	42,800	0.41
Cleland Drive	56	US 15-501 (Fordham Boulevard)	Hamilton Road	2,100	1,700	13,000	0.13
Brandon Road	57	US 15-501 (Fordham Boulevard)	Flemington Road	-	1,400	14,500	0.10
NC 54 (Raleigh Road)	58	Greenwood Drive	US 15-501 (Fordham Boulevard)	19,000	19,800	42,800	0.46
	59	US 15-501 (Fordham Boulevard)	Hamilton Road	50,000	51,200	64,300	0.80
Old Mason Farm Road / Carmichael Drive	60	NC 54 (Raleigh Road)	Prestwick Drive	2,900	3,200	14,700	0.22
	61	US 15-501 (Fordham Boulevard)	E of Highland Woods Road	3,000	3,500	14,700	0.24
	62	US 15-501 (Fordham Boulevard)	Fern Lane	-	1,100	14,700	0.07
Manning Drive	63	US 15-501 (Fordham Boulevard)	Skipper Bowles Drive	17,000	16,400	34,700	0.47

vpd = vehicles per day

Data Sources: 2017 AADT Counts from NCDOT Traffic Survey Group and 2019 Field Data, Daily capacity data from the TRM Version 6.0 (Hourly Capacity Divided by Assumed DHV = 0.10)

*- V/C Ratio for Highest Demand Between 2017 NCDOT and 2019 Field-Collected Data



D. Existing Transit Capacity Analysis

An existing analysis of all current CHT and GoTriangle fixed routes in the project study area (directly serving stops within the study area boundaries or periphery near the proposed UNC Health Care Eastowne Property) was conducted based on existing weekday ridership demand data (boardings and alightings) and service capacity, based on bus sizes/seats and existing headways (latest fall 2019 data provided by CHT and GoTriangle). A summary of each existing route serving the UNC Health Care Eastowne Property and the peak hour capacity analysis results are shown on the following pages.

Calculations of route demand are given by average load at each bus stop taken from ridership samples collected by CHT and GoTriangle. Estimations of bus capacity were made by the following:

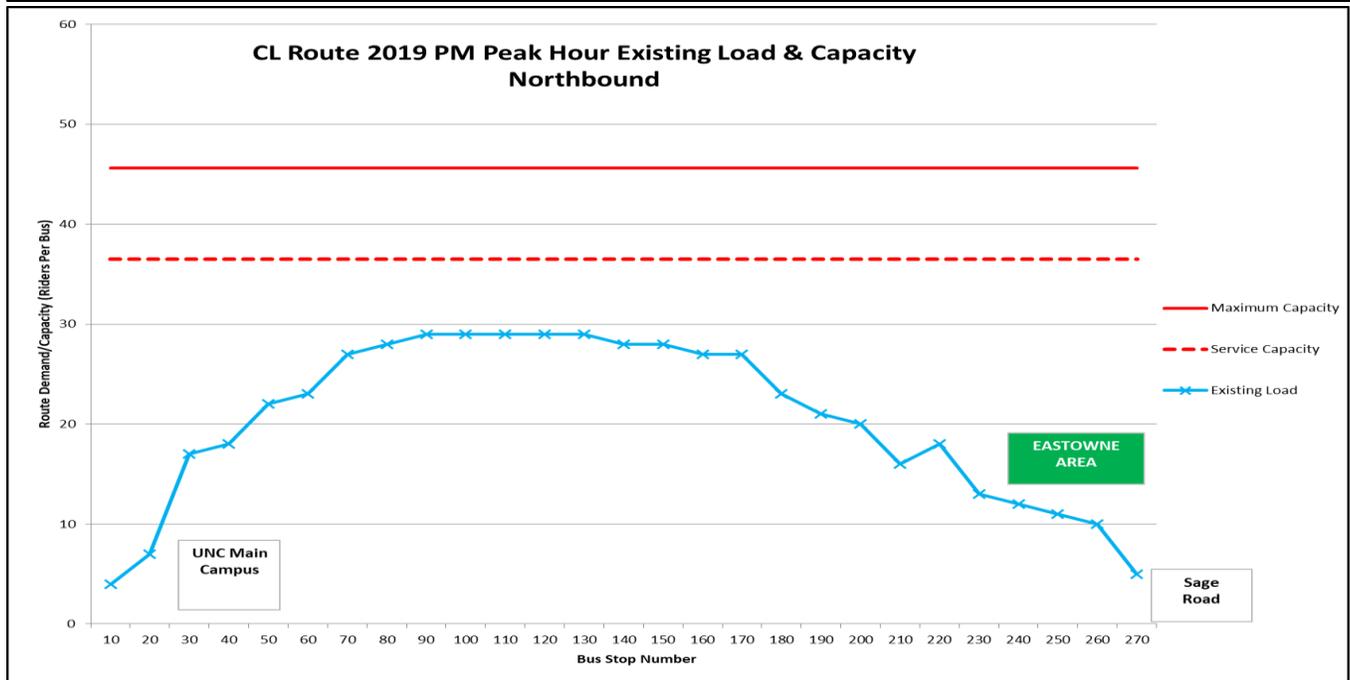
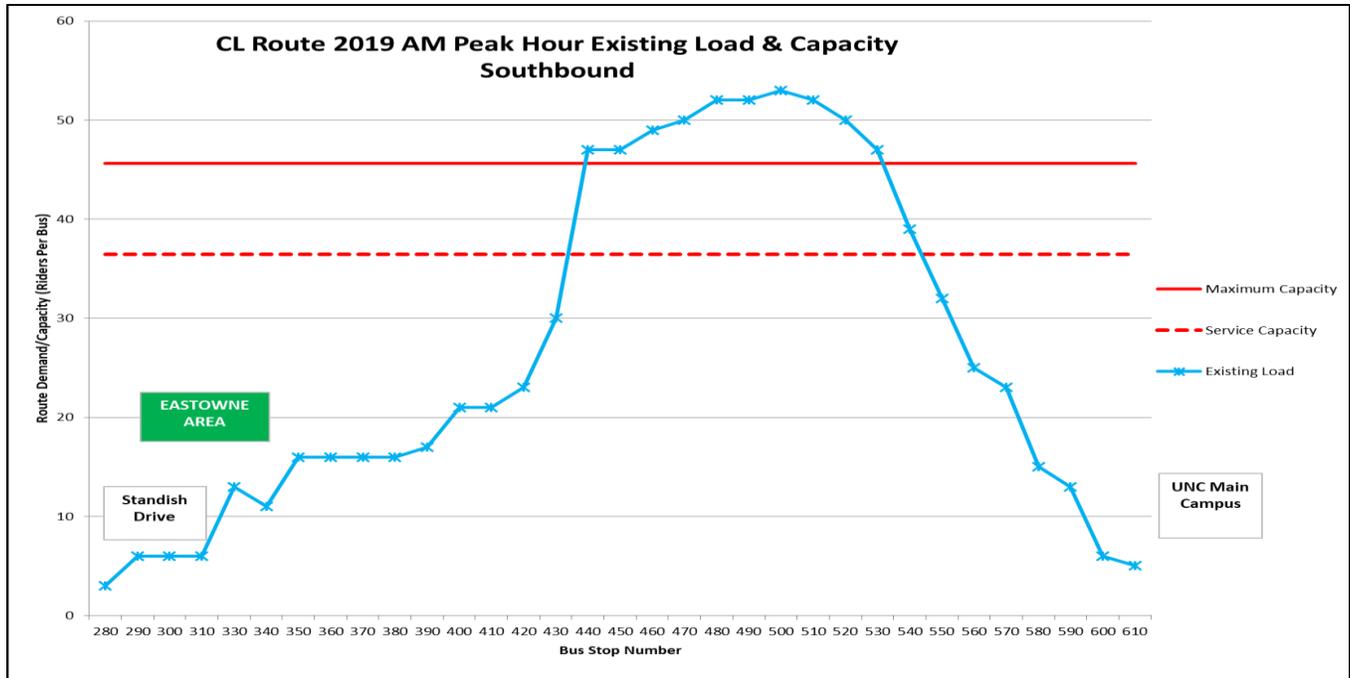
- Maximum bus capacity for a 40 foot standard bus = 38 seats X 1.5 maximum capacity factor = 57 passengers
- Maximum threshold capacity assumed to = 57 passengers X 0.80 factor = 45.6 passengers = analyzed "maximum capacity" of a bus
- Service capacity = 45.6 passengers X 0.80 factor = 36.48 passengers/bus

These values were developed based on input by CHT staff on previous bus operational capacity studies for other traffic impact analyses for major developments in Chapel Hill. Average loads were further computed by accounting for by multiple buses traveling through the UNC Health Care Eastowne Property during weekday peak hours based on vehicular traffic and not necessarily directly correlated to peak hours for transit loads, though the two often correlate well. This assumption will be necessary in making estimates for future transit ridership increases due to development changes in future scenarios where methodologies for trip generation and resulting mode split estimations will be done for the vehicular peak hours analyzed in this study. **Appendix D** contains load/capacity graphical results for CHT and GoTriangle routes in the project study area.

CL Route Demand/Capacity Results

CL Route information provided by CHT indicates that one bus traverses the project study area in the AM and PM peak hours, with no noon peak bus service for this route. Load and capacity graphs are shown on the following page for the peak hour highest ridership/load levels – inbound (southbound) in the AM peak hour and outbound (northbound) in the PM peak hour. Several stops on the CL route are within a walkable distance to the UNC Health Care Eastowne Property along Sage Road and Standish Drive. The two graphs shown below highlight loads along the route. In the AM peak, passenger loads to the south of the UNC Health Care Eastowne Property are exceeding current service capacity for an individual bus, and PM peak hour loads are nearing service capacity for a large portion of the route.

Passenger loads in the opposite direction are much lower during these peak time periods, with average demand less than 10 riders on a bus for every stop along the route.



D. Route Demand/Capacity Results

D Route information provided by CHT indicates that three buses traverse the UNC Health Care – Eastowne Property immediate study area in the AM and PM peak hours, with two noon peak buses in service in the area for this route. Load and capacity graphs are shown below for the highest ridership/load levels – inbound (southbound) in the AM peak hour and outbound (northbound) in the PM peak hour, along with outbound in the noon peak hour. Several stops on the D route are within the UNC Health Care Eastowne Property along Eastowne Drive, Old Sterling Drive, and Lakeview Drive. The three graphs shown below highlight loads along the route. In the AM peak, passenger loads within and to the south of the UNC Health Care Eastowne Property are exceeding current service and maximum capacity for an

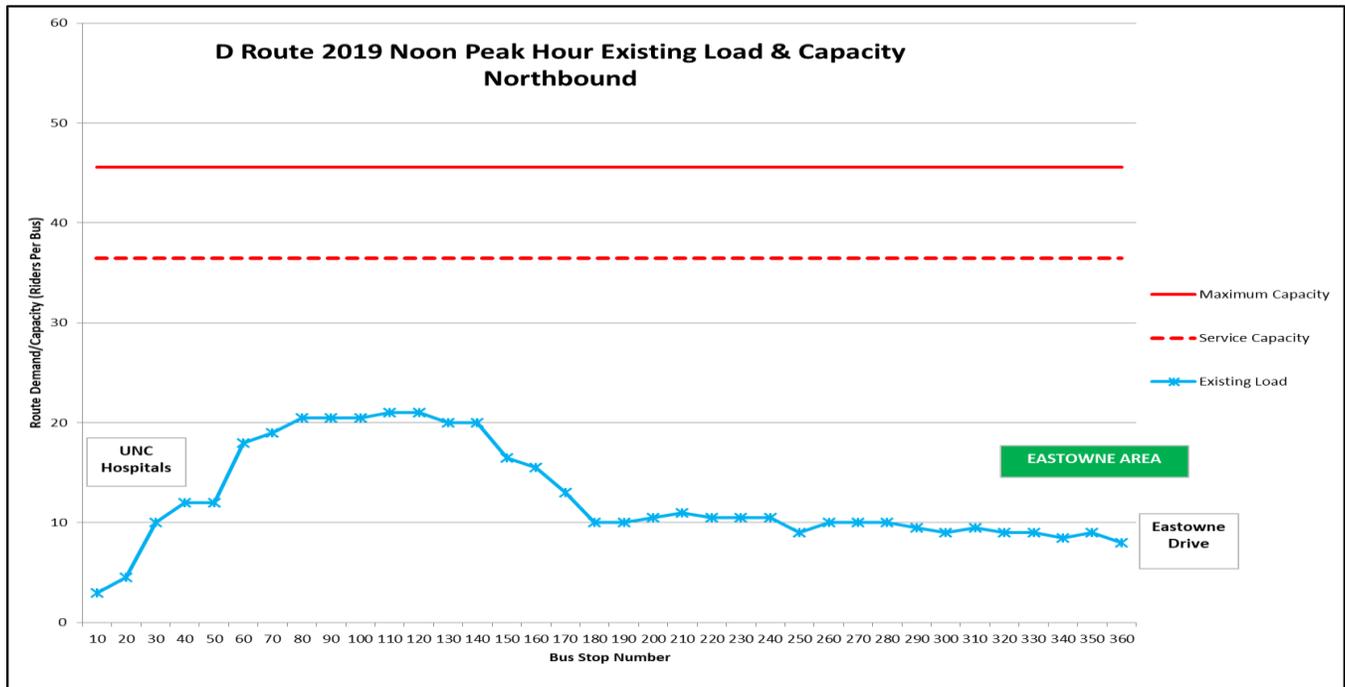
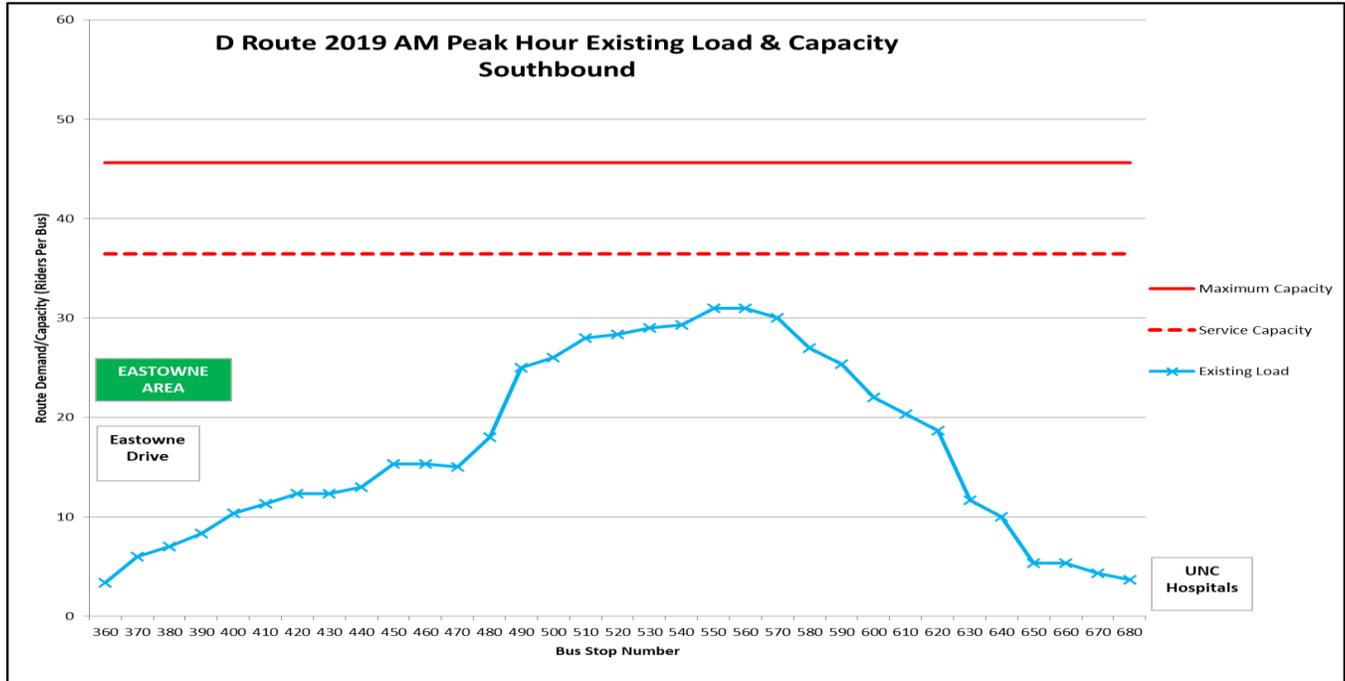


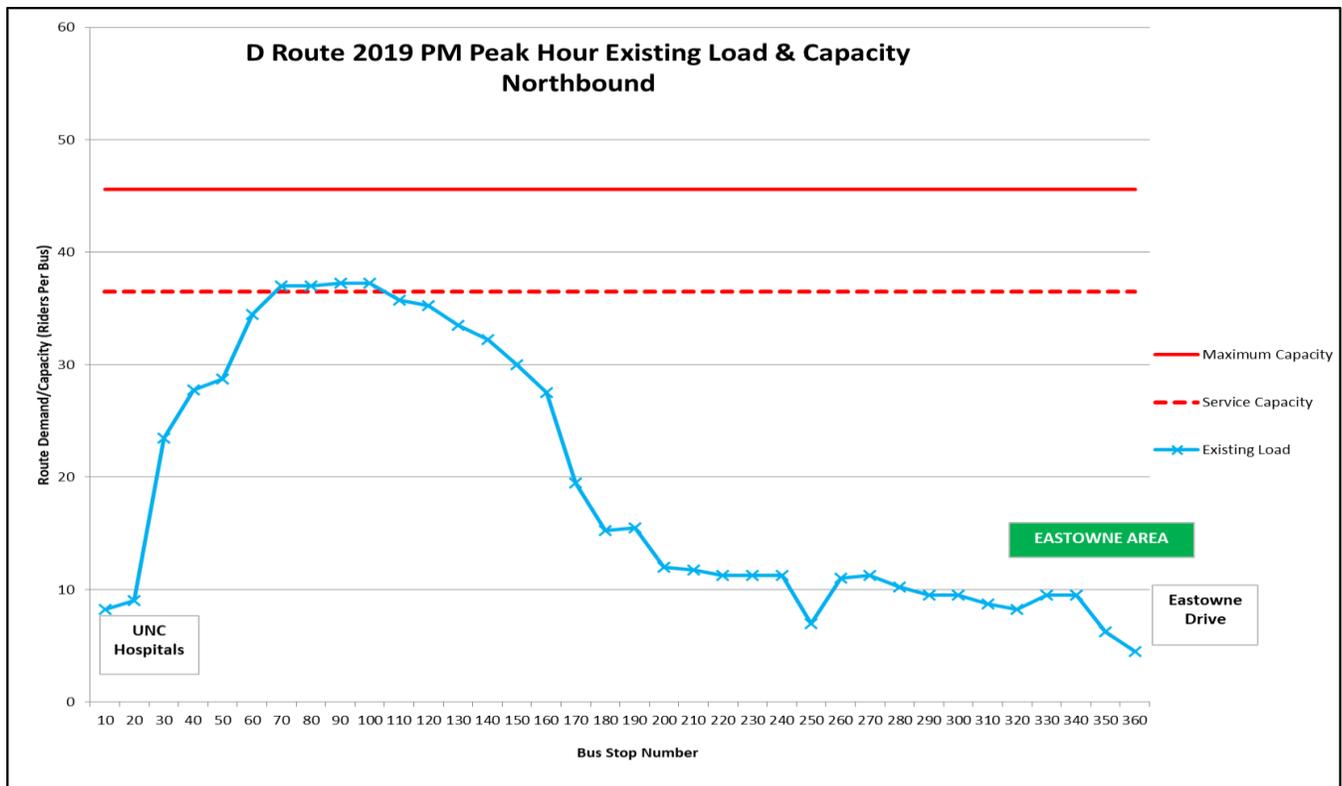
UNC Health Care Eastowne Property - Transportation Impact Analysis

DRAFT - 2019 Existing Conditions Technical Memorandum

individual bus, and PM peak hour loads are exceeding service capacity for a small portion of the route prior to the UNC Health Care Eastowne Property area, where a sizable number of riders alight.

Passenger loads in the opposite direction are much lower during these peak time periods, with average demand less than 20 riders on a bus for every stop along the route.





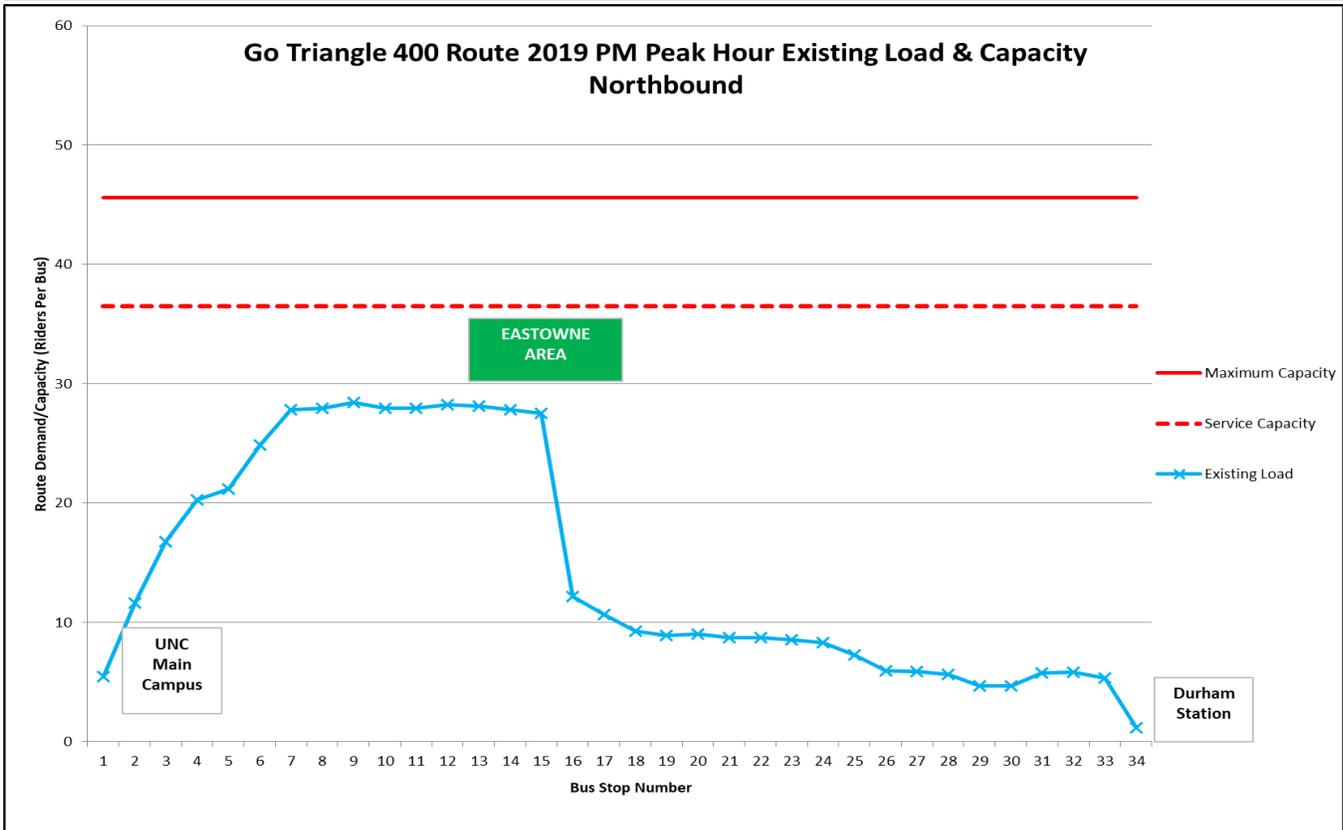
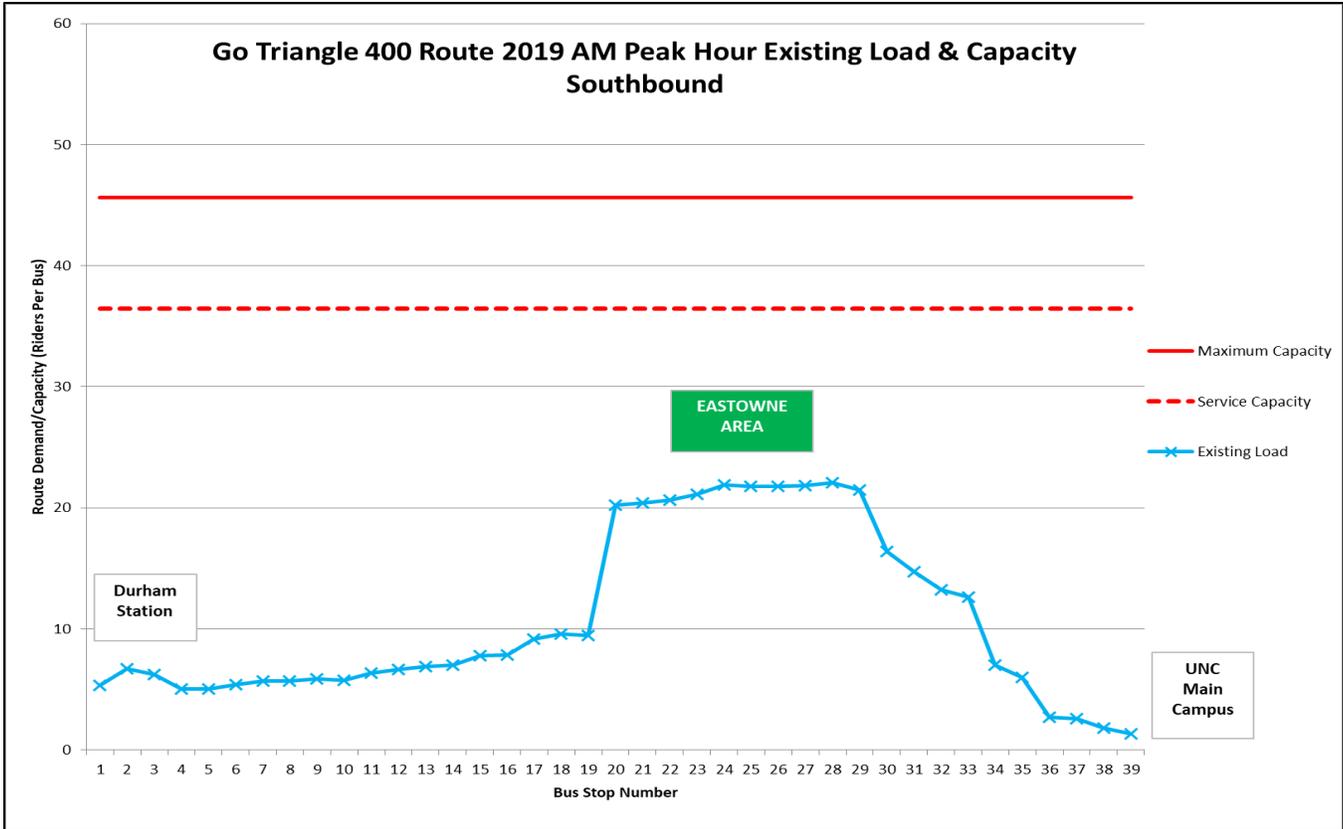
Go Triangle Routes 400/405 Demand/Capacity Results

Routes 400 and 405 have potential stops adjacent to the UNC Health Care Eastowne Property along US 15-501 and were included in transit capacity analyses to assess potential effects on regional transit trips. Route 400 and 405 demand and capacity information was provided by Go Triangle and indicate that two Route 400 buses traverse the UNC Health Care – Eastowne Property immediate study area in the AM, noon, and PM peak hours. Load and capacity graphs are shown on the following page for the highest ridership/load levels. For all peak hours the passenger load increases toward the middle stops along the route and then decreases towards the terminal points, with maximum loads nearing 30 passengers. The noon peak capacity and demand graph is not shown, as demand along the entire route is less than 10 passengers maximum.

Route 405 information indicates that two buses traverse the study area during the AM and PM peak hours, with no noon peak service. Passenger loads are generally less than 25 riders along the route during each time period and increase towards the mid-point of the route near the Eastowne area, similar to the Route 400 data and graphs.



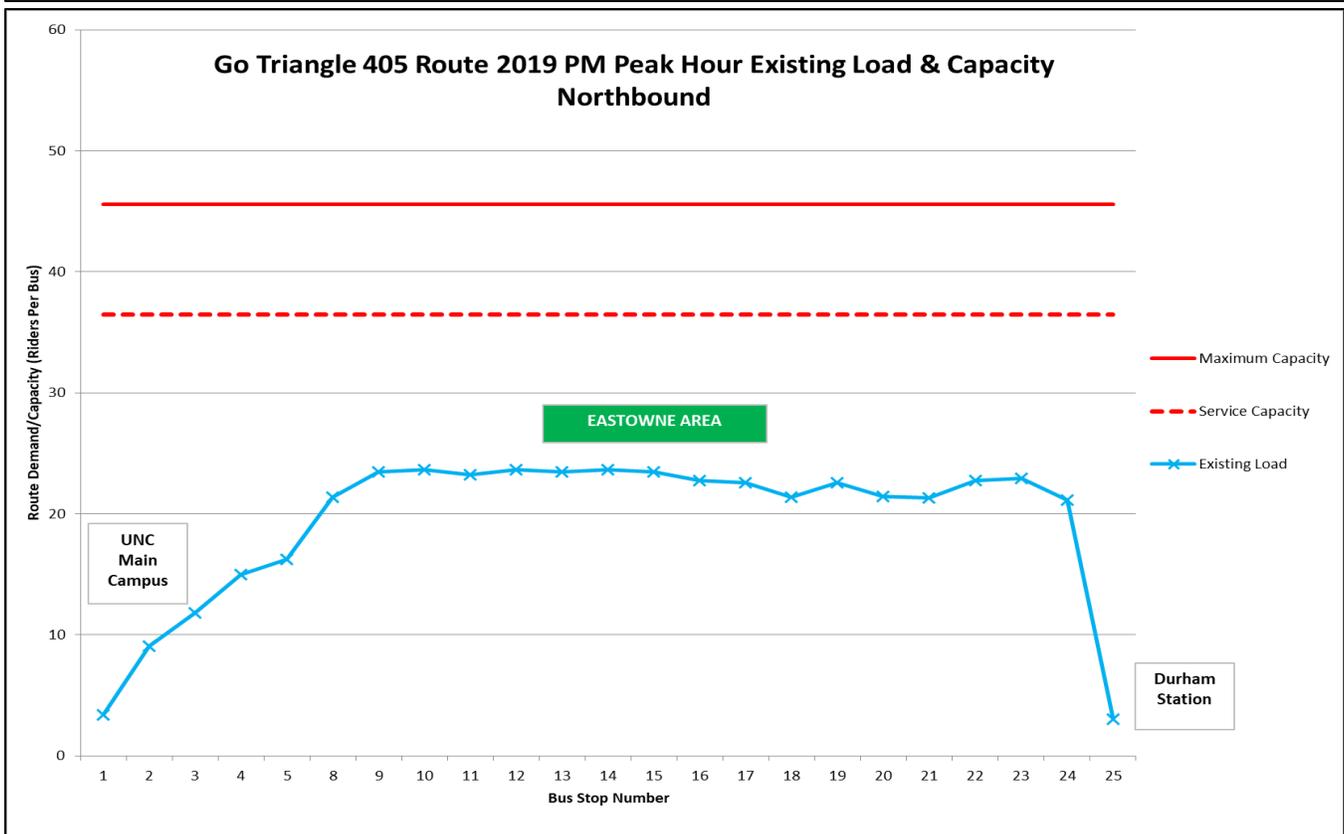
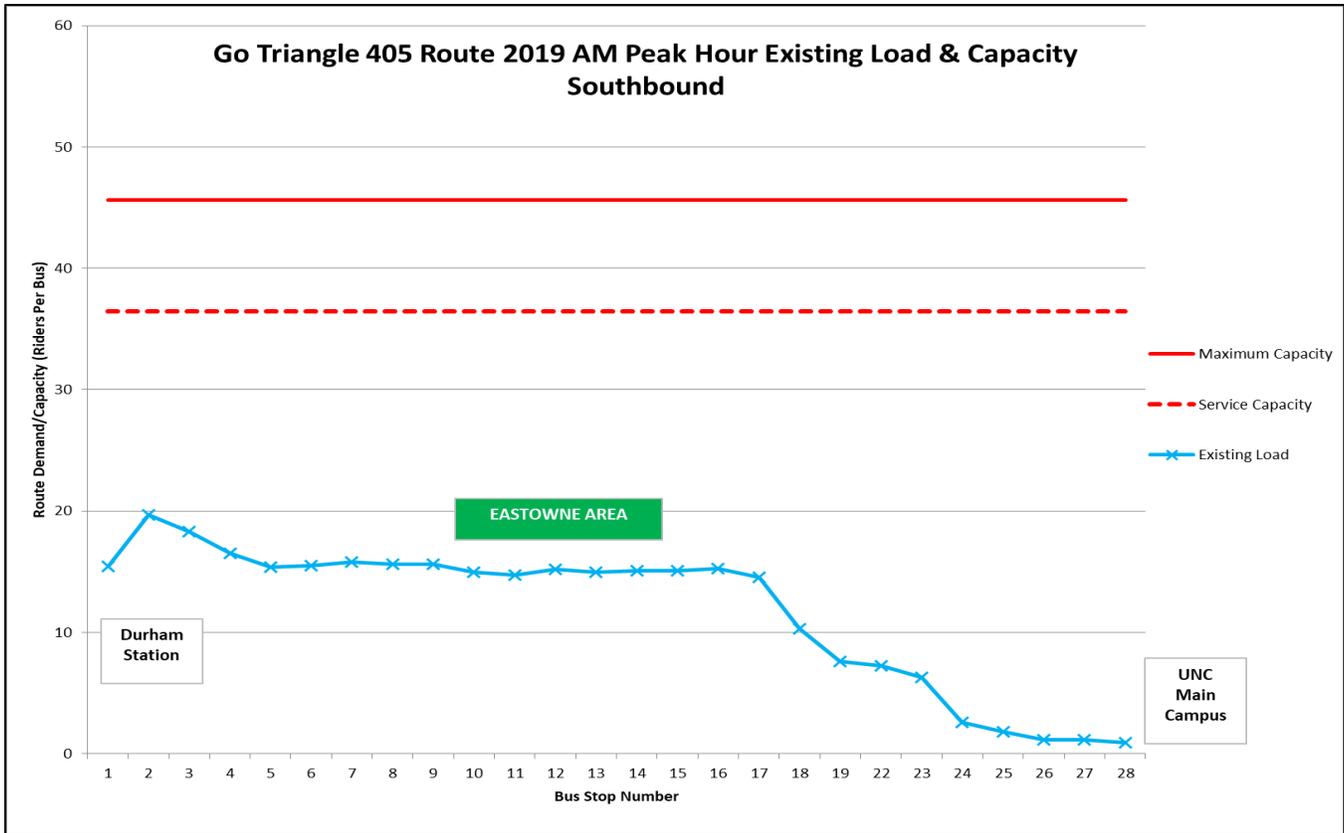
UNC Health Care Eastowne Property - Transportation Impact Analysis
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In the regional model development and modification process for this study, an assessment of existing TRM transit networks will be made to compile model boarding and alighting local/express daily assignment data. This information was compared with a summation of total daily boardings for CHT routes in this study taken from fall 2019 raw information. **Table 15** shows that the TRM, in all cases, is over predicting the levels of transit boarding compared to existing field collected information. Additional review of both existing data sources and model data will be made to verify results and determine applicability of direct usage of transit route information from future scenario regional travel demand models developed for this study.

Table 15. Comparison of TRM Transit Boardings to Fall 2019 Ridership Data

Bus Route	Model	Actual	Ratio
CHT CL	1,122	574	1.95
CHT D	4,739	1,698	2.79
Go Triangle 400	1,569	974	1.61
Go Triangle 405	678	548	1.24

Transit operations were also evaluated as part of multi-modal analyses of pedestrian and bicycle facilities within the UNC Health Care Eastowne Property in the next sections of this report. **Table 16** highlights LOS results for transit facilities and operations along five UNC Health Care Eastowne Property transportation corridors. These results are not as detailed as the operational load/capacity evaluations and pertain to the availability and condition of bus stops, bus shelters and raw number of buses running during peak time periods along each side of a roadway. The LOS results are demonstrative of several issues – lack of stops and buses directly equates to a poor LOS score, and even with buses and facilities present along a road segment, if load factors are excessive, the resulting LOS will degrade rapidly.

E. Existing Multi-Modal LOS Analyses

A corridor-level pedestrian, bicycle and transit LOS assessment of five (5) existing corridors within and connecting to the specific UNC Health Care Eastowne Property area was conducted using the Highway Capacity Software (HCS) ARTPLAN multi-modal analysis tool to provide a more robust analysis of existing multi-modal corridor facilities. The five corridors involved in the analysis are the following (shown also in **Figure 16**):

- US 15-501 (Fordham Boulevard) from Estes Drive to the I-40 Westbound Ramps
- E. Franklin Street from Estes Drive to US 15-501 (Fordham Boulevard) interchange
- Eastowne Drive / Lakeview Drive
- Old Sterling Drive
- Sage Road – Old Durham Road / Old Chapel Hill Road

The ARTPLAN multi-modal evaluation tool relies on geometric, traffic flow, and traffic control information entered for each corridor in a peak direction. Thus, two analyses of each corridor were done to correspond to AM and PM peak hour directions, based on highest traffic flows for each of the four facilities. After this data was input, multi-modal data for each link segment and each direction was entered. This data included the following:

- Outside Lane Width (narrow, typical, wide)
- Pavement Condition (desirable, typical, undesirable)
- Paved Shoulder/Bicycle Lane (yes/no)
- Side Path (yes/no and if yes, distance from roadway)



- Sidewalk (yes/no)
- Sidewalk/Roadway Protective Barrier (yes/no – refers to tree lawn or other physical barrier)
- Bus Frequency (buses per direction on segment per hour)
- Passenger Load Factor (demand versus hourly bus capacity)
- Amenities (bus shelters?)
- Bus Stop (Typical, major or none)

These data sets included quantitative information available from field review or aerial/Google Earth inspection of existing facilities along each corridor, by direction. If sidewalk characteristics varied with a roadway link segment, pedestrian sub-links were added to address changes to that particular segment. Results for pedestrian LOS, bicycle LOS, and transit LOS were extracted from the ARTPLAN models and are shown in **Table 16**. LOS values are determined by composite “scores” of the existing multi-modal features entered into the evaluation tool and pre-set thresholds developed through research done for the Highway Capacity Manual. They do not correspond to the same methodology for LOS for vehicular operations. LOS thresholds for pedestrians, bicycle and transit link segments are shown in **Table 17**, for reference. **Appendix E** contains the raw output sheets from the ARTPLAN program.

Table 17. Multi-Modal Level-of-Service (LOS) Threshold Values

Level-of-Service	Mode		
	Pedestrian and Bicycle	Transit	Bicycle Side Path
	Link Score	Link Score	Link Score
A	≤ 2.00	> 6	≤ 1.50
B	≥ 2.00 – 2.75	> 4 and ≤ 6	≥ 1.50 – 2.50
C	≥ 2.75 – 3.50	≥ 3 and ≤ 4	≥ 2.50 – 3.50
D	≥ 3.50 – 4.25	≥ 2 and < 3	≥ 3.50 – 4.50
E	≥ 4.25 – 5.00	≥ 1 and < 2	≥ 4.50 – 5.50
F	> 5.00	< 1	> 5.50

It is important to note that, in addition to the characteristics directly related to bicycle, pedestrian, and transit environments along a corridor, roadway characteristics such as traffic volumes and speeds have direct correlation in affecting the multi-modal LOS results.

Pedestrian Corridor Evaluation

From a qualitative perspective, the UNC Health Care Eastowne Property TIA have areas of adequate pedestrian accessibility and connectivity, but lack an overall “complete” pedestrian network, with sidewalk on both sides of major roadways, and easily accessible pedestrian crossing on multiple sides of major intersections. A review of **Figures 4A and 4B** highlight these issues.

For the UNC Health Care Eastowne Property pedestrian facilities, **Table 16** indicates that LOS scores range between LOS A and LOS D, depending on the existing sidewalk characteristics. The US 15-501 corridor, which lacks pedestrian facilities and connectivity in most of the District, has a corresponding LOS F. Most of the other corridors in the study area perform better, due to the presence of sidewalks or paths along many of the links. **Figures 17A and B** provide study area maps of the results.

Bicycle Corridor Evaluation

Similar to the pedestrian analysis completed in the previous section, a qualitative review of existing bicycling facilities and conditions was conducted. In general, although portions of facilities in the immediate vicinity of the Eastowne area provide bike lanes for cyclists (Sage Road, Old Sterling Road), there is limited organized bicycle connectivity and safe bicycling routes in the greater study area corridor



Table 16. Multi-Modal HCM Bike/Ped/Transit Analysis Results

E. Franklin Street Corridor		Bicycle Street		Pedestrian		Bus	
Link #	Score	LOS	Score	LOS	Adj. Buses	LOS	
Southbound (AM Peak)							
1 (to Eastgate Driveway)	4.35	E	4.69	E	3.21		C
2 (to Elliott Road)	4.32	E	3.27	C	8.98		A
3 (to Estes Drive)	4.35	E	3.38	C	8.98		A
Overall Corridor	4.35	E	4.07	D	6.36		A
Northbound (PM Peak)							
1 (to Estes Drive)	4.12	D	3.17	C	7.68		A
2 (to Elliott Road)	4.34	E	3.52	D	7.7		A
3 (to Eastgate Driveway)	4.32	E	3.27	C	4.62		B
4 (to Europa Dr)	4.35	E	4.94	E	4.71		B
Overall Corridor	4.32	E	4.15	D	6.07		A

Eastowne Dr/Lakeview Dr Corridor		Bicycle Street		Pedestrian		Bus	
Link #	Score	LOS	Score	LOS	Adj. Buses	LOS	
Southbound (AM Peak)							
1 (to US 15-501/Lakeview Drive)	2.37	B	2.7	B	4.85		B
2 (to Old Durham/Old Chapel Hill Road)	3.08	C	3.6	D	0		F
Overall Corridor	2.66	B	3.07	C	3.15		C
Northbound (PM Peak)							
1 (to US 15-501/Lakeview Drive)	3.08	C	3.6	D	3.31		C
2 (to US 15-501/Service Road)	2.37	B	1.76	A	0		F
Overall Corridor	2.66	B	2.72	B	1.16		E

Old Sterling Drive Corridor		Bicycle Street		Pedestrian		Bus	
Link #	Score	LOS	Score	LOS	Adj. Buses	LOS	
Eastbound (AM Peak)							
1 (to Eastowne Drive)	1.97	A	1.99	A	0		F
Overall Corridor	1.97	A	1.99	A	0		F
Westbound (PM Peak)							
1 (to Sage Road)	1.97	A	1.99	A	2.11		B
Overall Corridor	1.97	A	1.99	A	2.11		B

Old Chapel Hill/Old Durham/Sage Rd Corridor		Bicycle Street		Pedestrian		Bus	
Link #	Score	LOS	Score	LOS	Adj. Buses	LOS	
Northbound (AM Peak)							
1 (to US 15-501 (Fordham))	4.11	D	2.77	C	1.16		E
2 (to Cosgrove Avenue)	1.97	A	2.3	B	0.71		F
3 (to Erwin Road)	2.64	B	3.19	C	1.1		E
4 (Weaver Dairy Rd)	2.5	B	2.95	C	0		F
Overall Corridor	3.56	D	2.89	C	0.91		F
Southbound (PM Peak)							
1 (to Erwin Road)	2.5	B	2.95	D	0		F
2 (to Cosgrove Avenue)	2.64	B	3.19	C	4.47		B
3 (to US 15-501 (Fordham))	2.47	B	3.01	C	5.95		B
4 (to Pope Rd)	3.98	D	4.12	D	6.89		A
Overall Corridor	3.48	C	3.71	D	5.04		B

US 15-501 Corridor		Bicycle Street		Bicycle Sidepath		Pedestrian		Bus	
Link #	Score	LOS	Score	LOS	Score	LOS	Adj. Buses	LOS	
Southbound (AM Peak)									
1 (to Lakeview Drive)	4.67	E	-	-	6.08	F	2.31		D
2 (to Eastowne Drive)	4.68	E	-	-	6.01	F	3.64		C
3 (to Sage Road)	4.74	E	-	-	6.29	F	2.31		D
4 (to Erwin Rd)	4.76	E	-	-	5.47	F	2.31		D
5 (to Ephesus Church Rd)	4.69	E	-	-	5.98	F	0		F
6 (to Elliott Road)	4.64	E	-	-	5.47	F	0.52		F
7 (to Willow Drive)	4.57	E	-	-	4	D	0		F
8 (to Estes Drive)	4.59	E	-	-	5.37	F	0		F
Overall Corridor	4.68	E			5.74	F	1.29		E
Northbound (PM Peak)									
1 (to Estes Drive)	4.71	E	1.47	A	6.16	F	0		F
2 (to Willow Drive)	4.59	E	-	-	5.62	F	0		F
3 (to Elliott Road)	4.57	E	-	-	5.64	F	0		F
4 (to Ephesus Church Rd)	4.64	E	-	-	5.84	F	2.89		D
5 (to Europa Drive)	4.69	E	-	-	5.68	F	2.31		D
6 (to Sage Road)	4.76	E	-	-	5.8	F	2.31		D
7 (to Eastowne Drive)	4.74	E	-	-	6.29	F	2.31		D
8 (to Lakeview Drive)	4.68	E	-	-	6.01	F	2.31		D
9 (to I-40 EB Ramp)	4.67	E	-	-	6.08	F	2.31		D
Overall Corridor	4.68	E			5.96	F	1.67		E



compared to existing pedestrian facilities. There are several highly utilized greenway off-road facilities for bicyclists in the broad study area, but little connectivity to the UNC Health Care Eastowne Property itself from these facilities. Recent bike lane improvements and upcoming planned improvements will allow better opportunities for cyclists in that area, but additional connectivity will be needed to link the southern region with the UNC Health Care Eastowne Property.

Looking at Bicycle LOS results from **Table 16** within the UNC Health Care Eastowne Property's primary roadways, the Old Sterling Road and Eastowne Drive corridors score LOS A and B, respectively. This indicates preferable conditions for cyclists, due to the presence of bidirectional bike lanes on Sterling Road, and wide travel lanes for the length of Eastowne Drive. The Sage Road – Old Durham Road/Old Chapel Hill Road Corridor performs at LOS C and D; although there are dedicated bicycle facilities along Sage Road, the narrow lanes on Old Durham Road/Old Chapel Hill Road result in less than ideal conditions for bicycles. Higher traffic volumes and lack of dedicated facilities impair bicycle LOS performance along all segments on E. Franklin Street and US 15-501. The paralleling northbound side path along US 15-501 prior to Estes Drive is evaluated by ARTPLAN as a LOS A. **Figures 18A and B** provide study area maps of these results.

Transit Corridor Evaluation

Multi-modal transit LOS analysis of each selected corridor in the overall UNC Health Care Eastowne study area focuses on the amount of service provided along each segment, the provision of designated stops, and the current passenger load (calculated in the transit demand/capacity analysis in the previous section of this report). It is also dependent on the direction of service provided along each corridor, so if service is provided in one direction along a segment and not provided along the opposite direction, LOS results can differ markedly.

The results in **Table 16** show that along each corridor, if service is provided, generally better LOS (A-C) may currently exist, but segments that lack service will score poorly (LOS F). **Figures 19A and B** provide study area schematic maps of the results.

F. Existing Crash Analysis

Crash analysis of two (2) corridors and nine (9) intersections within the Eastowne area was conducted using the NCDOT TEAAS software for the most current five (5) year study range at the initiation of the existing conditions study. Strip crash analysis data and crash rates for the two (2) corridors is summarized in **Table 18**.

The primary focus of tabular results is the comparison of summary statistics to current NCDOT statewide average crash rates for comparable facilities. Statewide average crash rates were converted to critical crash rates using the Rate Quality Control Method to remove the elements of chance and randomness. This method statistically adjusts the crash rate to determine whether the corridor crash rate for a segment is significantly higher than the rate of other locations with similar characteristics. Corridor crash rates equal to or greater than the critical crash rate may be considered significantly higher than average and not due to chance or randomness.

Appendix F presents raw crash data taken from the most recent information compiled from the TEAAS software platform for each corridor.

Results in **Table 18** are summarized for each corridor below:

- **US 15-501 (Fordham Boulevard / Durham – Chapel Hill Boulevard)** – crash rate data for this corridor adjacent to the UNC Health Care Eastowne Property are consistently higher than the



critical crash rate for all categories with the exception of fatal crashes. Existing traffic congestion throughout the day is likely a major contributing factor in the resulting crash rates.

- **Eastowne Drive** – crash rate data for this corridor exceeded the critical crash rate for total and non-fatal injury crashes, however, it should be noted that volumes along this corridor are quite low, which produces a small sample size of crashes.

In addition to the crash rate analysis, a breakout of crash types for each corridor and study intersection was completed and results are shown in **Table 19**. For the US 15-501 corridor and several study intersections, rear-end crashes are the predominate crash type, again pointing to the fact that existing congestion patterns can lead to high proportions of this crash type. A high number of frontal impact crashes (both left-turn and right-turn) were evident at the US 15-501 and I-40 ramp intersections.



Table 18. Five Year Study Area Crash Rate Comparison

Corridor	Facility Type	Crashes Per 100 Million Vehicle Miles				
		Total Crash Rate	Fatal Crash Rate	Non-Fatal (Injury) Crash Rate	Night Crash Rate	Wet Crash Rate
US 15-501	Urban US Route 4-Lane Divided – Partial Access Control	469.17	0.44	142.94	88.57	72.35
Critical Crash Rate		226.64	1.88	71.64	59.47	41.15
Eastowne Drive	Urban Secondary Road 2-Lane Undivided	433.55	0.00	273.82	114.09	45.64
Critical Crash Rate		392.34	20.71	157.26	141.97	102.92

RED = Facility Rate is Worse than State-wide Averages, **GREEN** = Facility Rate is Better than State-wide Averages

Table 19. Five Year Study Area Crash Type Summary

Location	Number of Crashes						
	Total	Angle	Left-Turn	Rear-End	Right-Turn	Sideswipe	Ped/Bike
US 15-501 Corridor	1,070	98	59	697	17	131	2
Eastowne Dr Corridor	19	7	7	2	1	1	0
Intersection	Total	Angle	Left-Turn	Rear-End	Right-Turn	Sideswipe	Ped/Bike
US 15-501 at Sage Rd/Scarlett Rd	63	4	3	41	2	9	0
US 15-501 at Eastowne Dr Western Loop	45	3	3	33	0	3	0
US 15-501 at Eastowne Dr Eastern Loop	50	1	3	40	0	4	0
US 15-501 at I-40 Eastbound Ramps	93	14	2	56	2	18	0
US 15-501 at I-40 Westbound Ramps	130	27	2	76	4	19	0
Eastowne Dr at Dobbins Dr	2	1	1	0	0	0	0
Eastowne Dr at Old Sterling Dr	2	1	0	1	0	0	0
Eastowne Dr at Providence Rd Western Loop	1	0	0	0	1	0	0
Eastowne Dr at Providence Rd Eastern Loop	1	0	0	0	1	0	0



IV. CONCLUSIONS/SUMMARY OF EXISTING CONDITIONS

In summary, this technical memorandum's purpose is to establish baseline conditions for traffic operations and safety for all travel modes within the broad study area, with a particular focus on the network near and adjacent to the UNC Health Care Eastowne Property. A comprehensive effort into collecting all pertinent field data was undertaken in November and December 2019 that included traffic counts, pedestrian and bicycle counts, compilation of transit ridership and bus route capacities, and collection of crash data for the last five years. Detailed field observations and collection of all applicable planning documents, traffic control data, and models was also done at this time.

Related to each travel mode, the existing conditions analyses provided in **Section III** can be summarized for each mode:

Vehicular operations – Peak hour analyses of the weekday AM, noon, and PM peak hours in the broad Eastowne TIA study area indicate several areas of peak traffic congestion in the project study area where individual intersection LOS falls below Town/NCDOT threshold for acceptable operation. Queue analyses verified similar areas where congestion currently exists, impairing traffic flow. Most signalized intersections operate at an acceptable LOS (A-D), but several are near/at capacity. Several unsignalized intersections operate at a LOS F, due to limited acceptable gaps in high volume arterial crossing streets.

Transit operations – Peak hour load/capacity evaluations for all routes directly serving the UNC Health Care Eastowne Property was completed with assistance from CHT and GoTriangle sources. Peak hour load demands exceed available individual bus capacity on several routes, depending on route direction and time of day. AM inbound routes through the UNC Health Care Eastowne Property and corresponding PM outbound routes experience the highest demands.

Pedestrian operations – The primary focus of pedestrian analyses for this study is the provision of adequate pedestrian facilities and crossings at intersections to provide connectivity within the UNC Health Care Eastowne Property and areas serving the study area. Existing analysis results, both LOS estimates and general qualitative inspection of the existing pedestrian network indicate gaps in connectivity throughout the overall TIA study area, though several areas of high pedestrian activity exist.

Bicycle operations – Similar to the pedestrian evaluations, bicycle analyses in this study focus on provision of safe and accessible bicycle routes within and outside the study area. Comparatively, pedestrian accessibility is better than bicycle accessibility within and outside the study area. There are locations throughout the larger study area where bicycling activity is present but is more limited to off-road paved paths and greenways.

Crash analysis – Data from the NCDOT crash analysis software indicates that crash rates on major facilities serving the UNC Health Care Eastowne Property vary considerably in comparison to state-wide averages, depending on the crash type evaluated. Primarily crashes in and near the UNC Health Care Eastowne Property were rear-end type collisions, with certain segments and individual intersections exhibiting high numbers of turning crashes. The total number of crashes along Eastowne Drive away from the US 15-501 intersection connections was low.

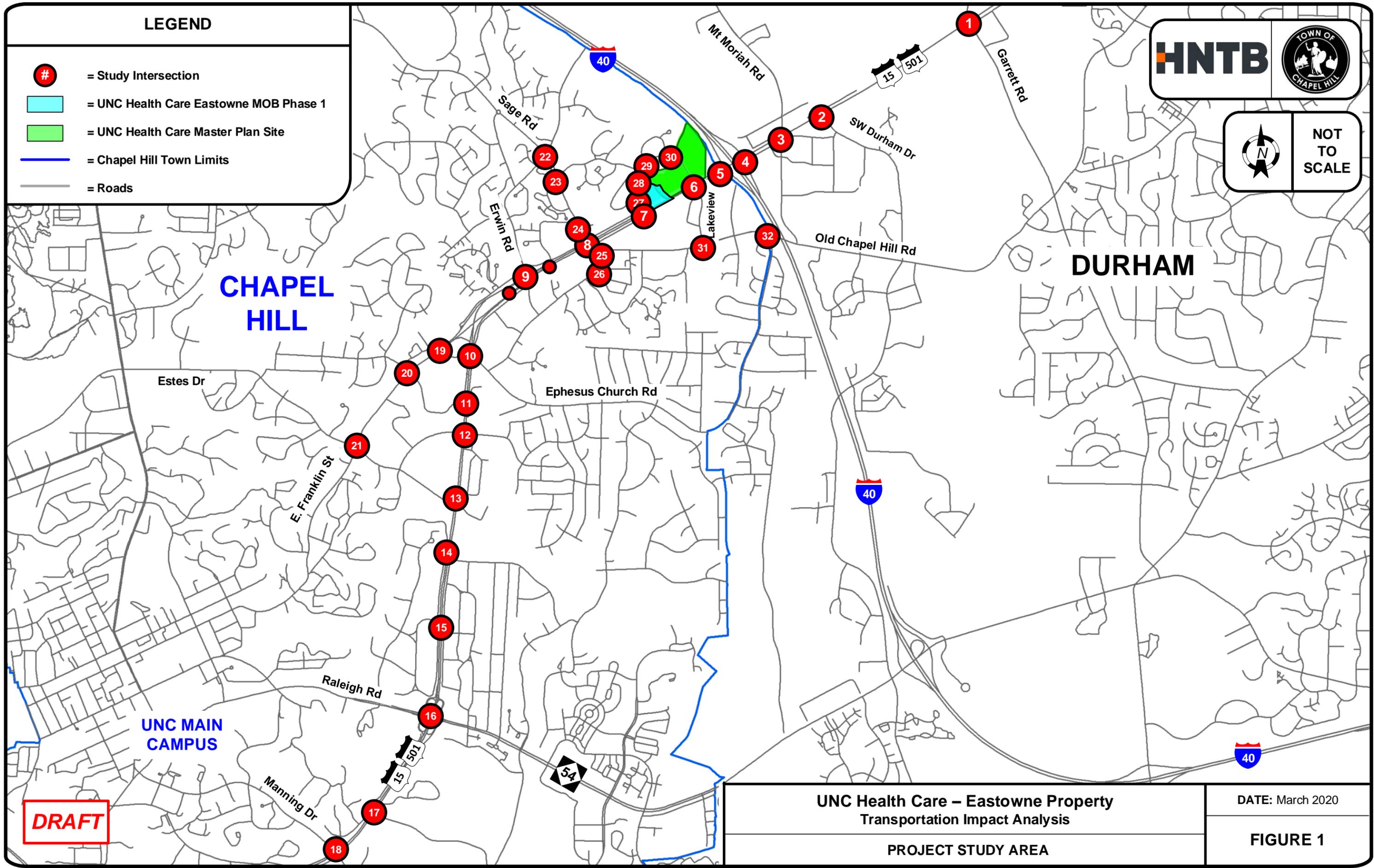
Information from TRM was used in comparison with existing peak hour data to aid the development of the peak hour traffic microsimulation model used in this study. The TRM will be used to evaluate travel growth for future year scenarios developed in the next phase of the Eastowne TIA.



Appendix A – Figures

LEGEND

- # = Study Intersection
- [Cyan Box] = UNC Health Care Eastowne MOB Phase 1
- [Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits
- [Grey Line] = Roads



DRAFT

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

PROJECT STUDY AREA

DATE: March 2020

FIGURE 1

LEGEND

- # = Study Intersection
- [Cyan Box] = UNC Health Care Eastowne MOB Phase 1
- [Green Box] = UNC Health Care Master Plan Site



UNC Health Care – Eastowne Property
Transportation Impact Analysis

DATE: March 2020

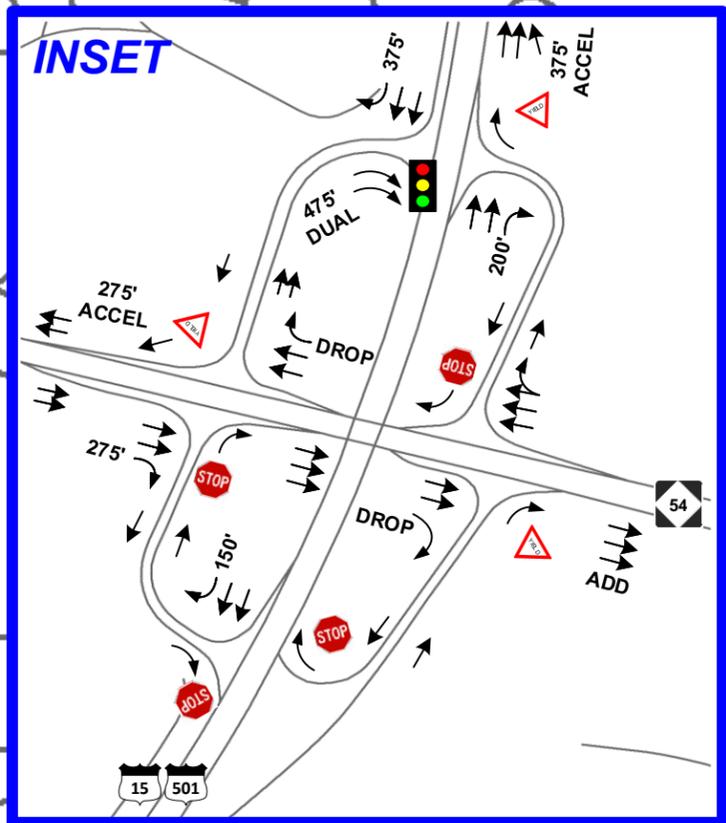
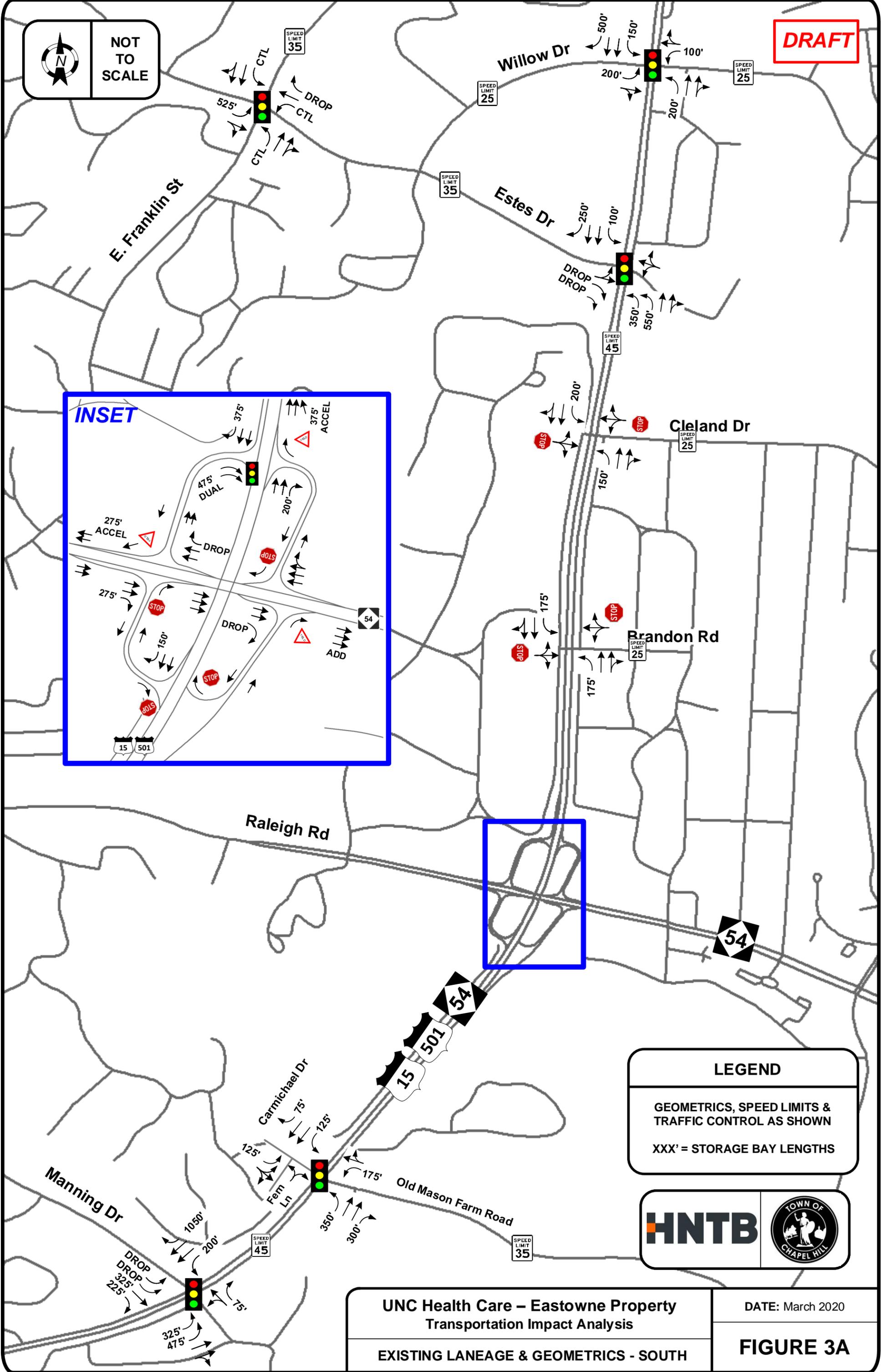
UNC HEALTH CARE EASTOWNE PROPERTY OVERVIEW

FIGURE 2

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NOT TO SCALE



LEGEND

GEOMETRICS, SPEED LIMITS & TRAFFIC CONTROL AS SHOWN

XXX' = STORAGE BAY LENGTHS

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

EXISTING LANEAGE & GEOMETRICS - SOUTH

DATE: March 2020

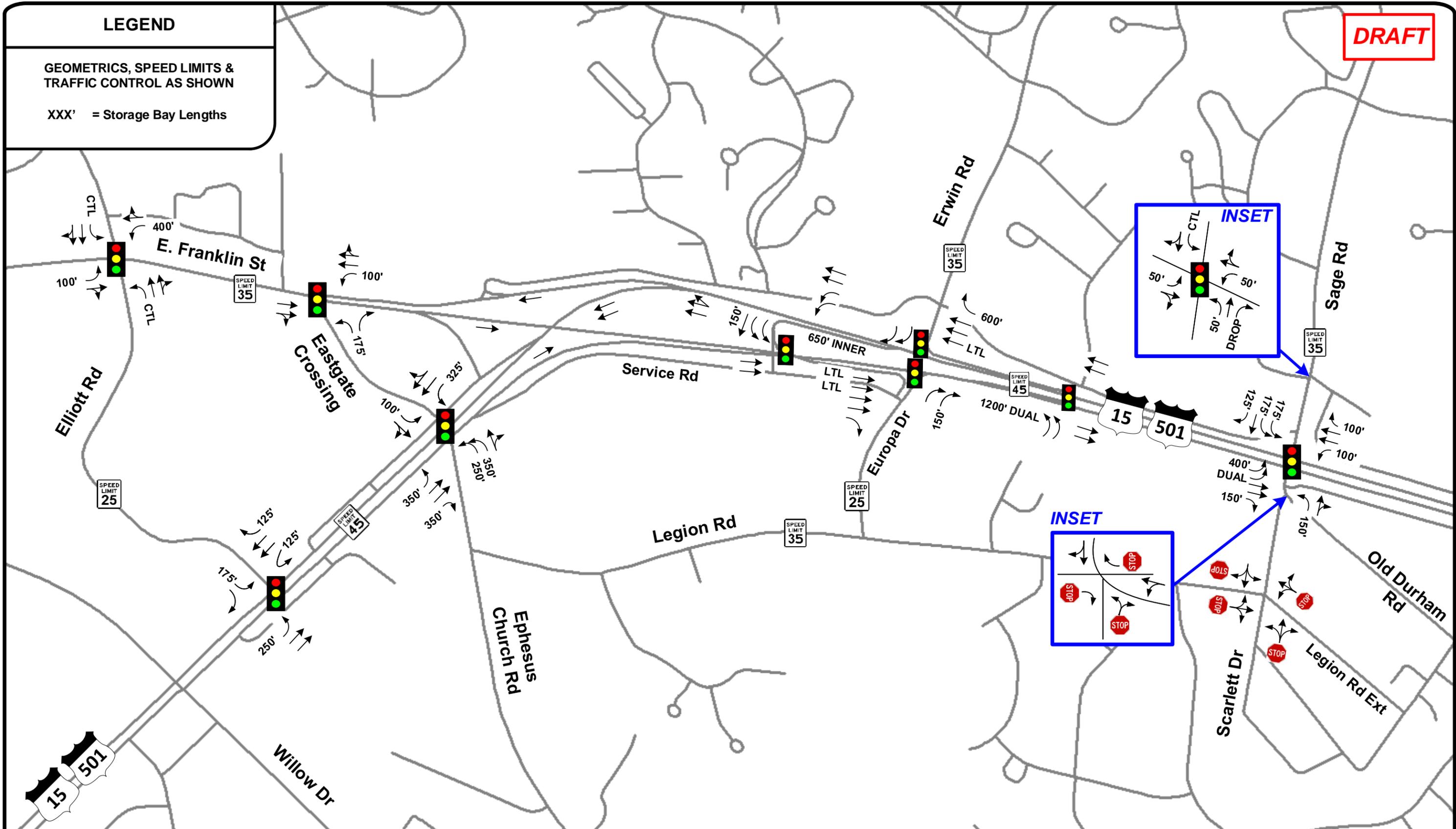
FIGURE 3A

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LEGEND

GEOMETRICS, SPEED LIMITS & TRAFFIC CONTROL AS SHOWN

XXX' = Storage Bay Lengths



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

EXISTING LANEAGE & GEOMETRICS - CENTER

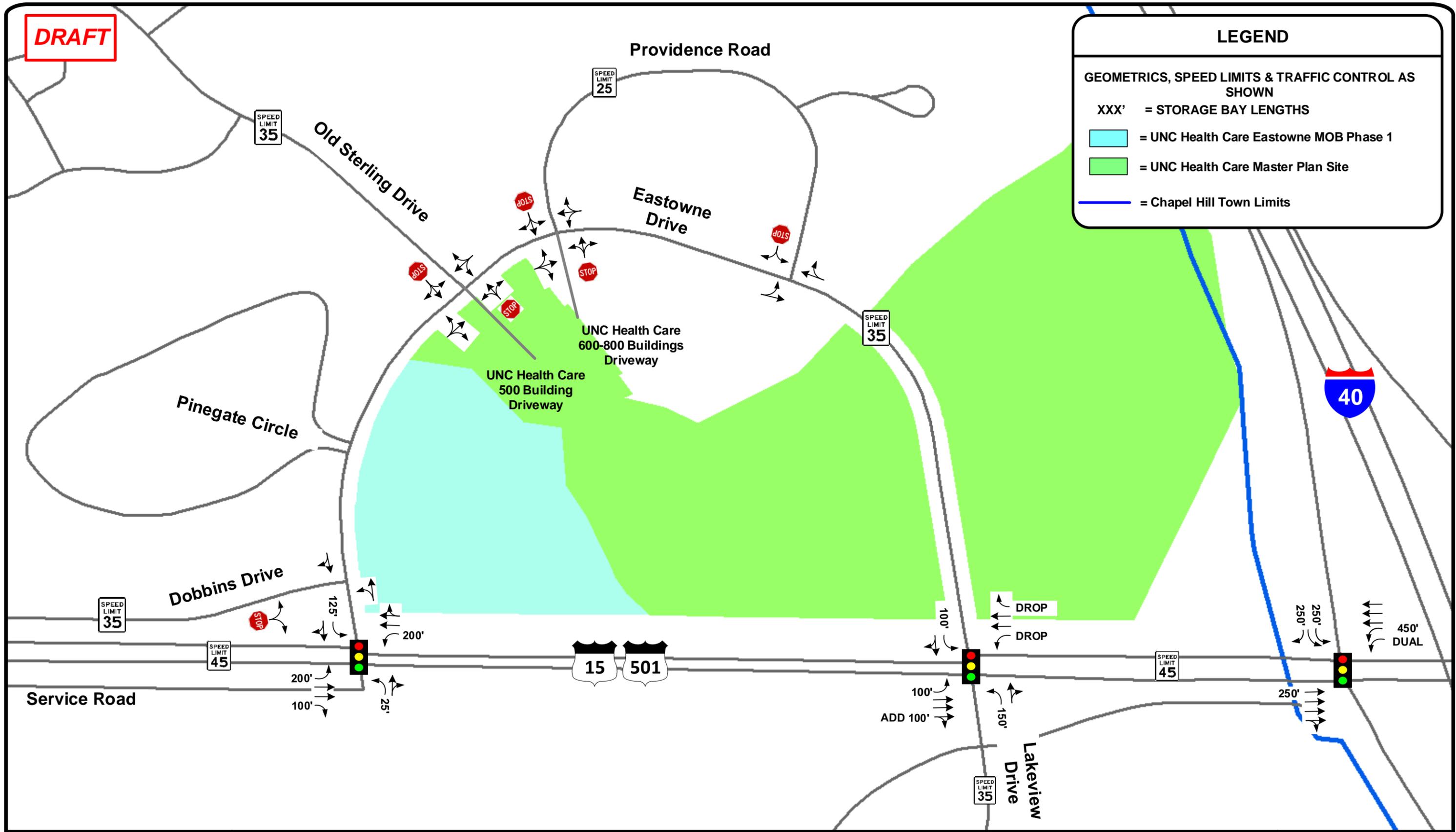
DATE: March 2020

FIGURE 3B

DRAFT

LEGEND

- GEOMETRICS, SPEED LIMITS & TRAFFIC CONTROL AS SHOWN
- XXX' = STORAGE BAY LENGTHS
 - [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
 - [Light Green Box] = UNC Health Care Master Plan Site
 - [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

UNC Health Care – Eastowne Property
Transportation Impact Analysis
EXISTING LANEAGE & GEOMETRICS – SITE VICINITY

DATE: March 2020

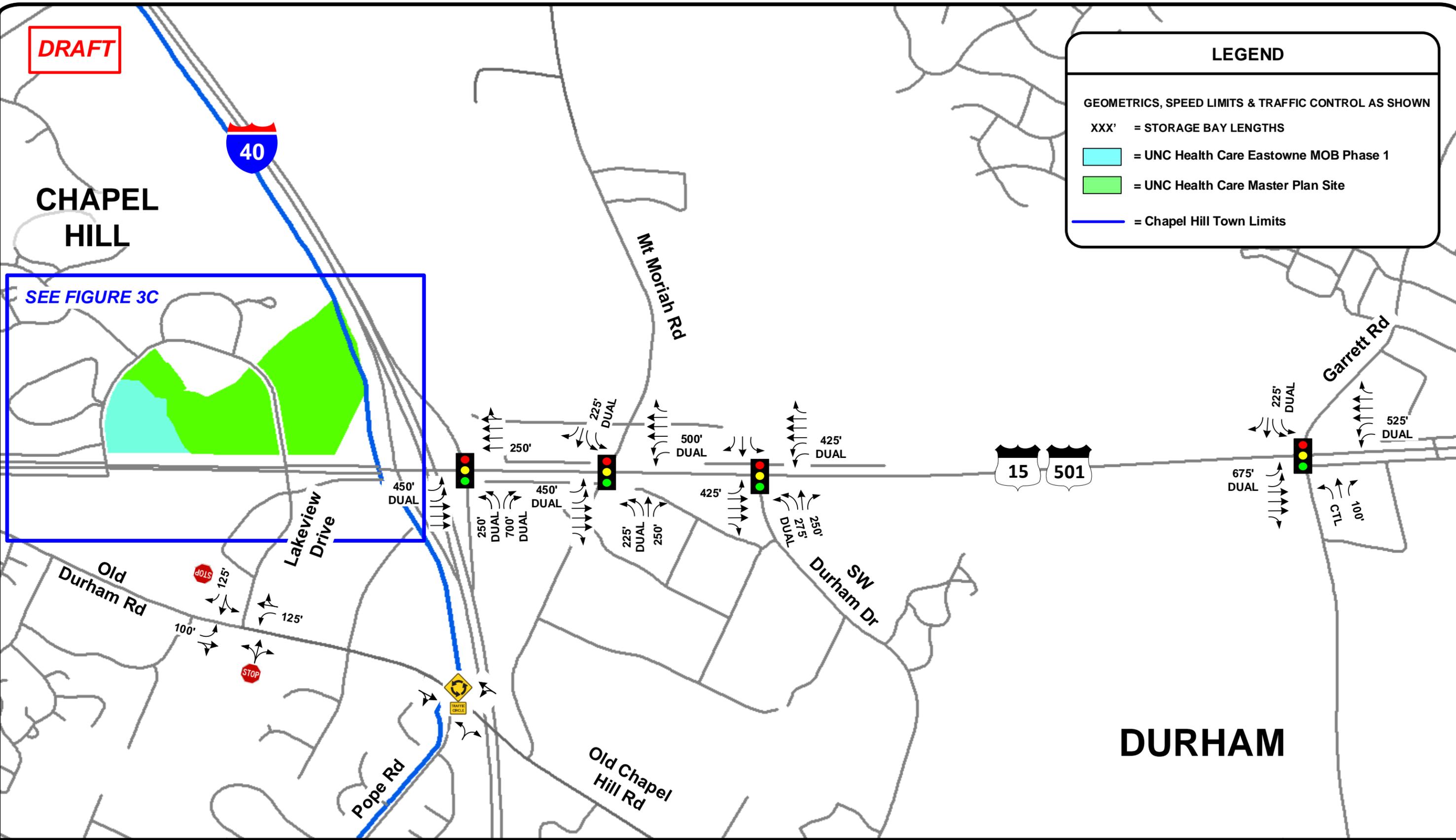
FIGURE 3C

DRAFT

LEGEND

GEOMETRICS, SPEED LIMITS & TRAFFIC CONTROL AS SHOWN

- XXX' = STORAGE BAY LENGTHS
- [Cyan Box] = UNC Health Care Eastowne MOB Phase 1
- [Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

UNC Health Care – Eastowne Property
 Transportation Impact Analysis

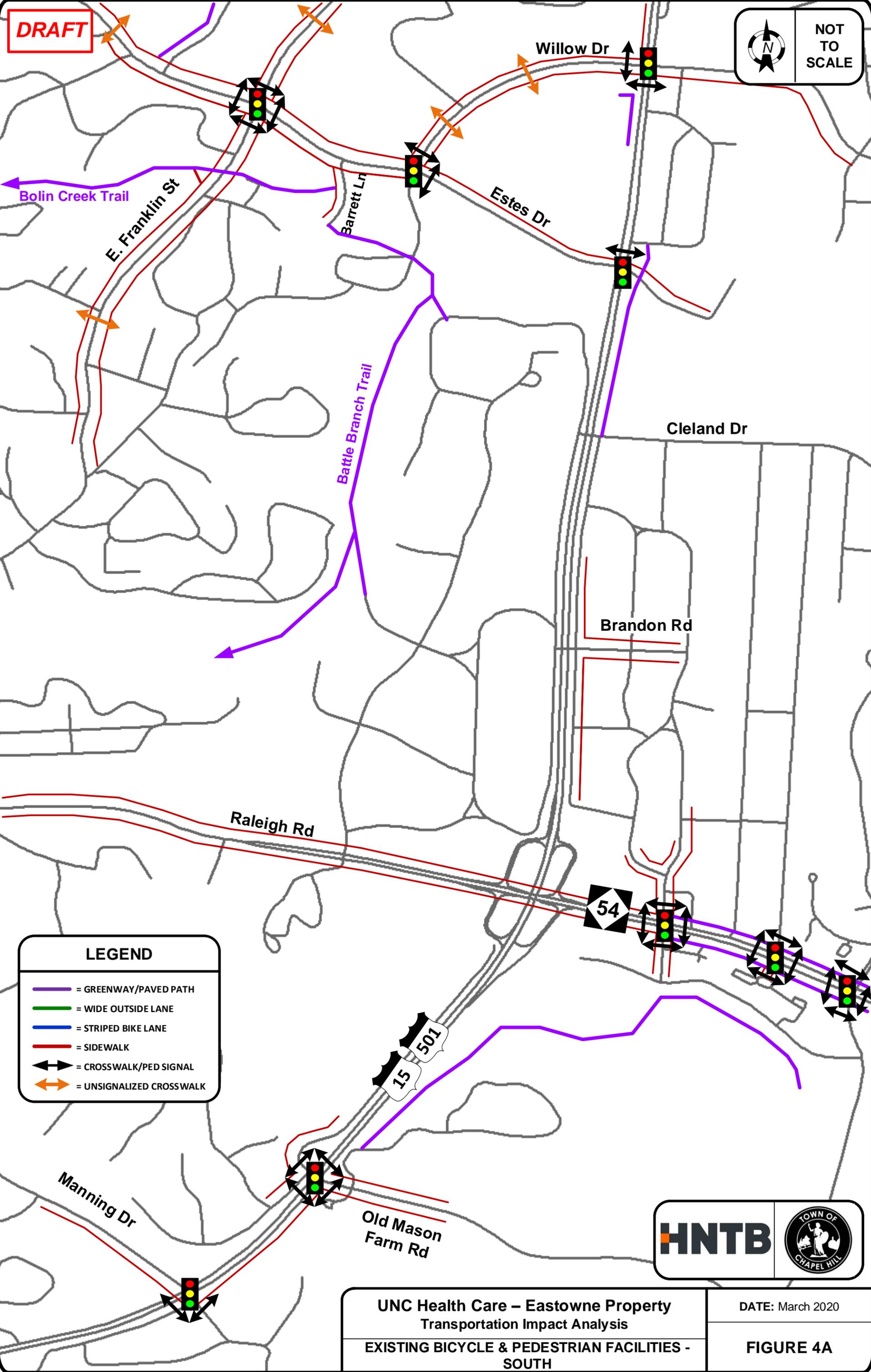
EXISTING LANEAGE & GEOMETRICS - NORTH

DATE: March 2020

FIGURE 3D

DRAFT

NOT TO SCALE



LEGEND

-  = GREENWAY/PAVED PATH
-  = WIDE OUTSIDE LANE
-  = STRIPED BIKE LANE
-  = SIDEWALK
-  = CROSSWALK/PED SIGNAL
-  = UNSIGNALIZED CROSSWALK

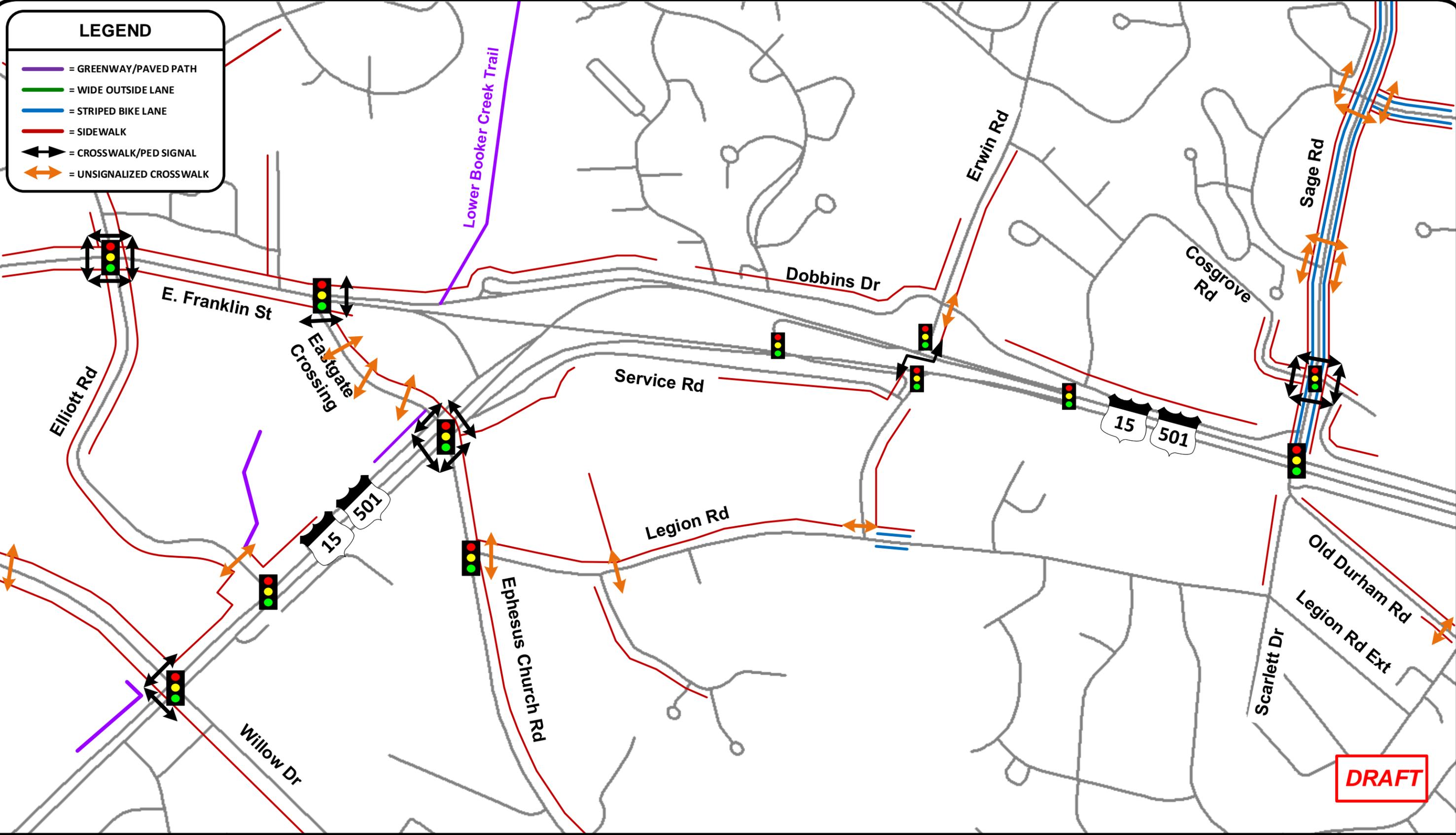
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**UNC Health Care – Eastowne Property
Transportation Impact Analysis
EXISTING BICYCLE & PEDESTRIAN FACILITIES -
SOUTH**

DATE: March 2020

FIGURE 4A



DRAFT



NOT TO SCALE

UNC Health Care – Eastowne Property
 Transportation Impact Analysis

EXISTING BICYCLE & PEDESTRIAN FACILITIES - CENTER

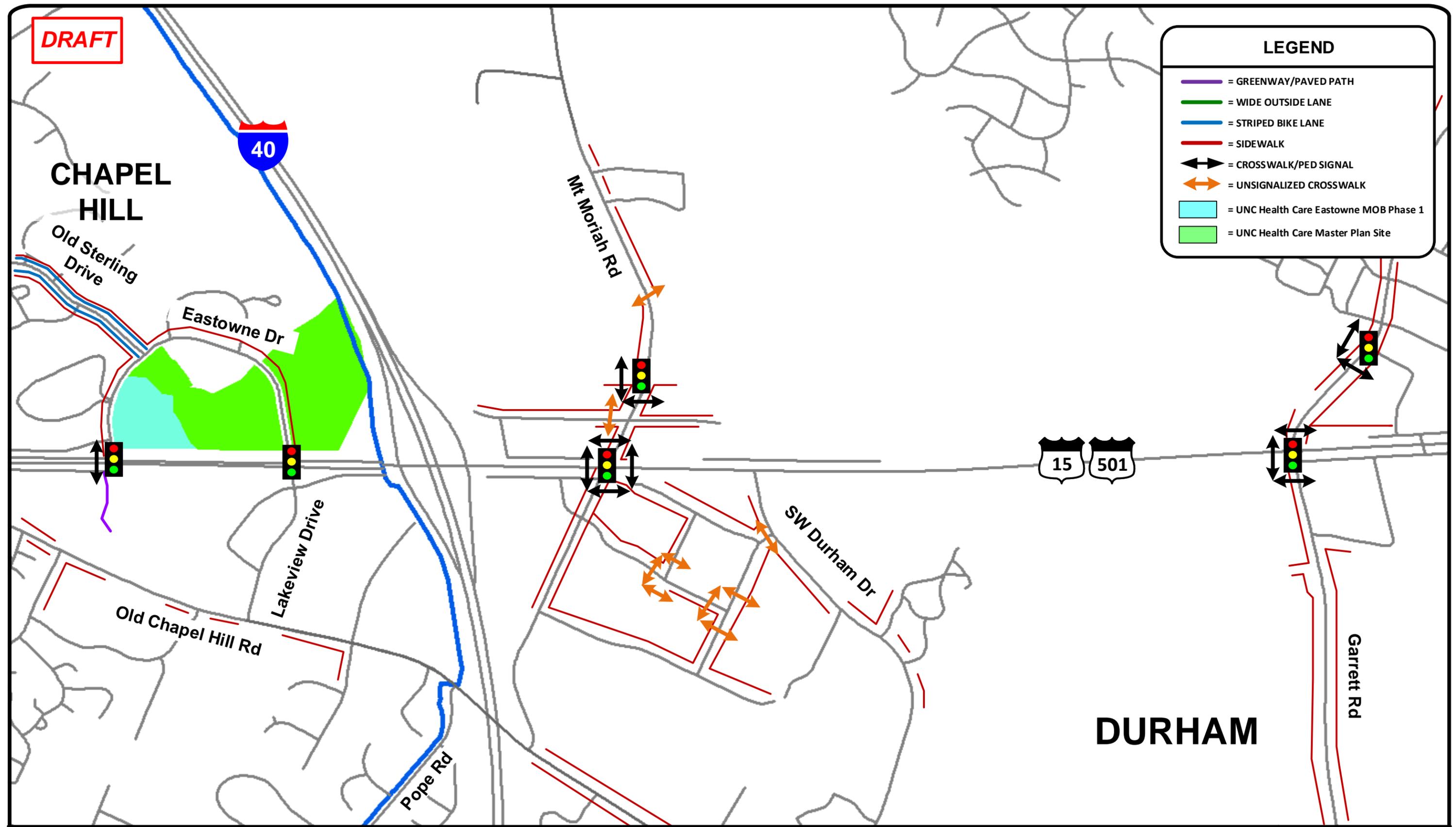
DATE: March 2020

FIGURE 4B

DRAFT

LEGEND

- = GREENWAY/PAVED PATH
- = WIDE OUTSIDE LANE
- = STRIPED BIKE LANE
- = SIDEWALK
- = CROSSWALK/PED SIGNAL
- = UNSIGNALIZED CROSSWALK
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site



NOT TO SCALE

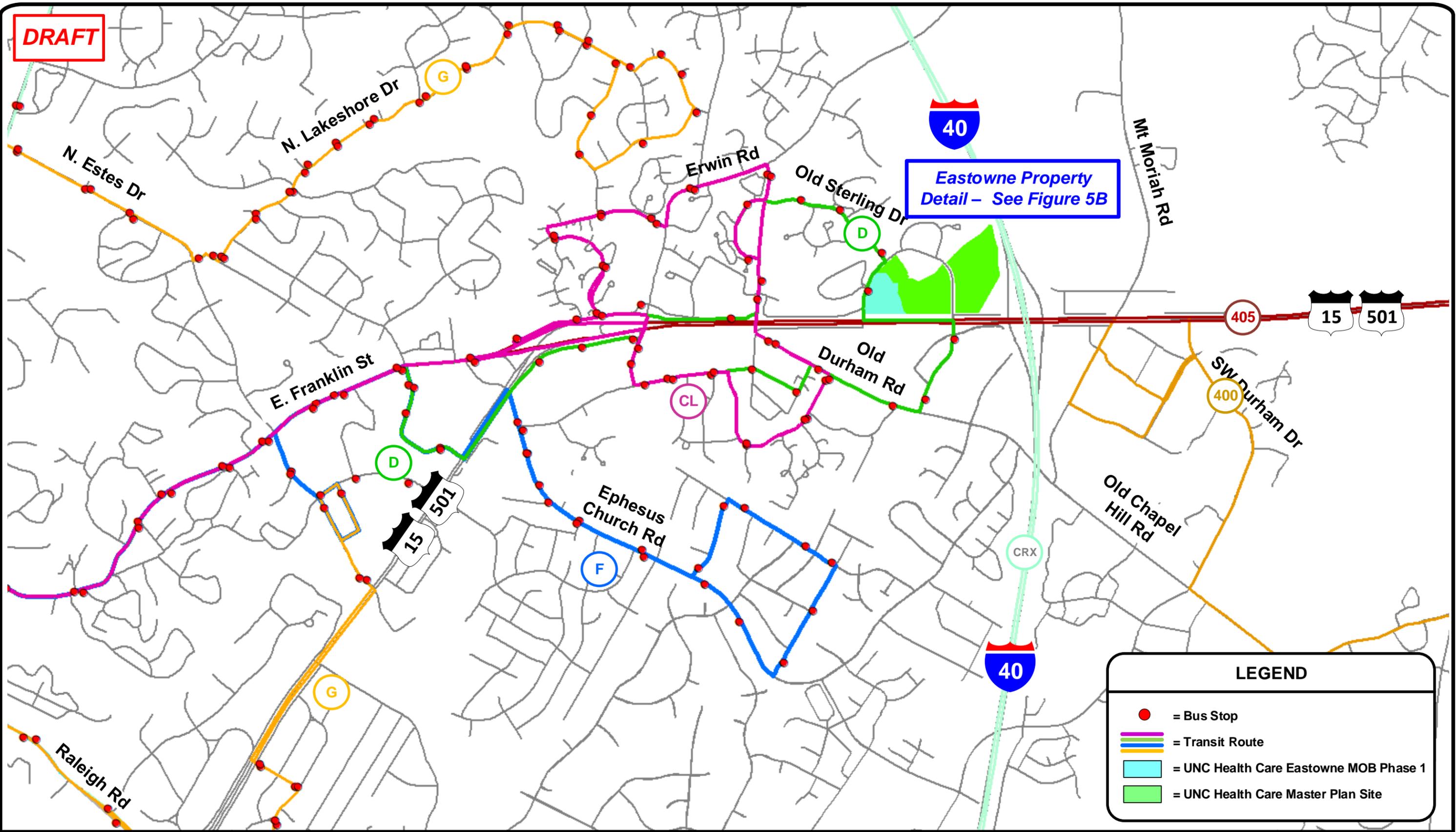
UNC Health Care – Eastowne Property
 Transportation Impact Analysis

DATE: March 2020

EXISTING BICYCLE & PEDESTRIAN FACILITIES - NORTH

FIGURE 4C

DRAFT



LEGEND

- = Bus Stop
- — — — = Transit Route
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**
EXISTING STUDY AREA TRANSIT ROUTES

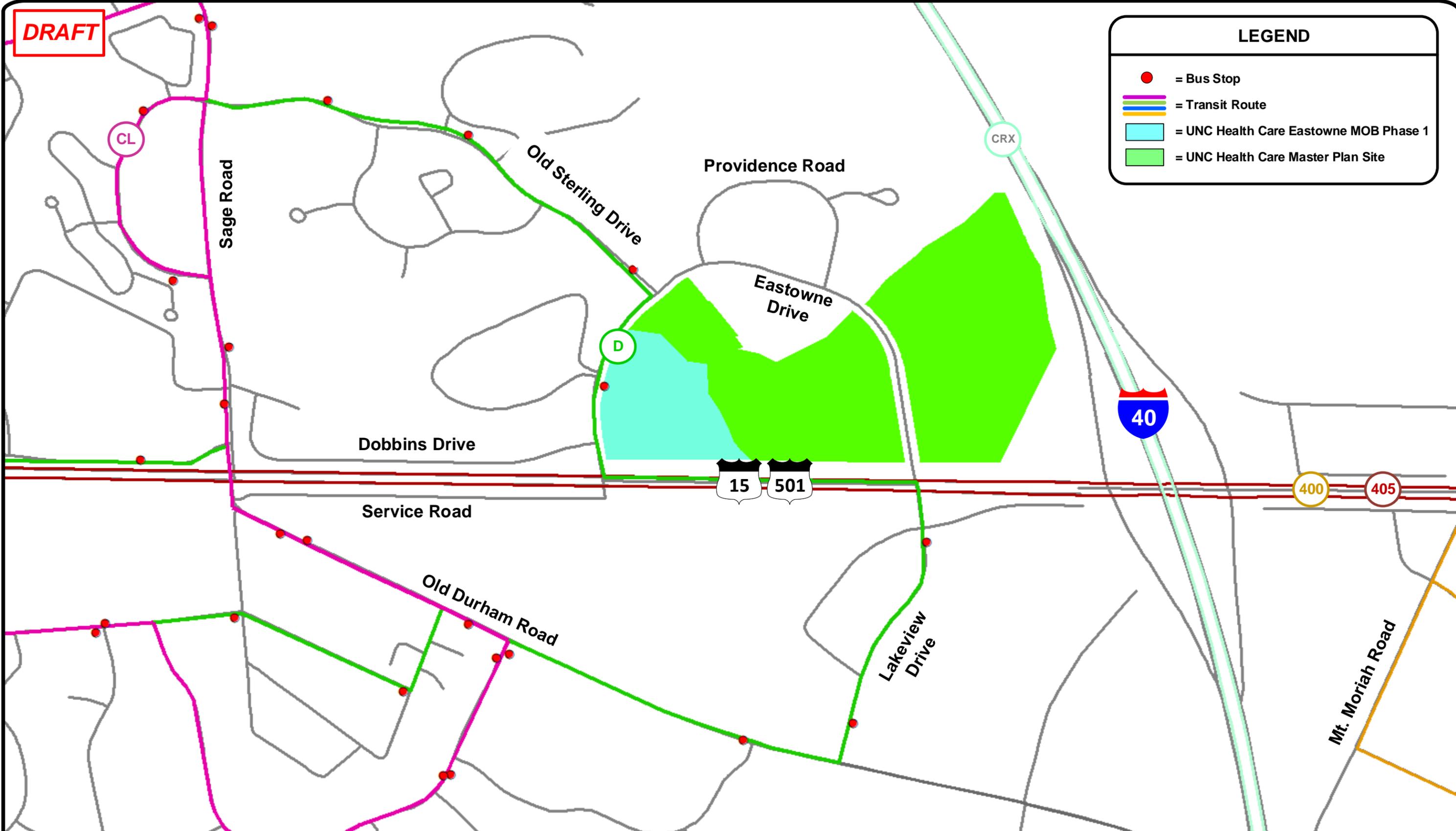
DATE: March 2020

FIGURE 5A

DRAFT

LEGEND

-  = Bus Stop
-  = Transit Route
-  = UNC Health Care Eastowne MOB Phase 1
-  = UNC Health Care Master Plan Site



HNTB



NOT TO SCALE

UNC Health Care – Eastowne Property
Transportation Impact Analysis

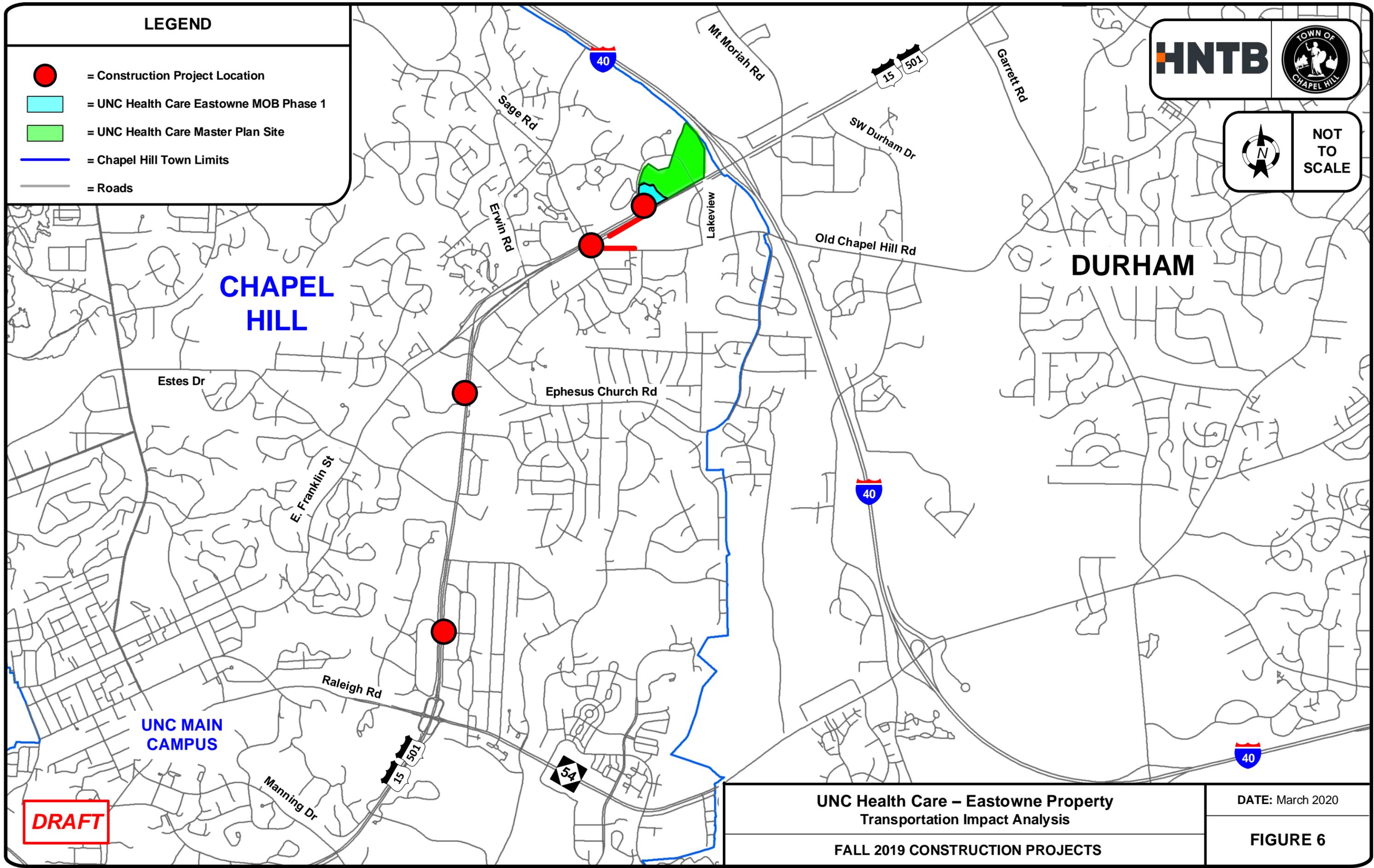
DATE: March 2020

EXISTING STUDY AREA TRANSIT ROUTES – SITE VICINITY

FIGURE 5B

LEGEND

-  = Construction Project Location
-  = UNC Health Care Eastowne MOB Phase 1
-  = UNC Health Care Master Plan Site
-  = Chapel Hill Town Limits
-  = Roads



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**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

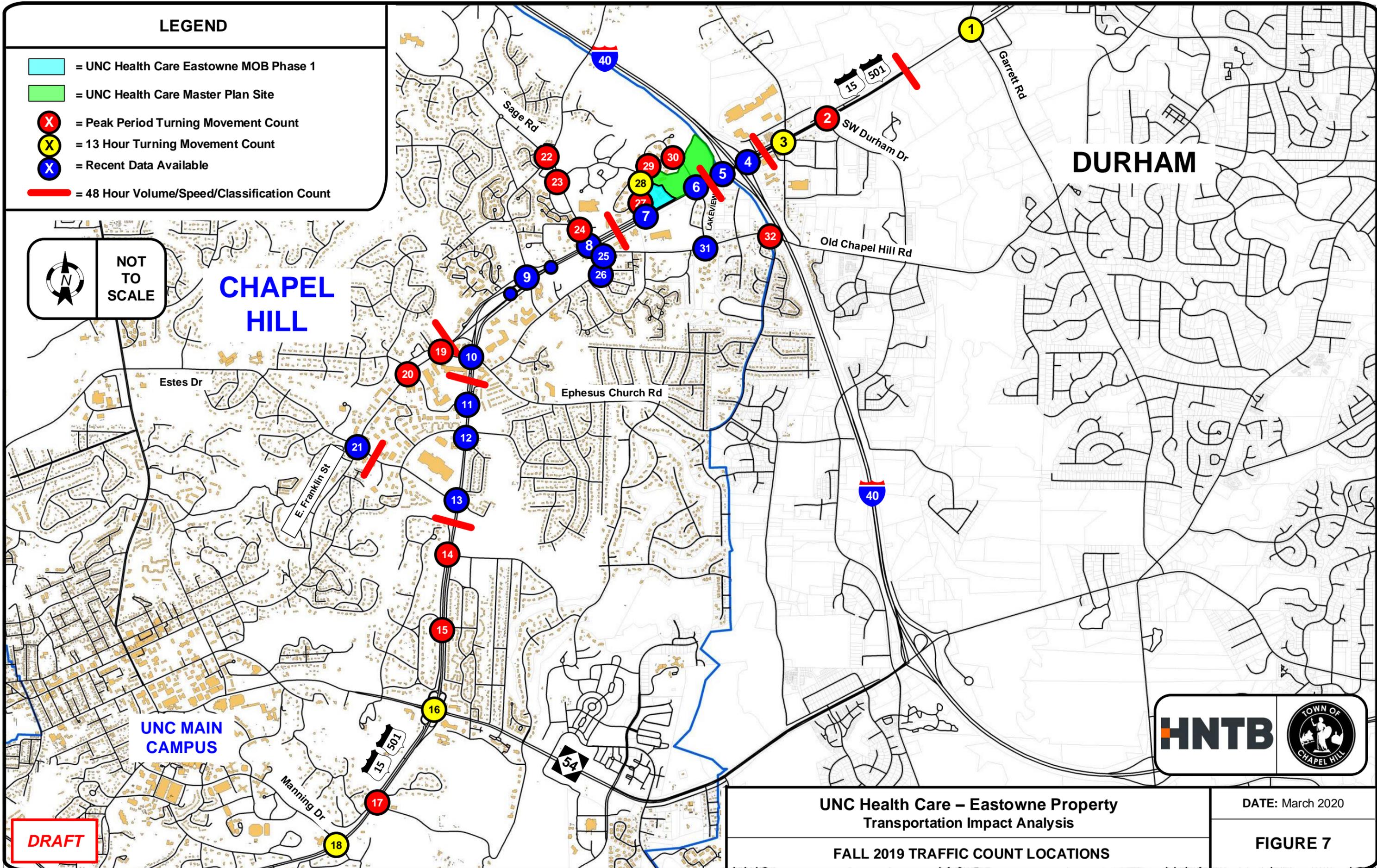
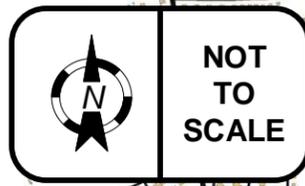
DATE: March 2020

FALL 2019 CONSTRUCTION PROJECTS

FIGURE 6

LEGEND

- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- X = Peak Period Turning Movement Count
- X = 13 Hour Turning Movement Count
- X = Recent Data Available
- = 48 Hour Volume/Speed/Classification Count



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**UNC Health Care – Eastowne Property
Transportation Impact Analysis**
FALL 2019 TRAFFIC COUNT LOCATIONS

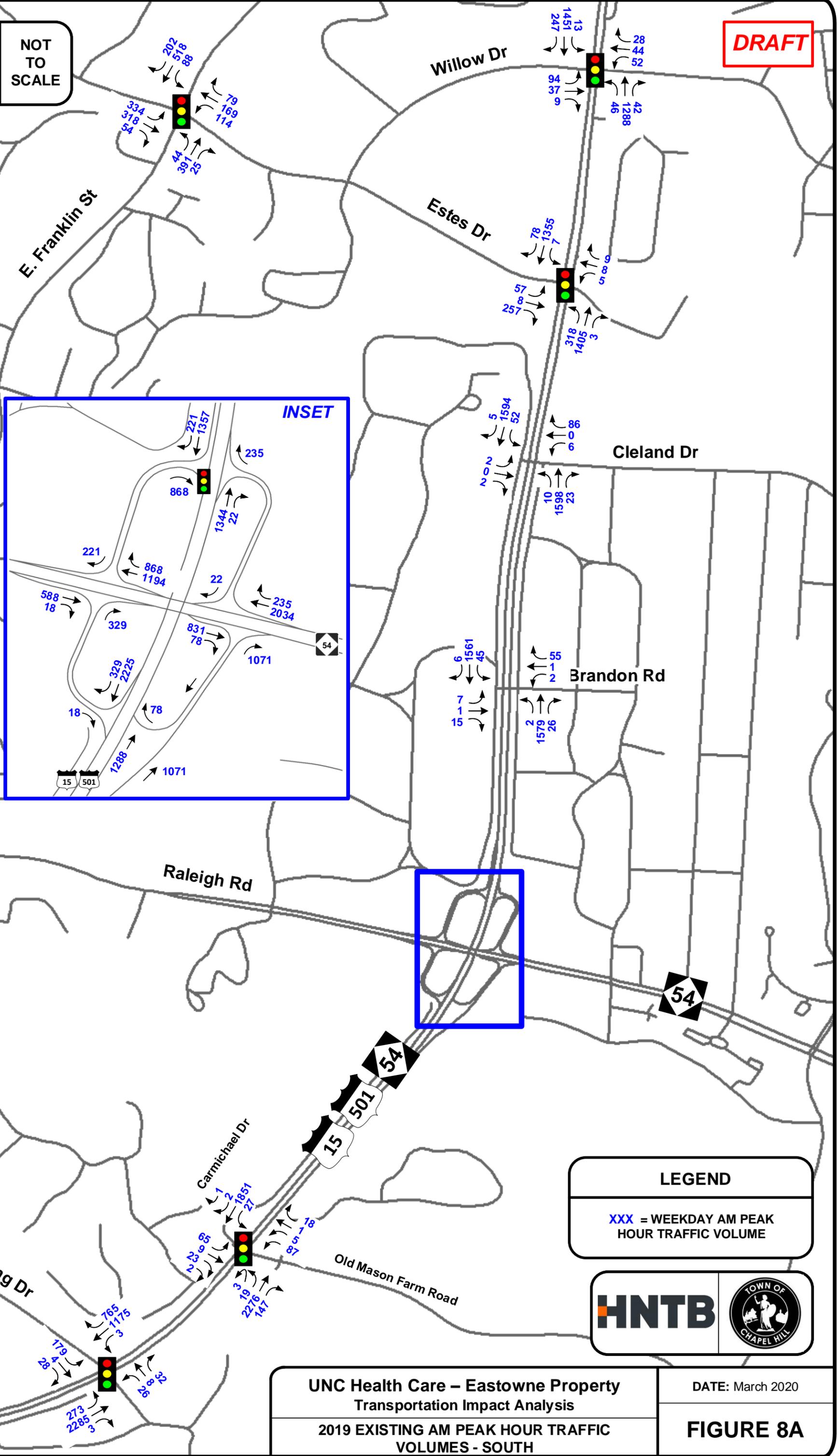


DATE: March 2020

FIGURE 7

DRAFT

NOT TO SCALE



LEGEND

XXX = WEEKDAY AM PEAK HOUR TRAFFIC VOLUME



**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING AM PEAK HOUR TRAFFIC VOLUMES - SOUTH

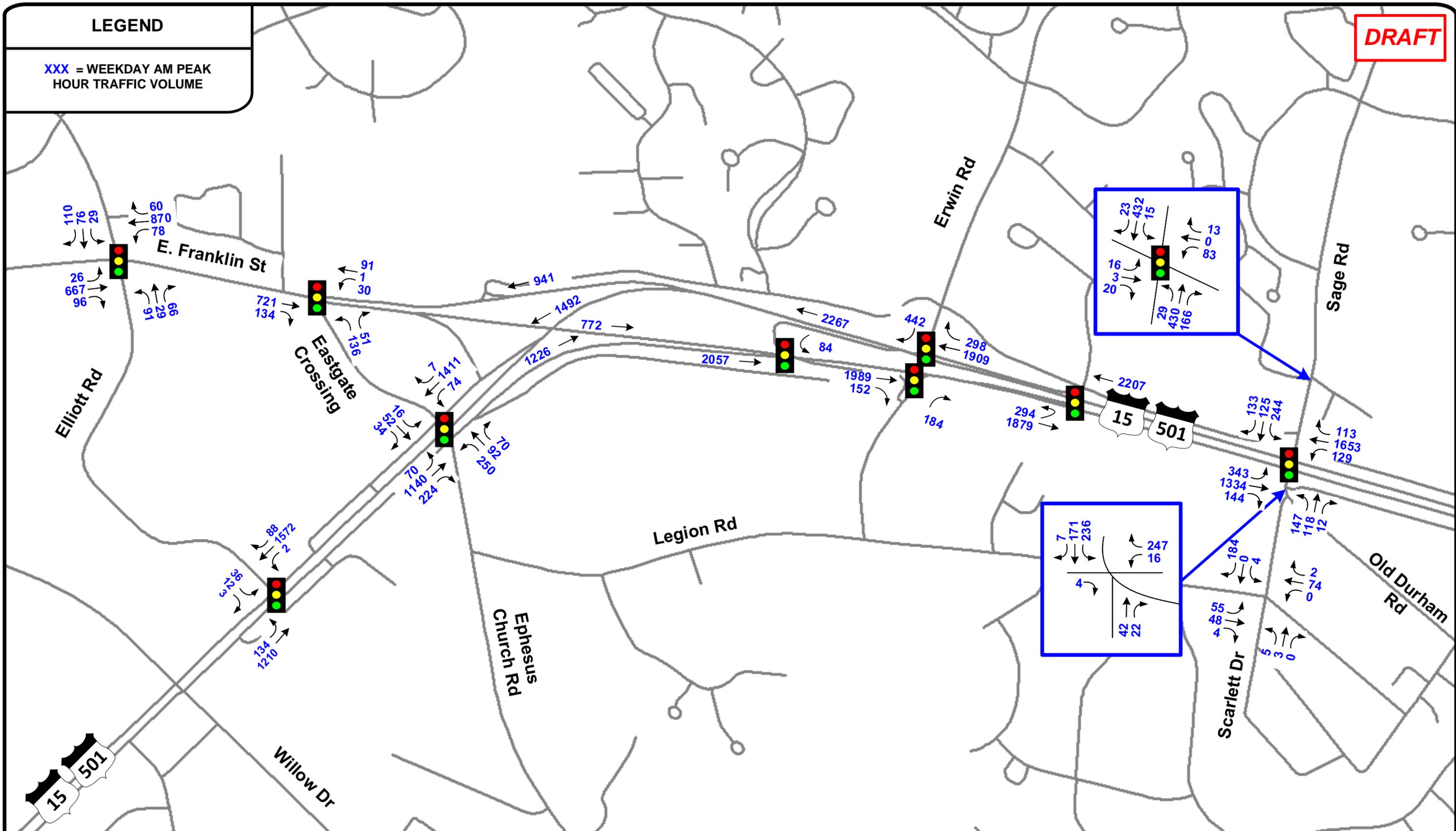
DATE: March 2020

FIGURE 8A

LEGEND

XXX = WEEKDAY AM PEAK HOUR TRAFFIC VOLUME

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NOT TO SCALE

UNC Health Care – Eastowne Property
Transportation Impact Analysis

DATE: March 2020

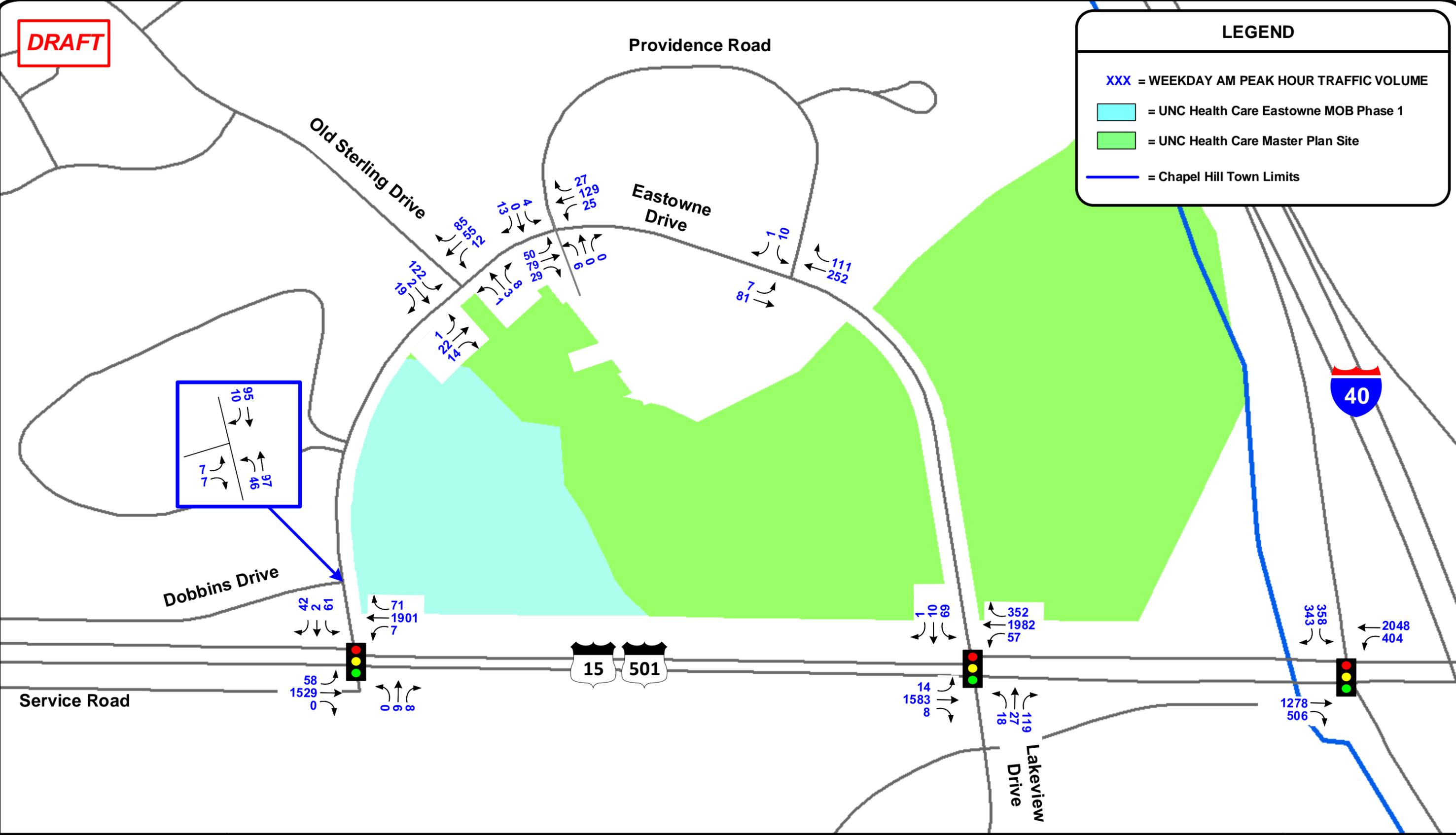
2019 EXISTING AM PEAK HOUR TRAFFIC VOLUMES - CENTER

FIGURE 8B

DRAFT

LEGEND

- XXX = WEEKDAY AM PEAK HOUR TRAFFIC VOLUME
- [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
- [Light Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

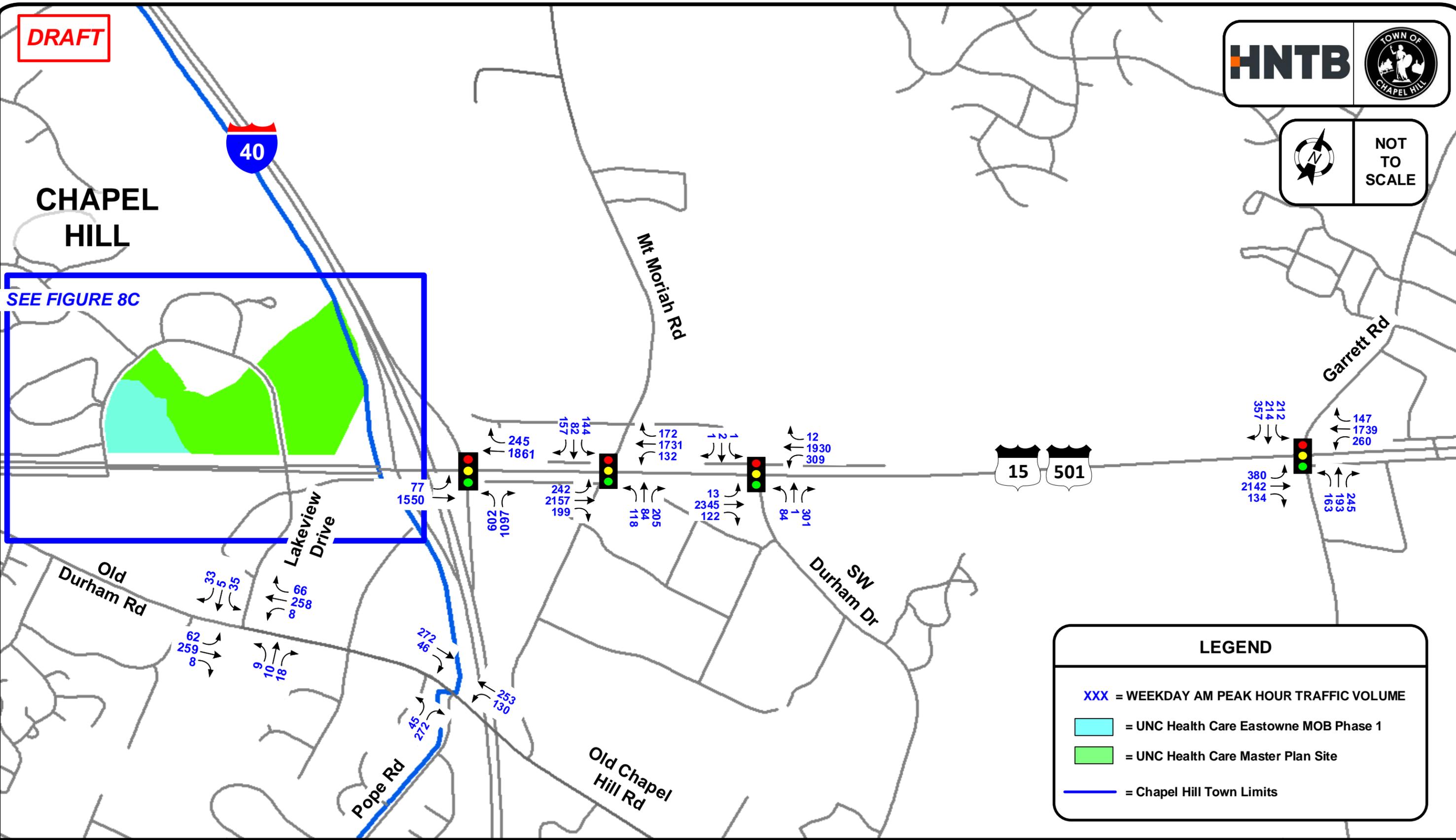
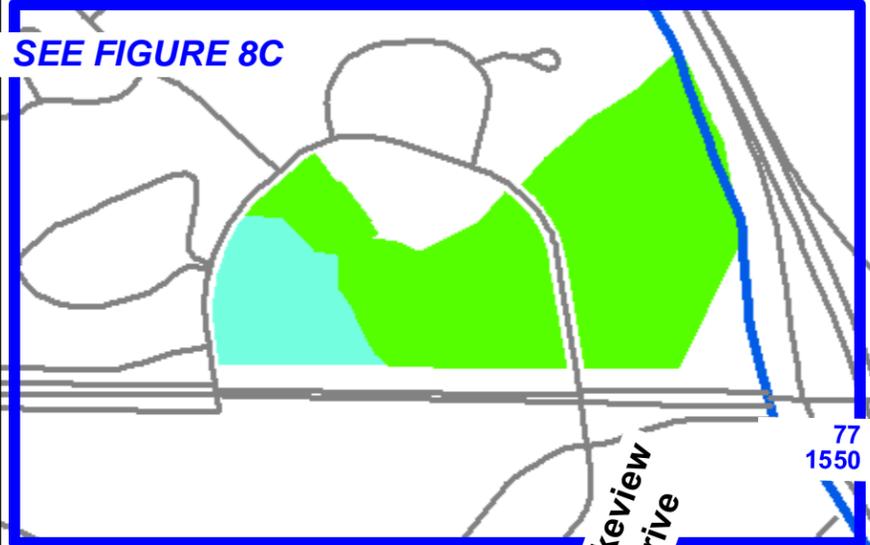
UNC Health Care – Eastowne Property
Transportation Impact Analysis

2019 EXISTING AM PEAK HOUR TRAFFIC VOLUMES – SITE VICINITY

DATE: March 2020

FIGURE 8C

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LEGEND

- XXX = WEEKDAY AM PEAK HOUR TRAFFIC VOLUME
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- = Chapel Hill Town Limits

NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING AM PEAK HOUR TRAFFIC VOLUMES – NORTH

DATE: March 2020

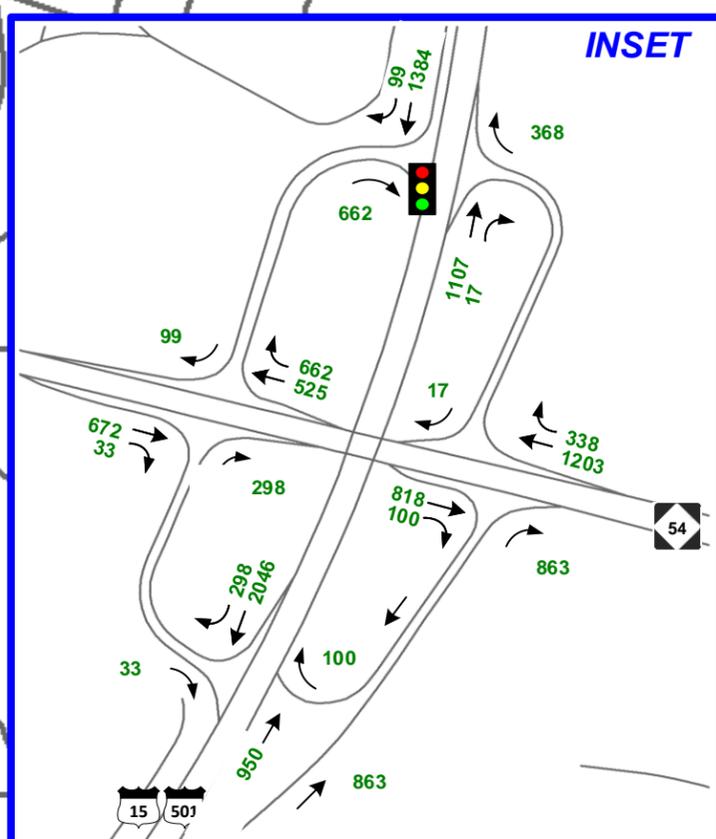
FIGURE 8D

DRAFT

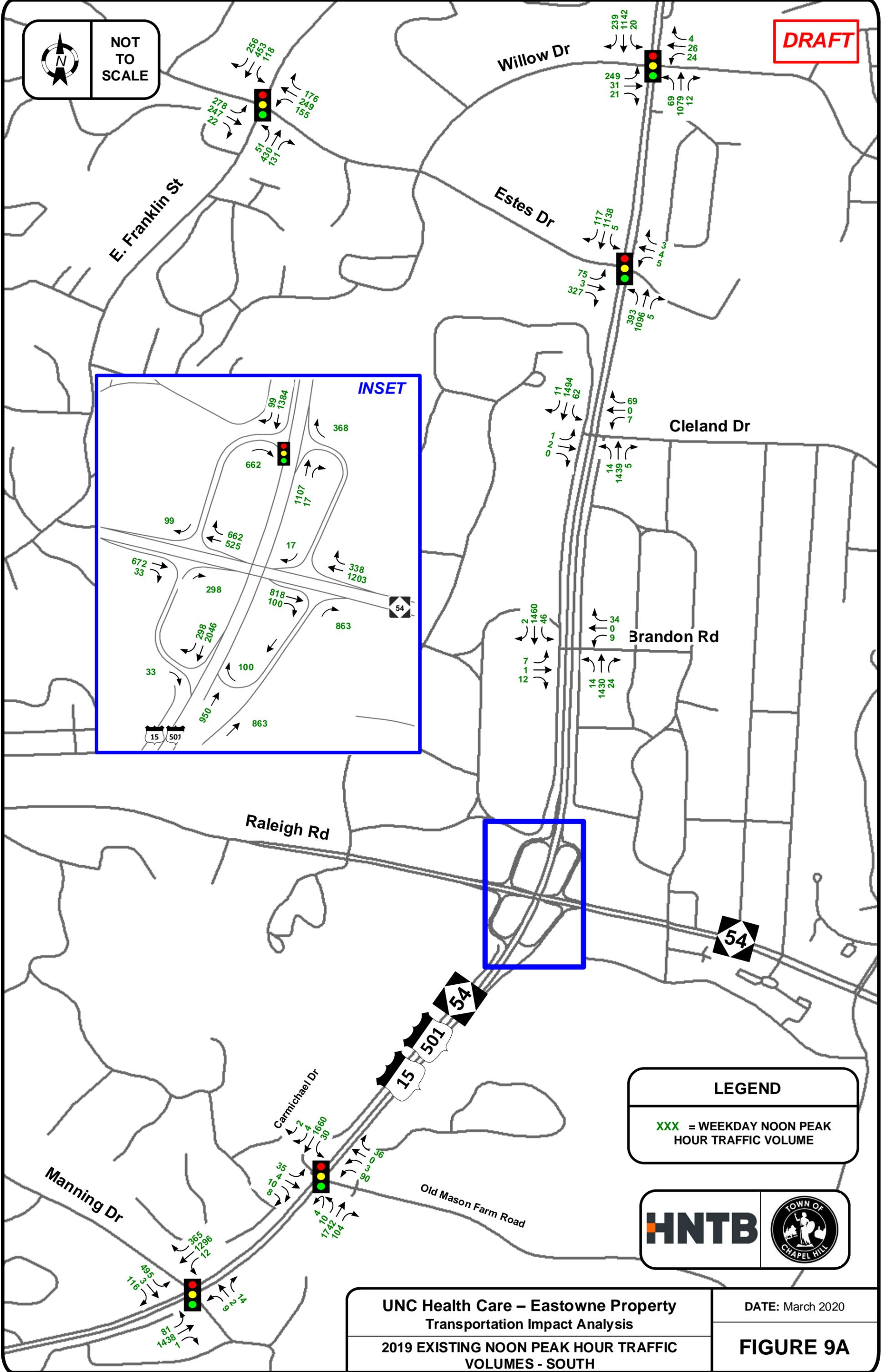


NOT TO SCALE

INSET



99, 1384, 368, 662, 1107, 17, 672, 33, 298, 818, 100, 338, 1203, 863, 863, 950, 100, 33, 15, 501



LEGEND

XXX = WEEKDAY NOON PEAK HOUR TRAFFIC VOLUME



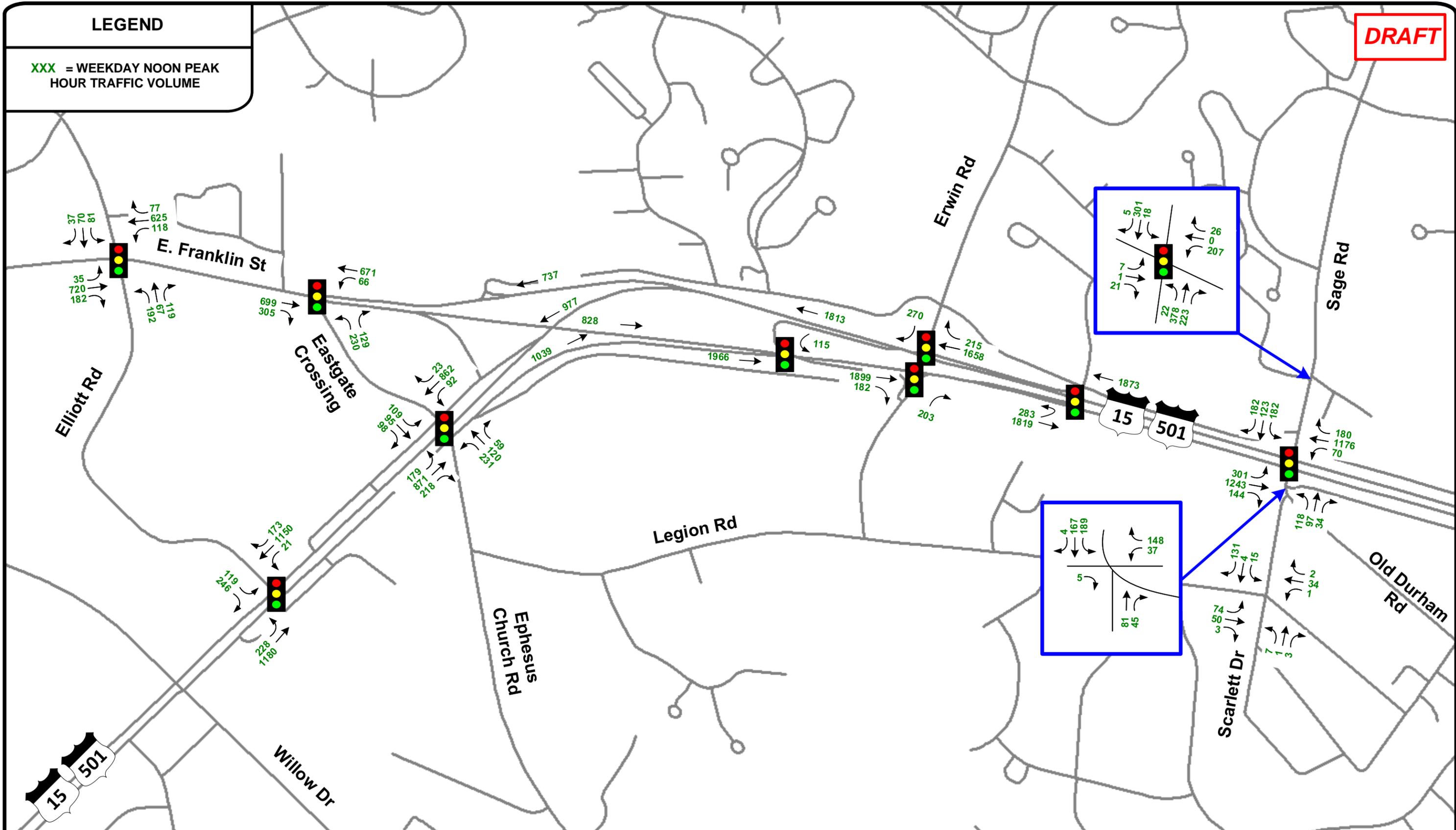

UNC Health Care – Eastowne Property
Transportation Impact Analysis
2019 EXISTING NOON PEAK HOUR TRAFFIC VOLUMES - SOUTH

DATE: March 2020
FIGURE 9A

DRAFT

LEGEND

XXX = WEEKDAY NOON PEAK HOUR TRAFFIC VOLUME



NOT TO SCALE

UNC Health Care – Eastowne Property
Transportation Impact Analysis

DATE: March 2020

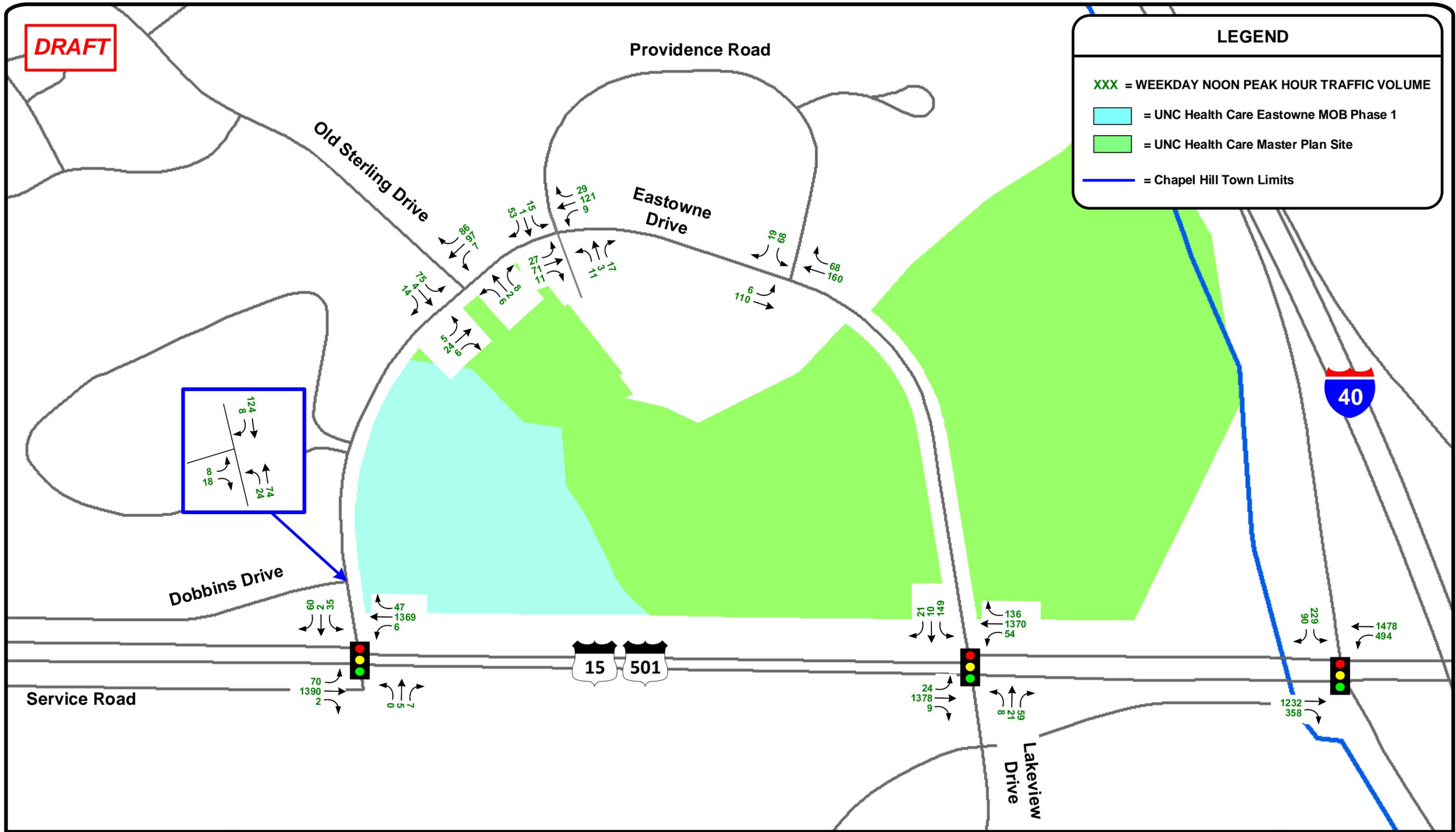
2019 EXISTING NOON PEAK HOUR TRAFFIC VOLUMES - CENTER

FIGURE 9B

DRAFT

LEGEND

- XXX = WEEKDAY NOON PEAK HOUR TRAFFIC VOLUME
- [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
- [Light Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING NOON PEAK HOUR TRAFFIC VOLUMES – SITE VICINITY

DATE: March 2020

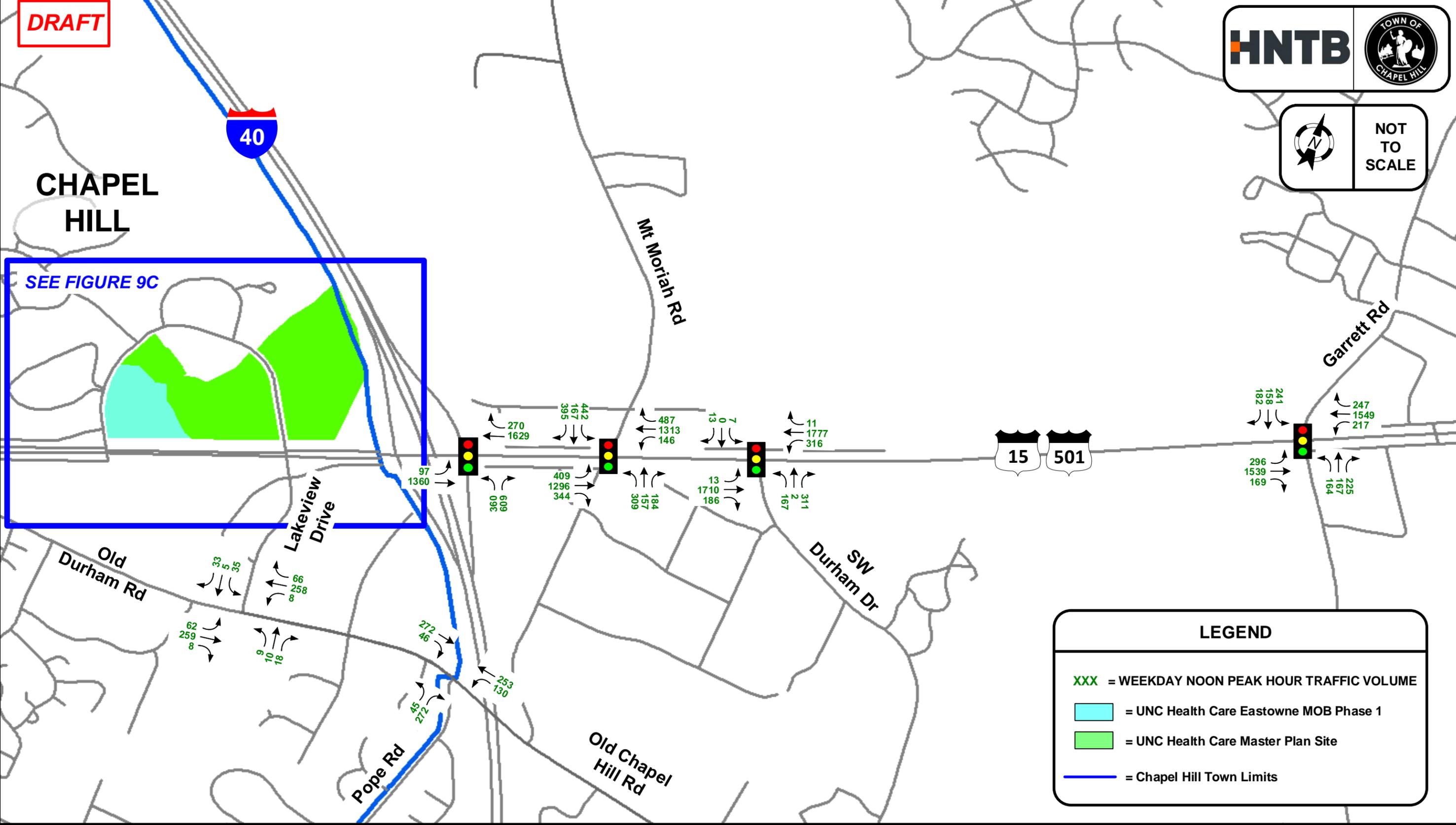
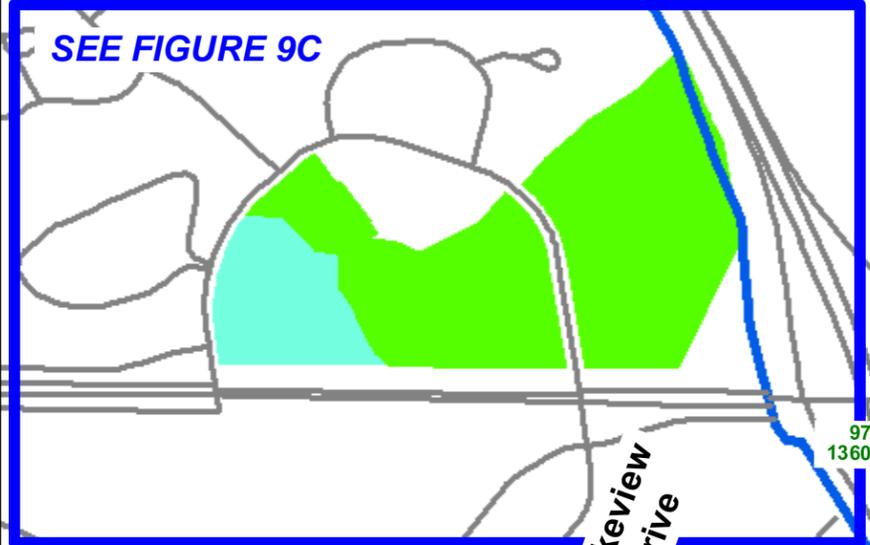
FIGURE 9C

DRAFT



CHAPEL HILL

SEE FIGURE 9C



LEGEND

- XXX = WEEKDAY NOON PEAK HOUR TRAFFIC VOLUME
- [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
- [Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits

NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

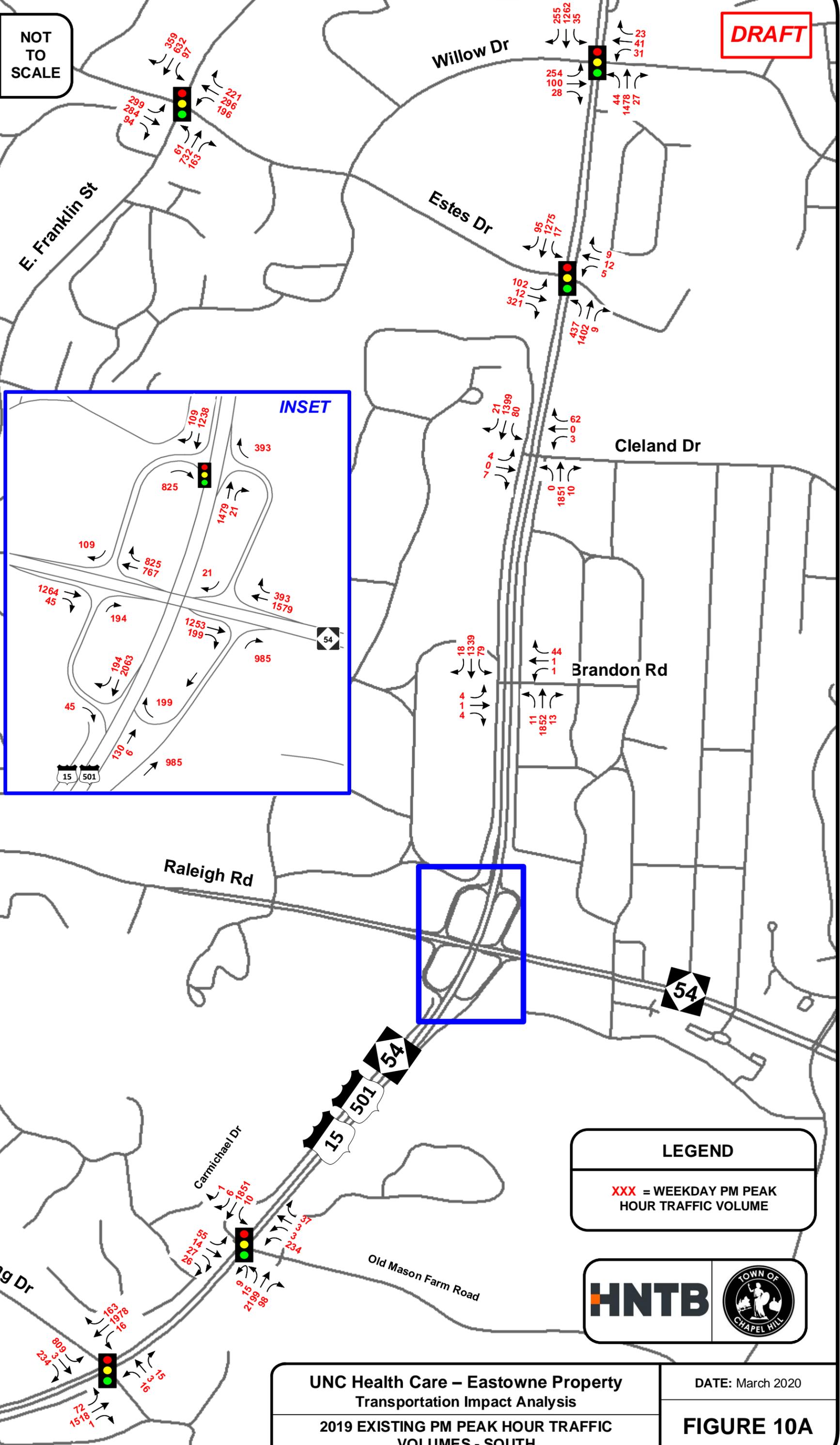
2019 EXISTING NOON PEAK HOUR TRAFFIC VOLUMES – NORTH

DATE: March 2020

FIGURE 9D

DRAFT

NOT TO SCALE



LEGEND

XXX = WEEKDAY PM PEAK HOUR TRAFFIC VOLUME



**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING PM PEAK HOUR TRAFFIC VOLUMES - SOUTH

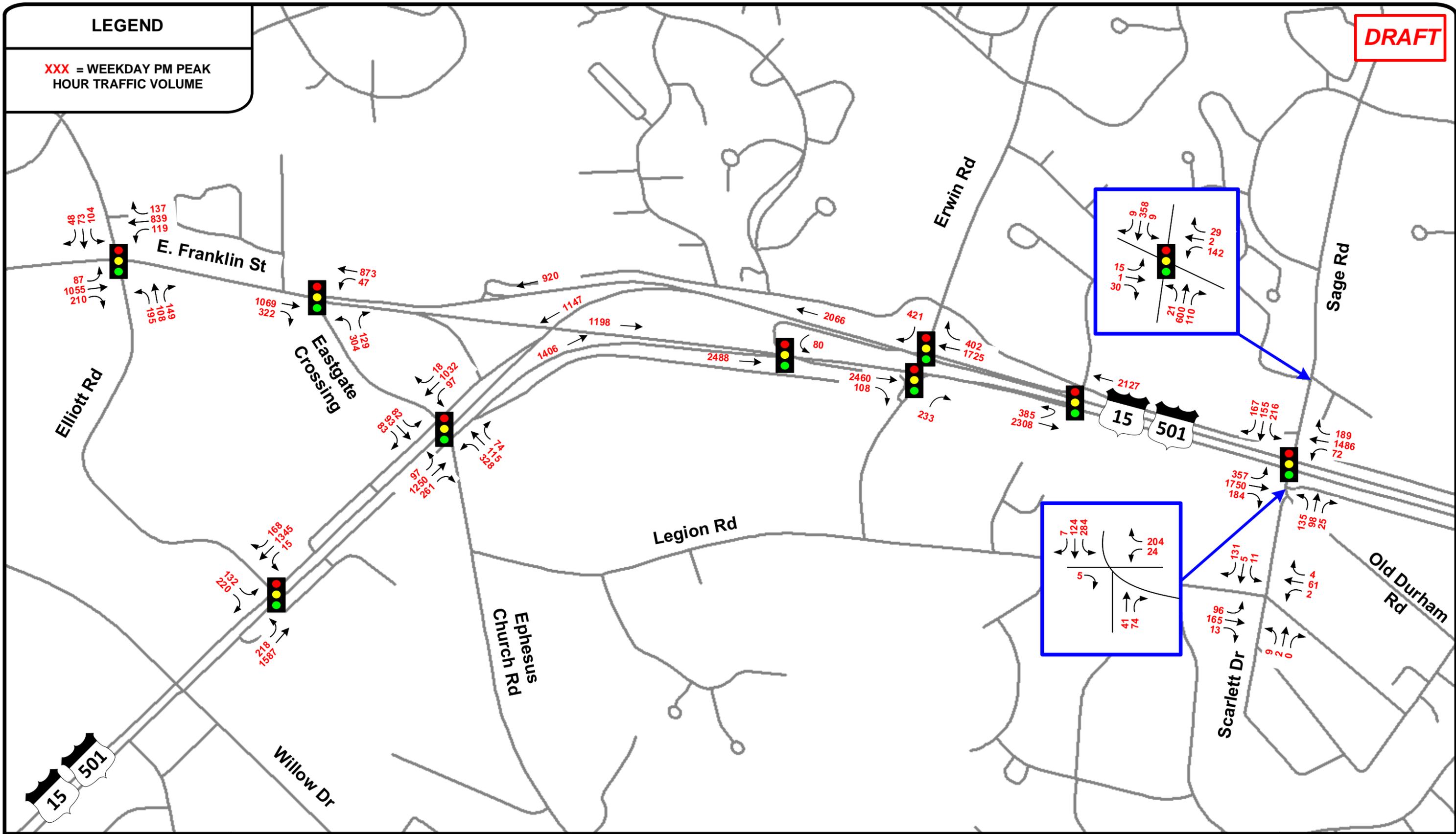
DATE: March 2020

FIGURE 10A

LEGEND

XXX = WEEKDAY PM PEAK HOUR TRAFFIC VOLUME

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NOT TO SCALE

UNC Health Care – Eastowne Property
Transportation Impact Analysis

2019 EXISTING PM PEAK HOUR TRAFFIC VOLUMES - CENTER

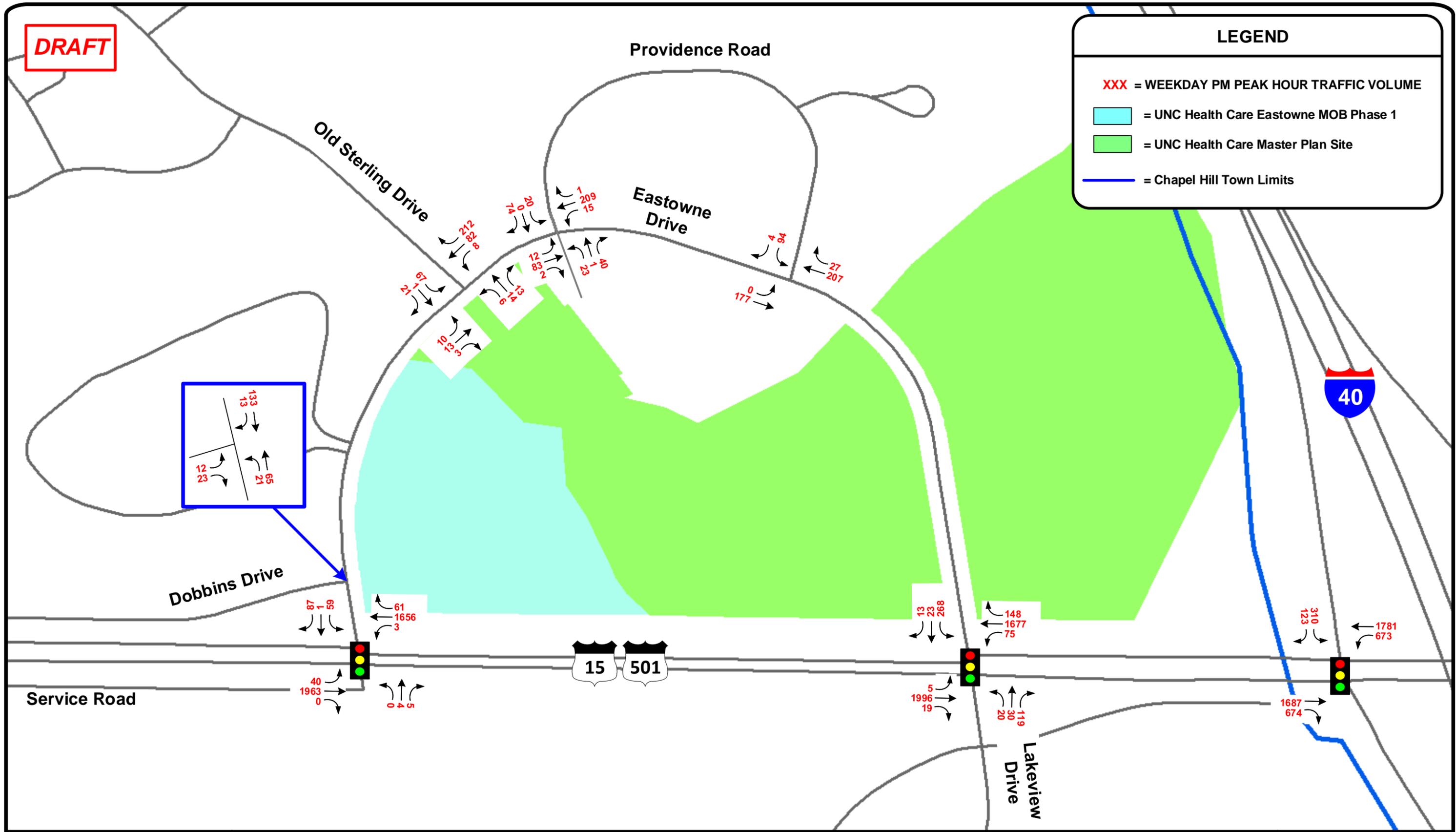
DATE: March 2020

FIGURE 10B

DRAFT

LEGEND

- XXX = WEEKDAY PM PEAK HOUR TRAFFIC VOLUME
- [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
- [Light Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING PM PEAK HOUR TRAFFIC VOLUMES – SITE VICINITY

DATE: March 2020

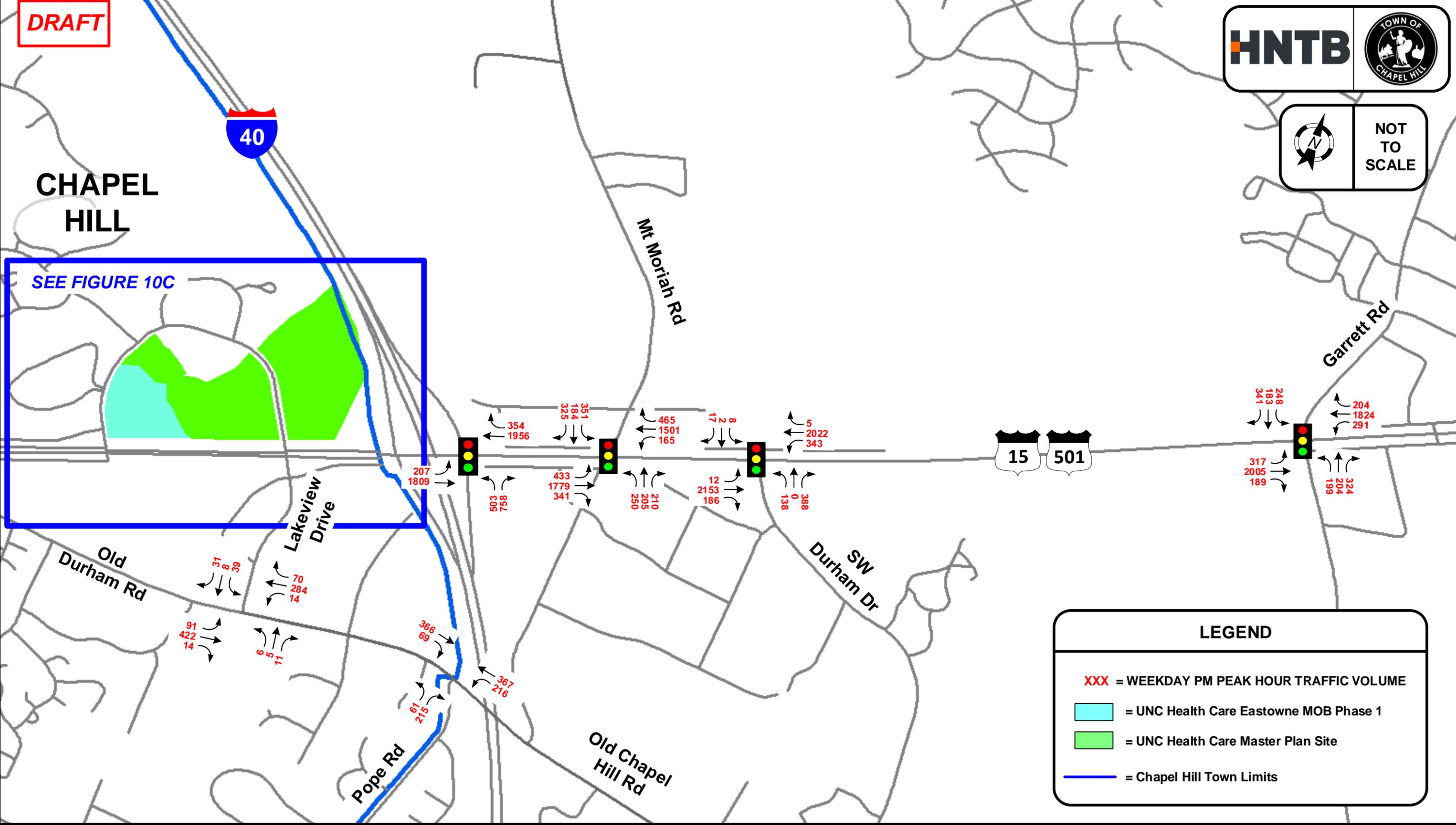
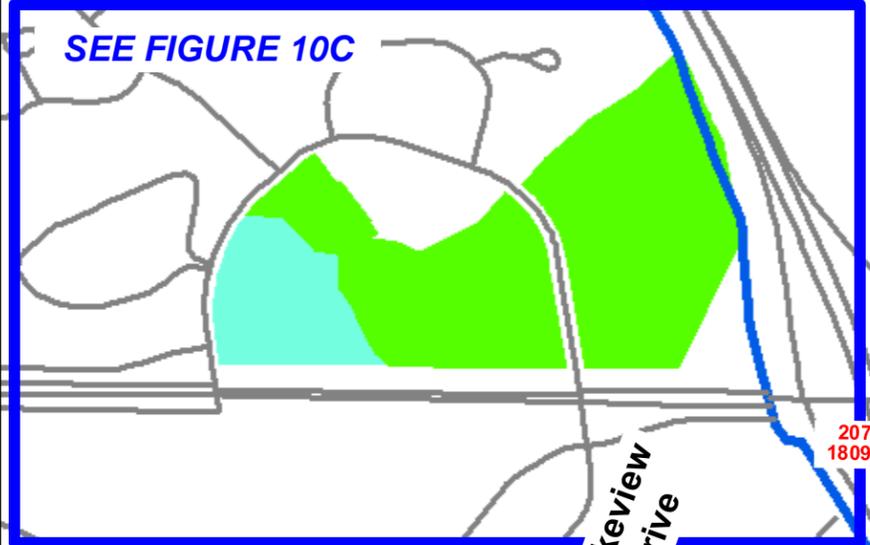
FIGURE 10C

DRAFT



CHAPEL HILL

SEE FIGURE 10C



LEGEND

- XXX = WEEKDAY PM PEAK HOUR TRAFFIC VOLUME
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- = Chapel Hill Town Limits

NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 EXISTING PM PEAK HOUR TRAFFIC VOLUMES – NORTH

DATE: March 2020

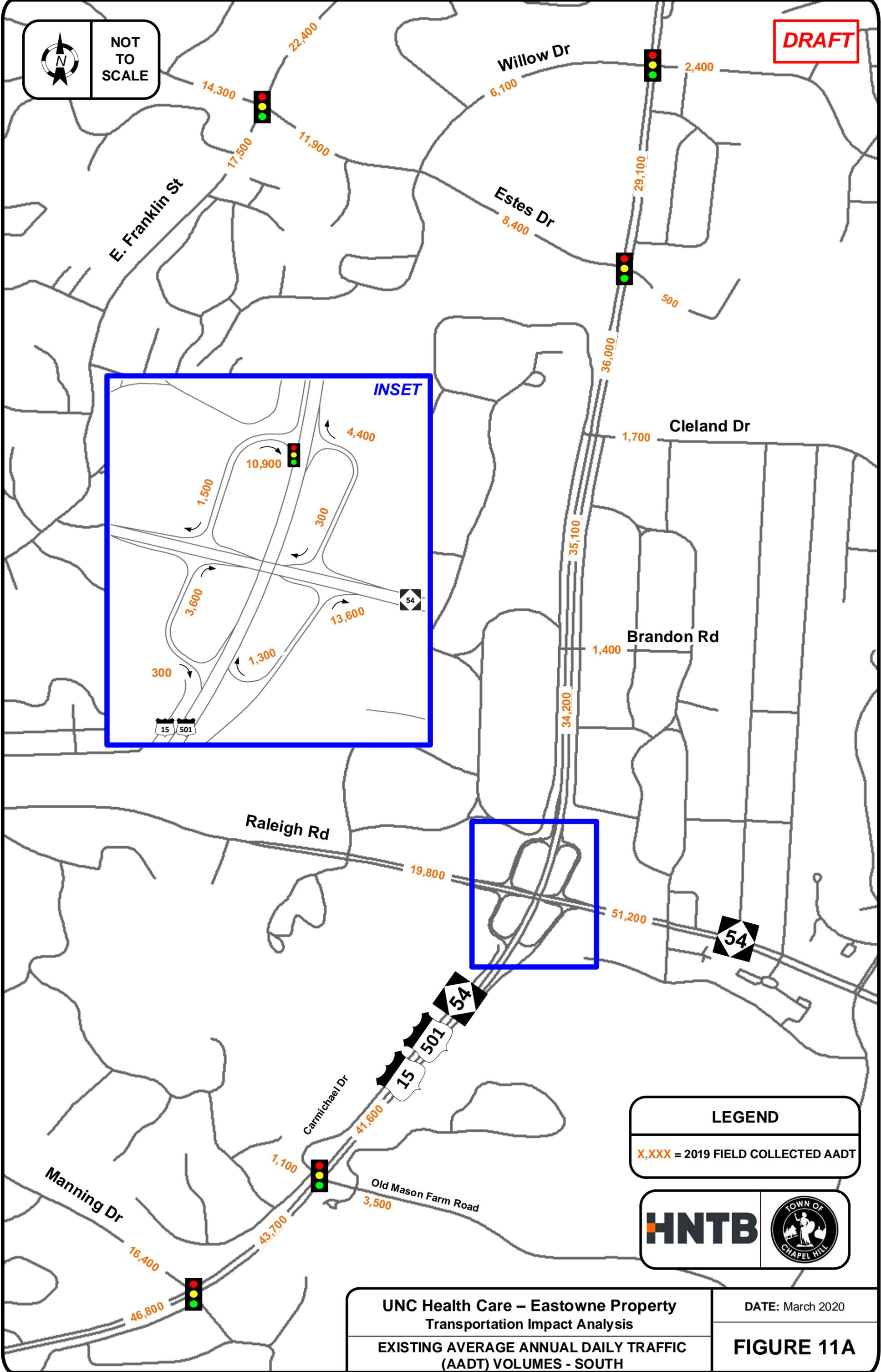
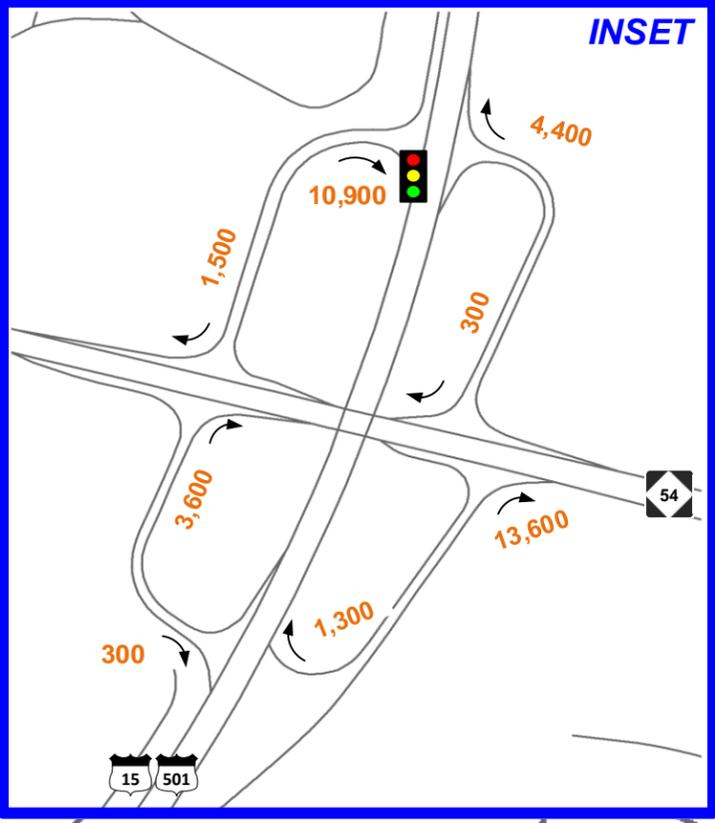
FIGURE 10D

DRAFT

NOT TO SCALE



INSET



LEGEND

X,XXX = 2019 FIELD COLLECTED AADT



**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

**EXISTING AVERAGE ANNUAL DAILY TRAFFIC
(AADT) VOLUMES - SOUTH**

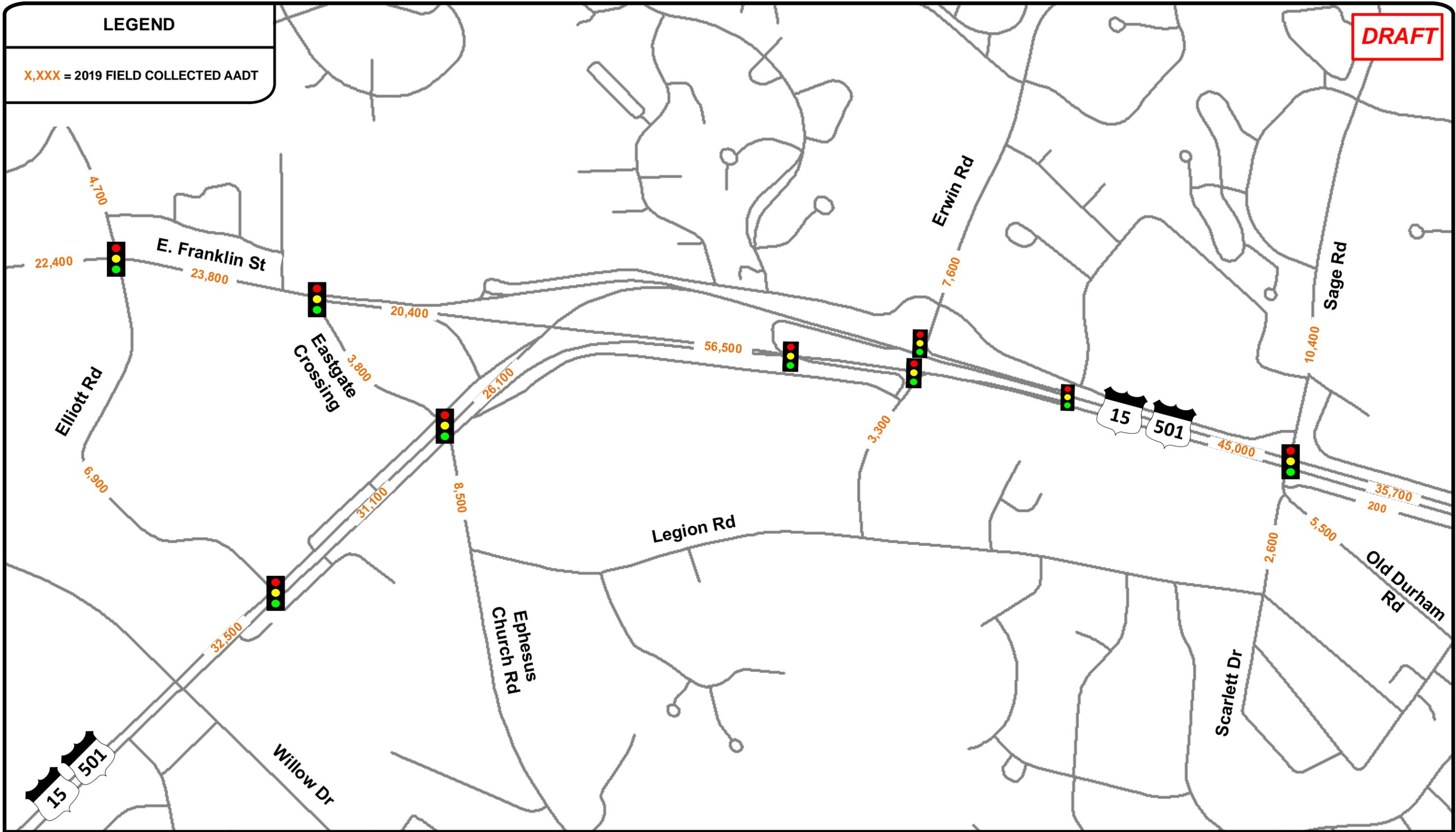
DATE: March 2020

FIGURE 11A

LEGEND

X,XXX = 2019 FIELD COLLECTED AADT

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UNC Health Care – Eastowne Property
Transportation Impact Analysis

DATE: March 2020

EXISTING AVERAGE ANNUAL DAILY TRAFFIC (AADT) VOLUMES - CENTER

FIGURE 11B

DRAFT

LEGEND

- X,XXX = 2019 FIELD COLLECTED AADT
- [Cyan Box] = UNC Health Care Eastowne MOB Phase 1
- [Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits



NOT TO SCALE

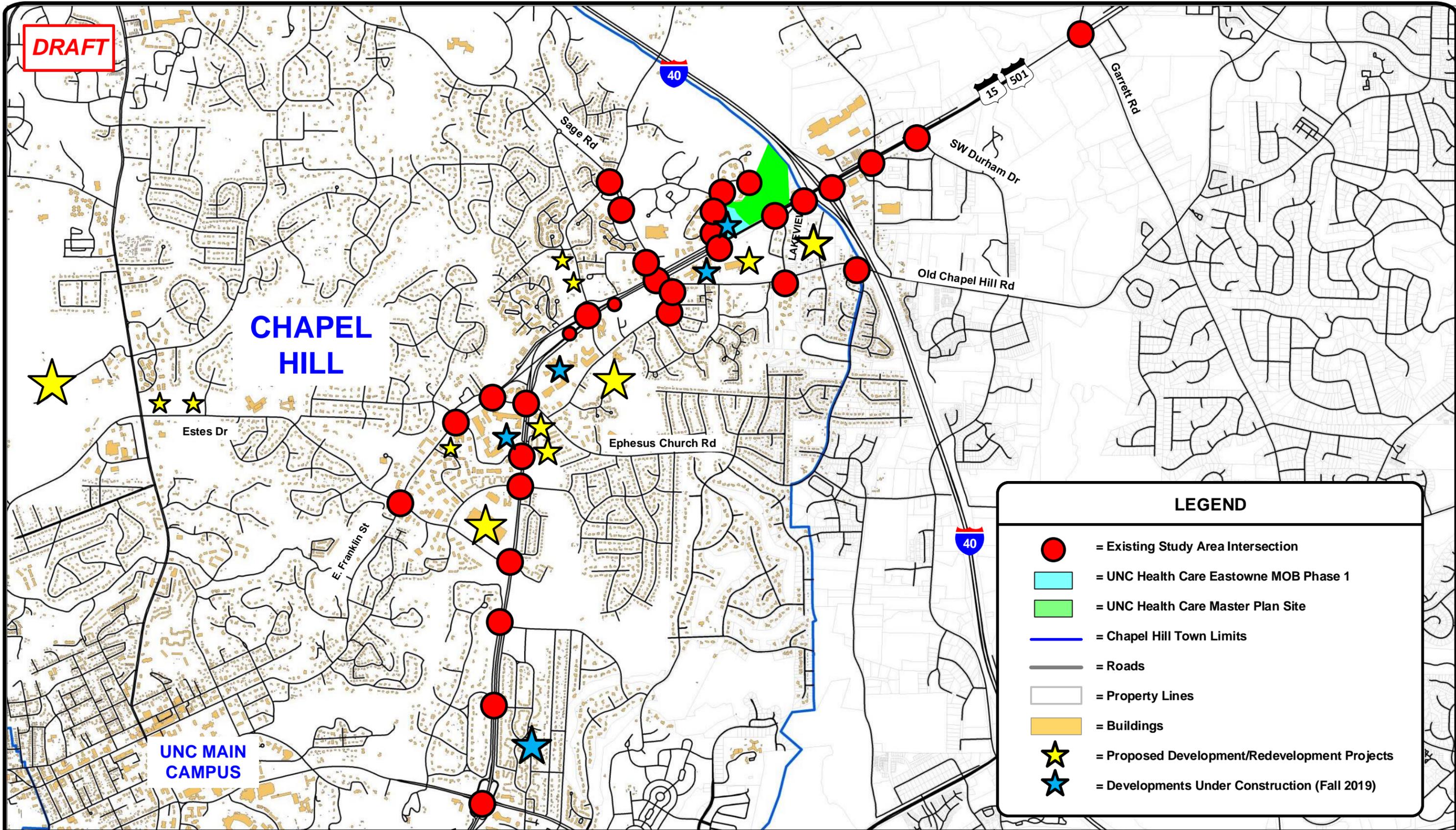
**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

EXISTING AVERAGE ANNUAL DAILY TRAFFIC (AADT) VOLUMES - NORTH

DATE: March 2020

FIGURE 11C

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LEGEND

- = Existing Study Area Intersection
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- = Chapel Hill Town Limits
- = Roads
- = Property Lines
- = Buildings
- = Proposed Development/Redevelopment Projects
- = Developments Under Construction (Fall 2019)



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

DATE: March 2020

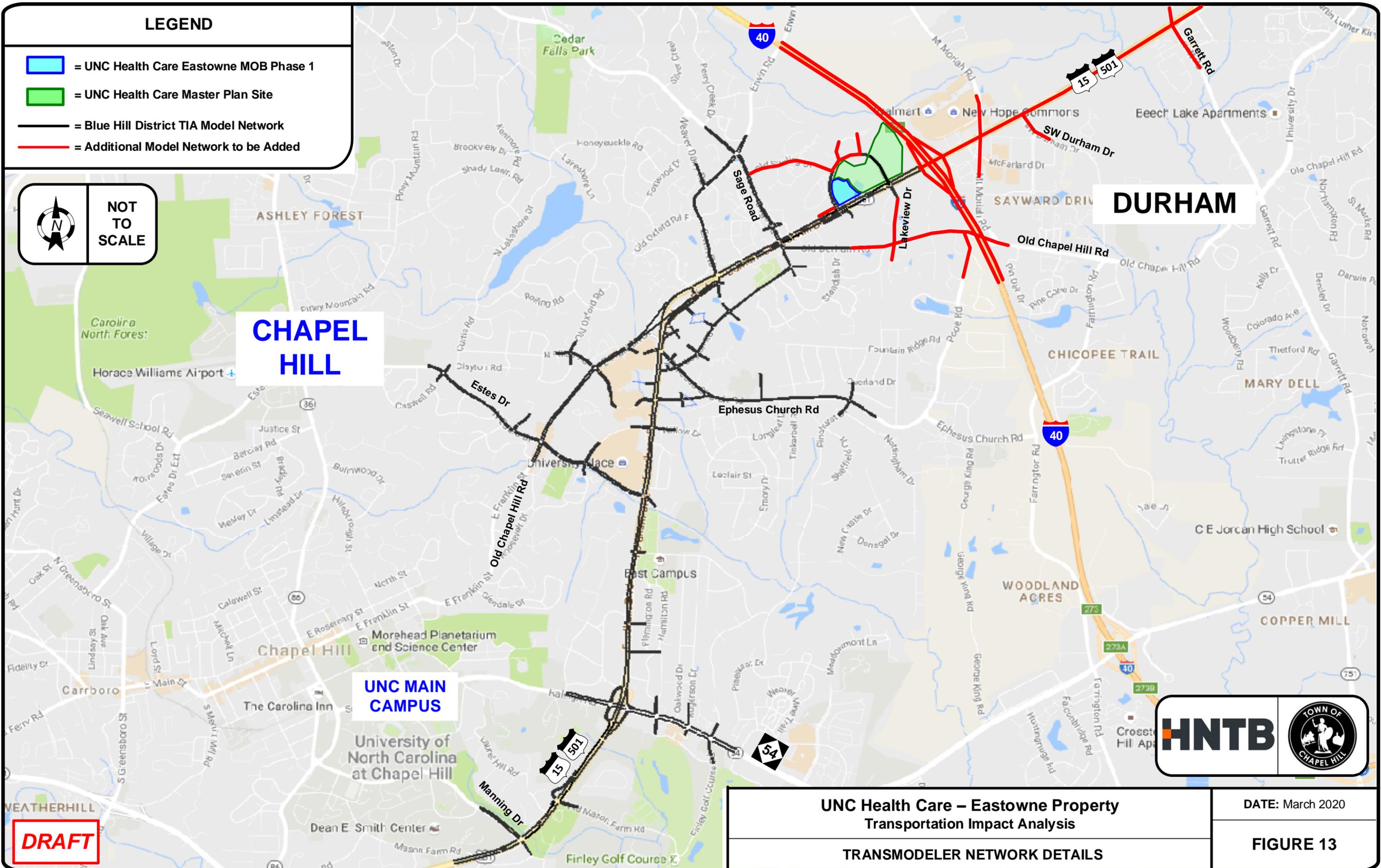
CURRENT / FUTURE BACKGROUND DEVELOPMENT PROJECTS

FIGURE 12

LEGEND

-  = UNC Health Care Eastowne MOB Phase 1
-  = UNC Health Care Master Plan Site
-  = Blue Hill District TIA Model Network
-  = Additional Model Network to be Added

 **NOT TO SCALE**



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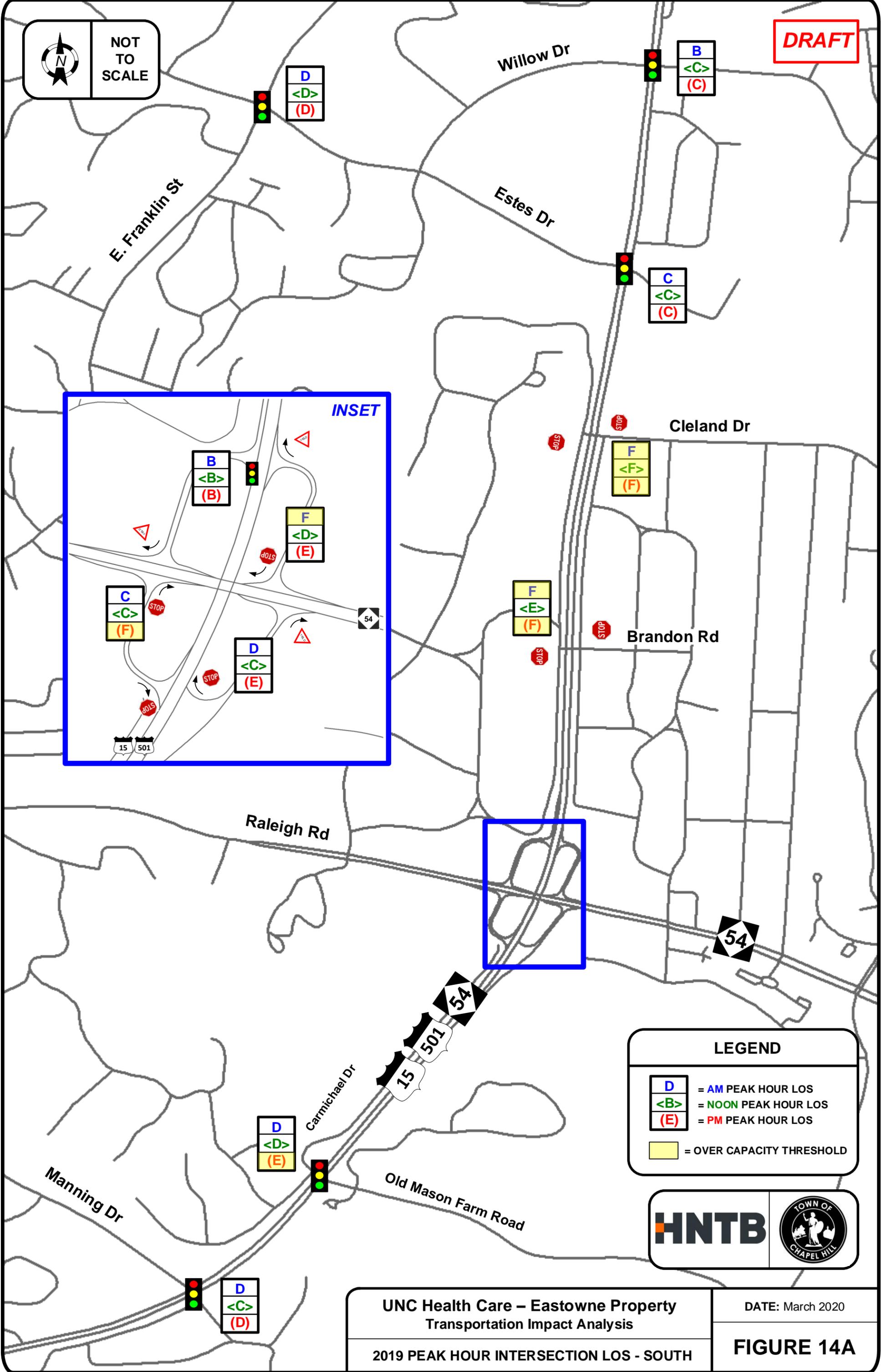
**UNC Health Care – Eastowne Property
Transportation Impact Analysis**
TRANSMODELER NETWORK DETAILS

DATE: March 2020
FIGURE 13

HNTB 

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NOT TO SCALE



INSET

LEGEND

D	= AM PEAK HOUR LOS
	= NOON PEAK HOUR LOS
(E)	= PM PEAK HOUR LOS
[Yellow Box]	= OVER CAPACITY THRESHOLD

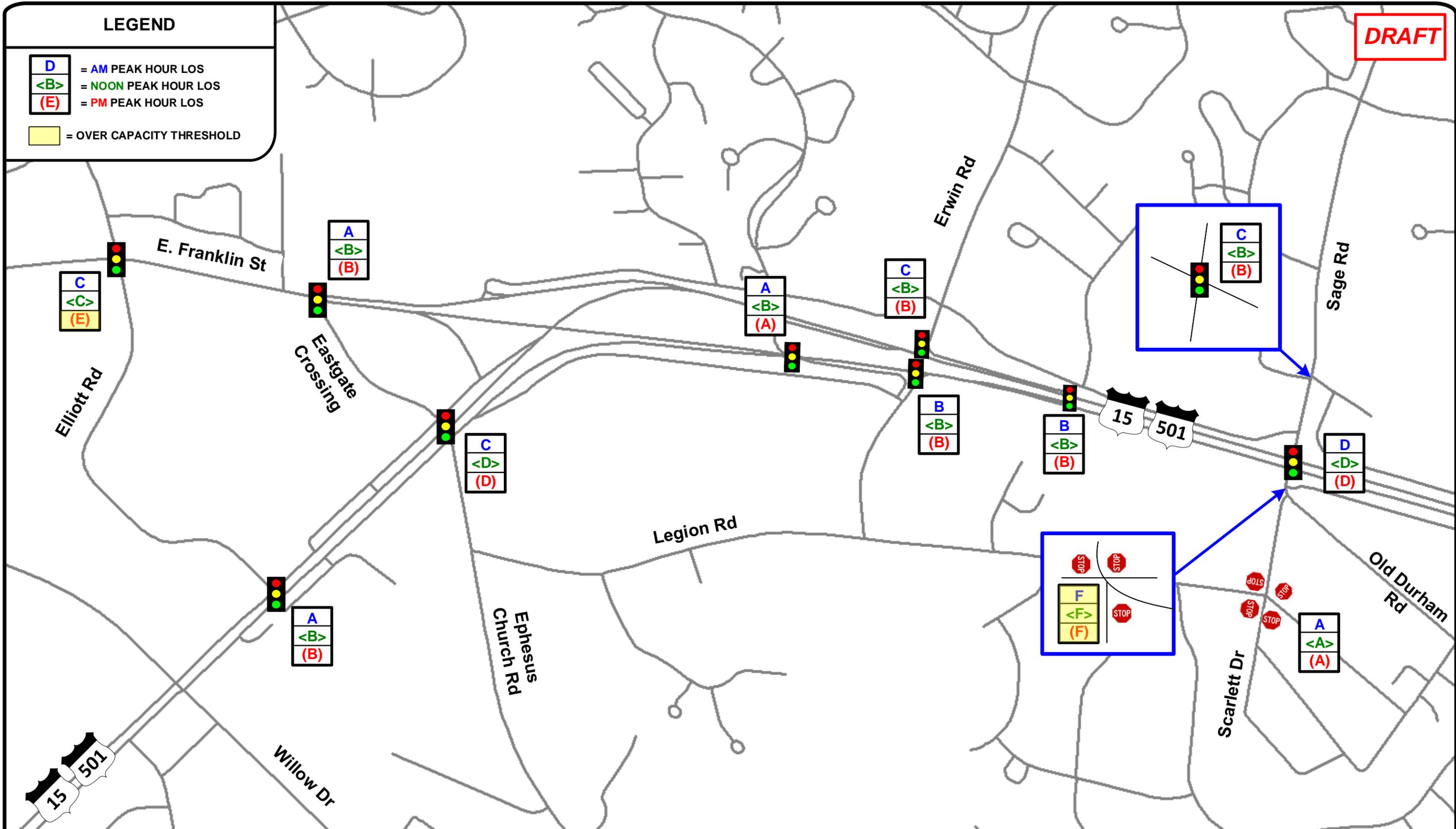
UNC Health Care – Eastowne Property
 Transportation Impact Analysis
 2019 PEAK HOUR INTERSECTION LOS - SOUTH

DATE: March 2020
FIGURE 14A

DRAFT

LEGEND

- D** = AM PEAK HOUR LOS
- ** = NOON PEAK HOUR LOS
- (E)** = PM PEAK HOUR LOS
- Yellow Box** = OVER CAPACITY THRESHOLD



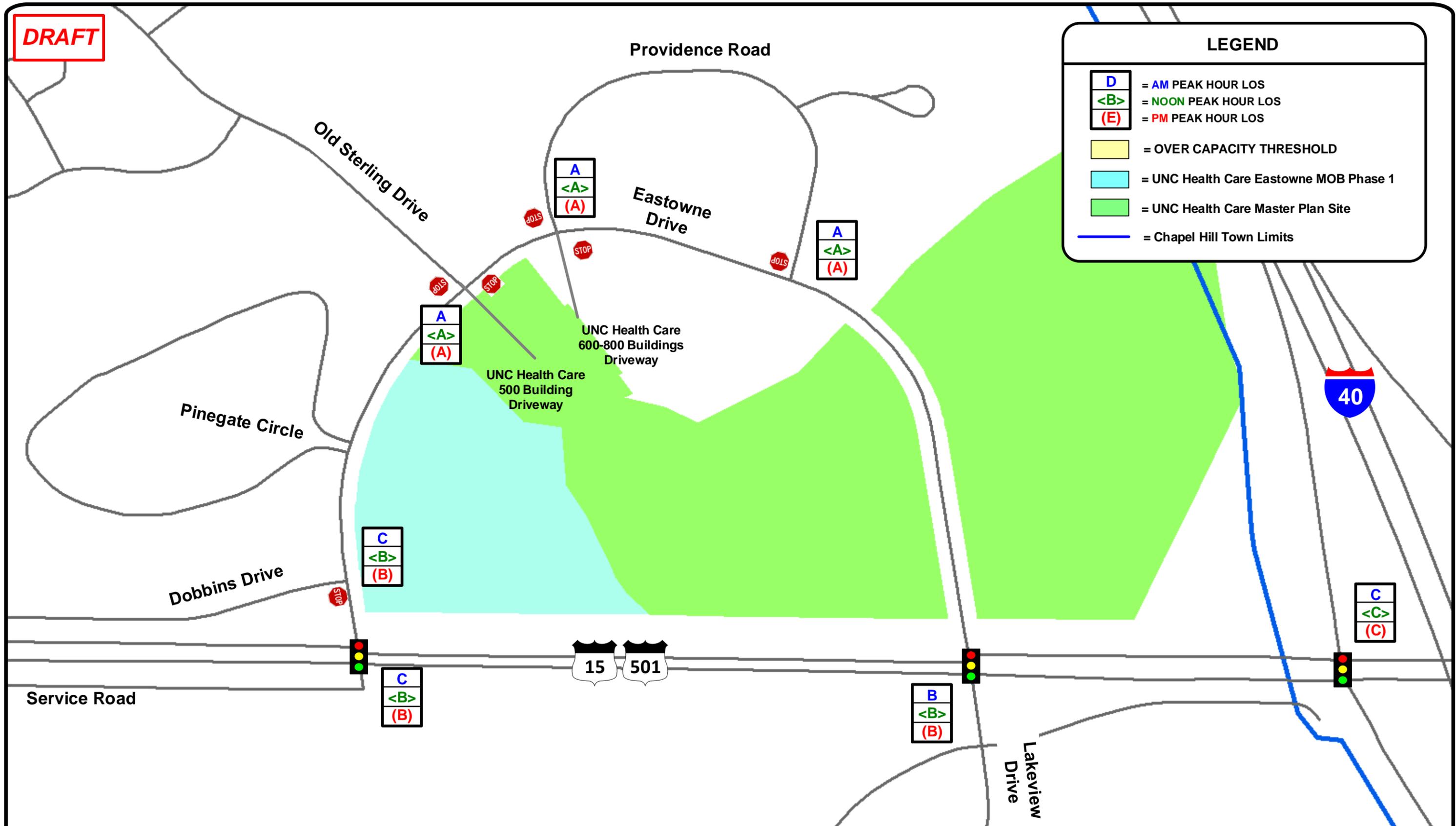
NOT TO SCALE

UNC Health Care – Eastowne Property
 Transportation Impact Analysis
 2019 PEAK HOUR INTERSECTION LOS - CENTER

DATE: March 2020

FIGURE 14B

DRAFT



NOT TO SCALE

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 PEAK HOUR INTERSECTION LOS – SITE VICINITY

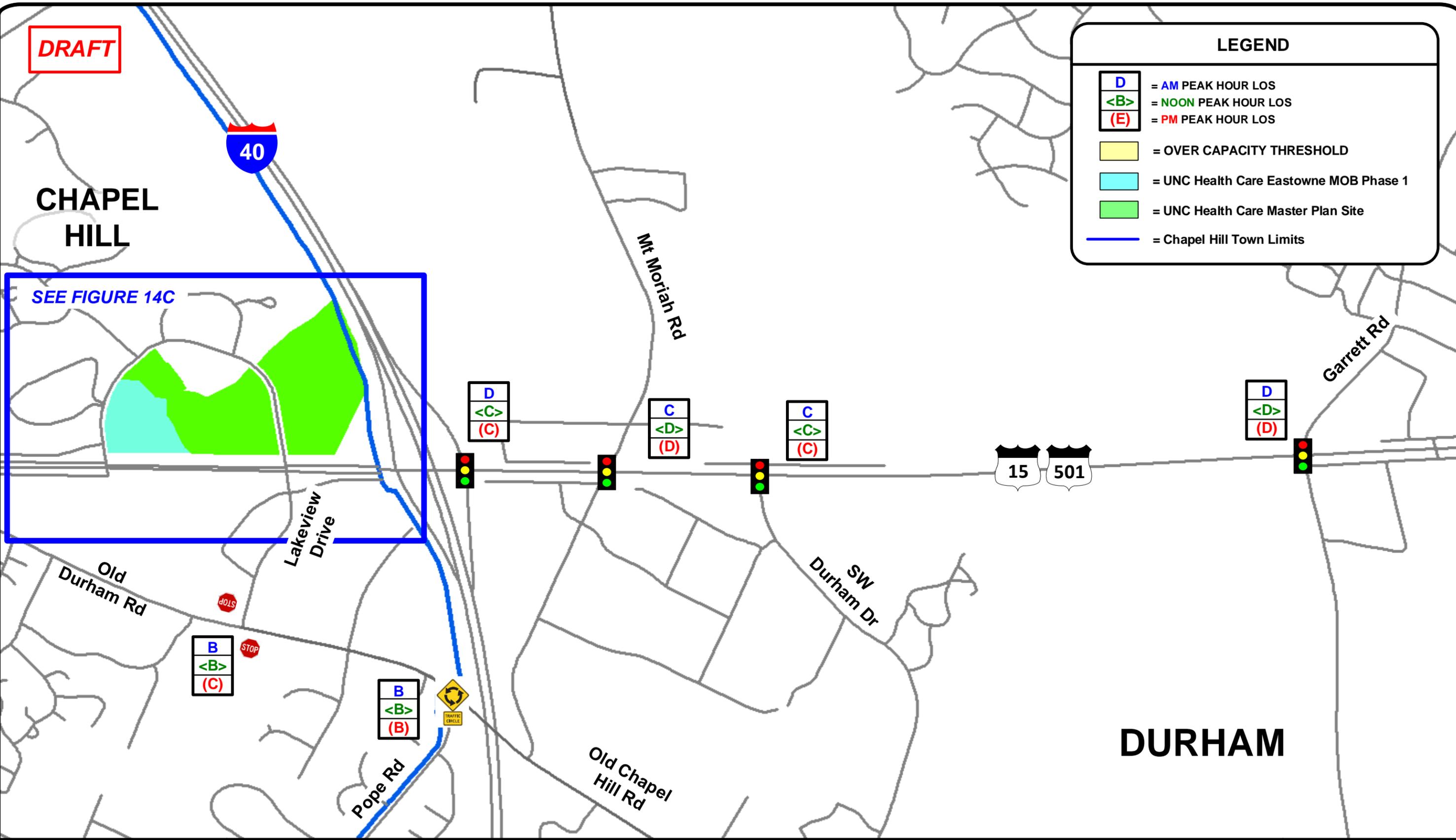
DATE: March 2020

FIGURE 14C

DRAFT

LEGEND

- D = AM PEAK HOUR LOS
- = NOON PEAK HOUR LOS
- (E) = PM PEAK HOUR LOS
- = OVER CAPACITY THRESHOLD
- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- = Chapel Hill Town Limits



NOT TO SCALE

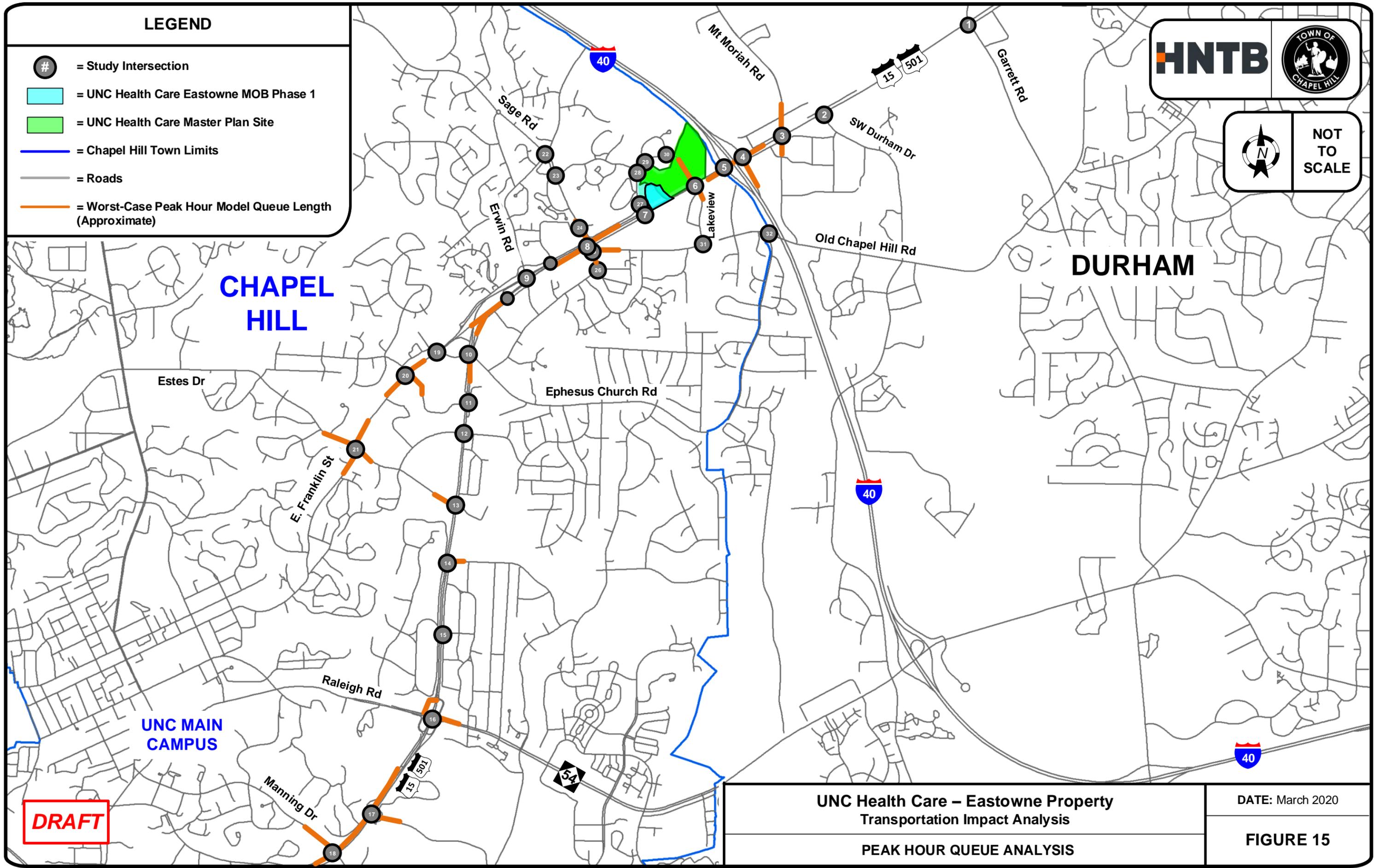
UNC Health Care – Eastowne Property
 Transportation Impact Analysis
 2019 PEAK HOUR INTERSECTION LOS – NORTH

DATE: March 2020

FIGURE 14D

LEGEND

- # = Study Intersection
- [Light Blue Box] = UNC Health Care Eastowne MOB Phase 1
- [Light Green Box] = UNC Health Care Master Plan Site
- [Blue Line] = Chapel Hill Town Limits
- [Grey Line] = Roads
- [Orange Line] = Worst-Case Peak Hour Model Queue Length (Approximate)



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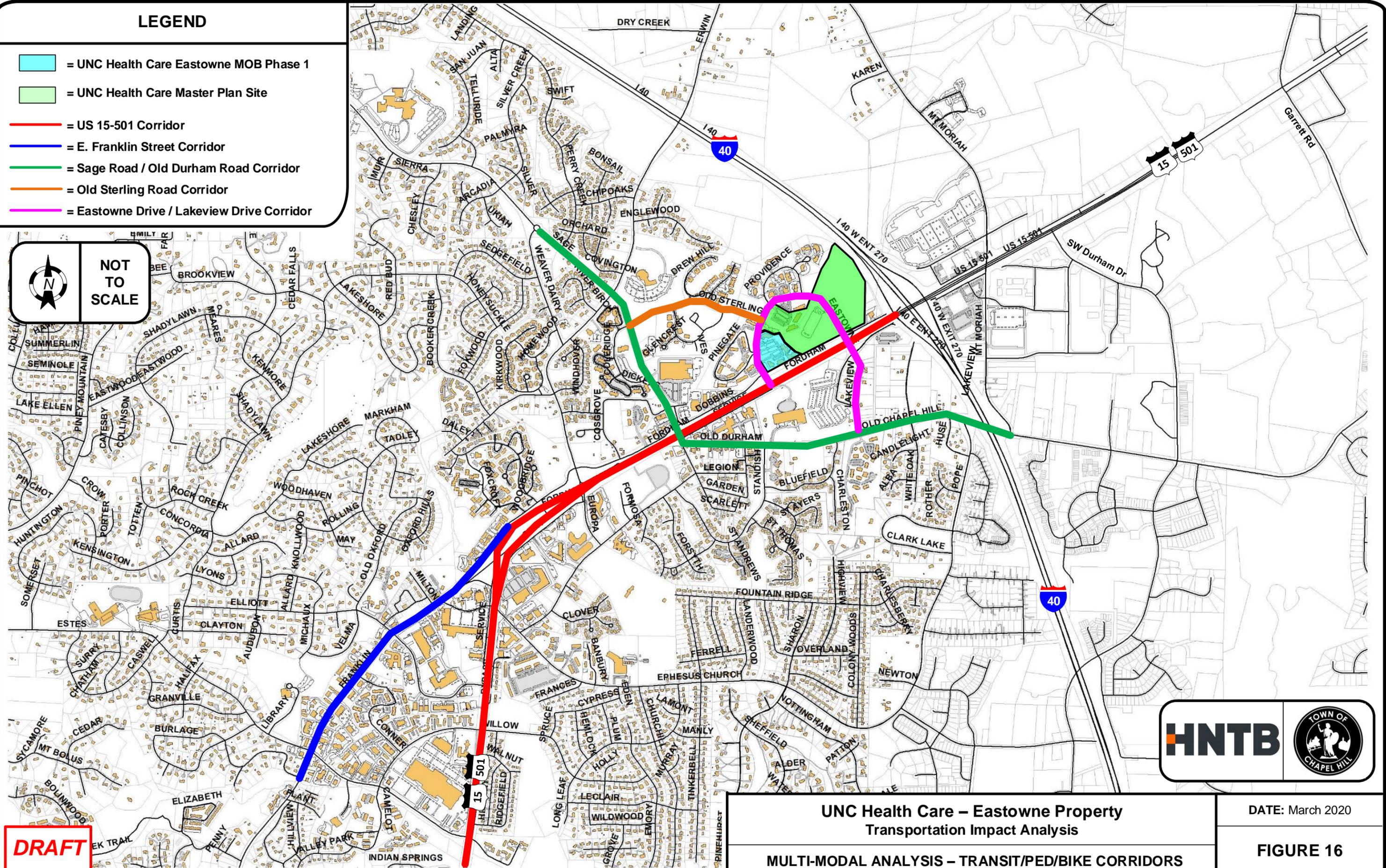
**UNC Health Care – Eastowne Property
Transportation Impact Analysis
PEAK HOUR QUEUE ANALYSIS**

DATE: March 2020

FIGURE 15

LEGEND

- = UNC Health Care Eastowne MOB Phase 1
- = UNC Health Care Master Plan Site
- = US 15-501 Corridor
- = E. Franklin Street Corridor
- = Sage Road / Old Durham Road Corridor
- = Old Sterling Road Corridor
- = Eastowne Drive / Lakeview Drive Corridor



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**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

MULTI-MODAL ANALYSIS – TRANSIT/PED/BIKE CORRIDORS

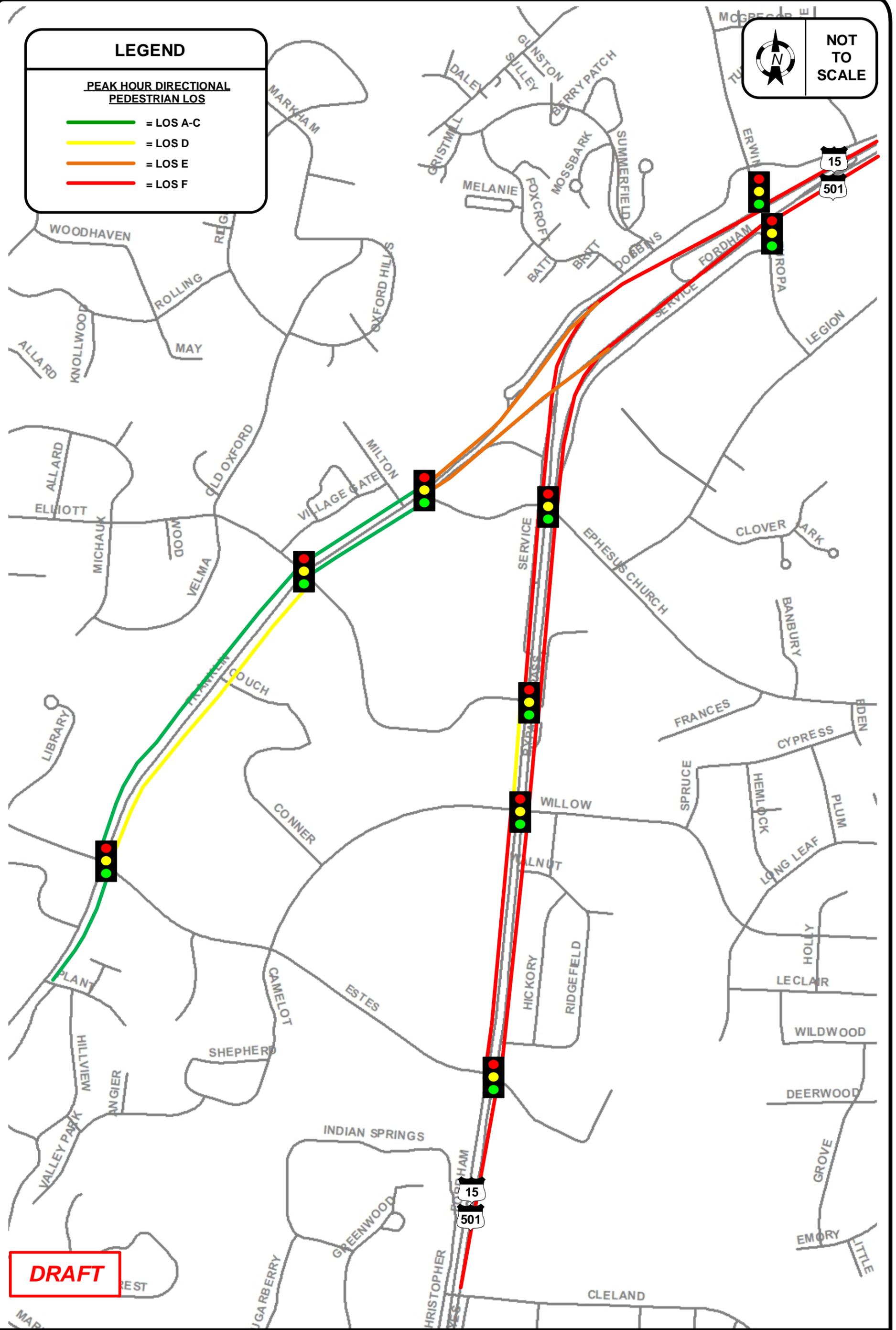
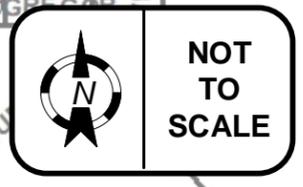
DATE: March 2020

FIGURE 16

LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



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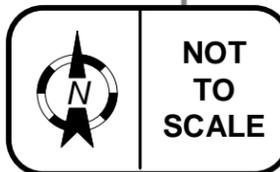
HNTB

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 MULTI-MODAL LOS RESULTS – PEDESTRIAN
EXISTING CONDITONS

DATE: March 2020

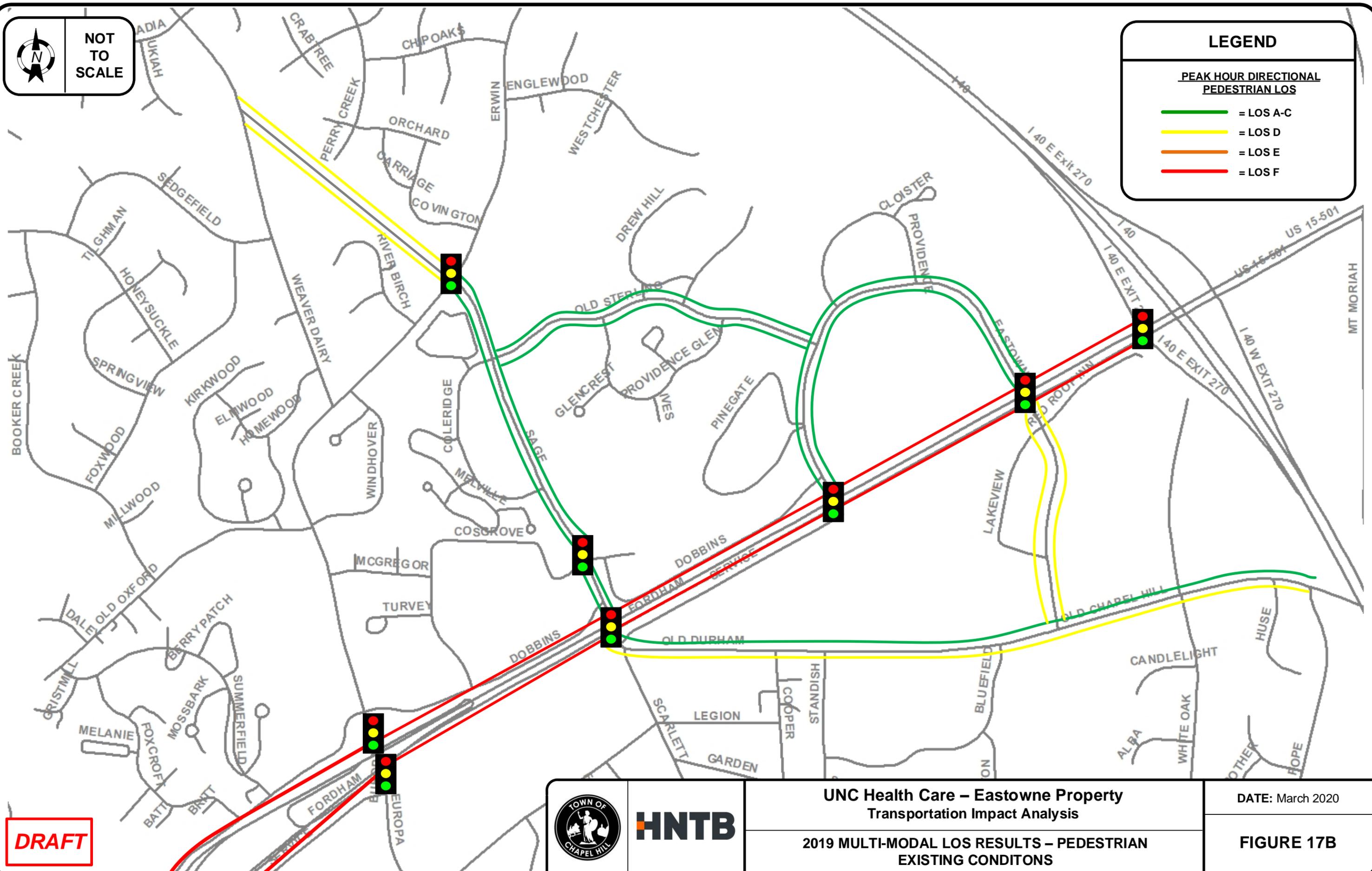
FIGURE 17A



LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



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UNC Health Care – Eastowne Property
 Transportation Impact Analysis

2019 MULTI-MODAL LOS RESULTS – PEDESTRIAN
 EXISTING CONDITONS

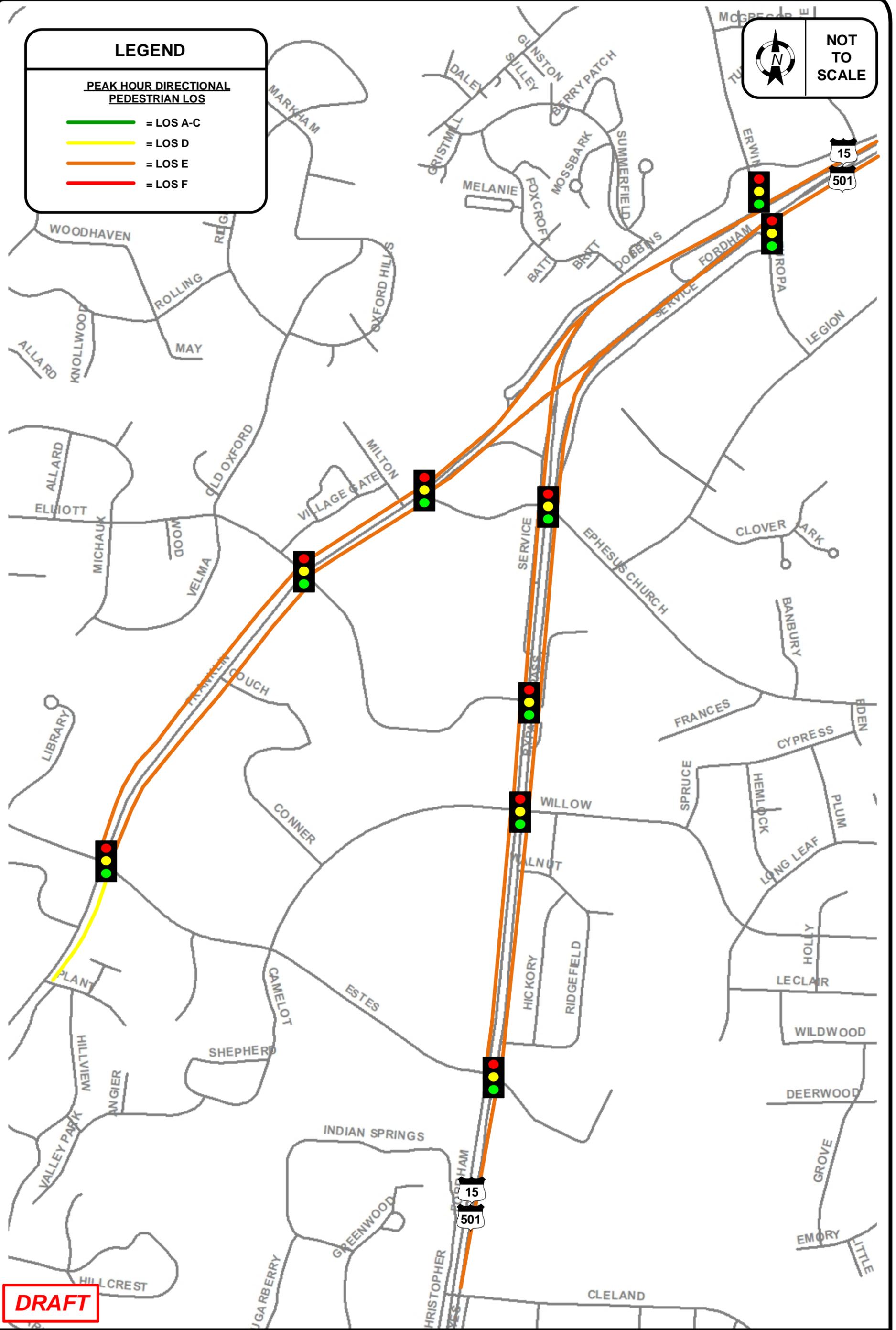
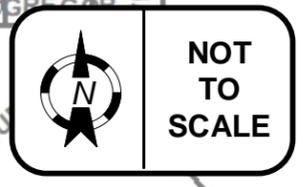
DATE: March 2020

FIGURE 17B

LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



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**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 MULTI-MODAL LOS RESULTS – BICYCLE
EXISTING CONDITONS

DATE: March 2020

FIGURE 18A

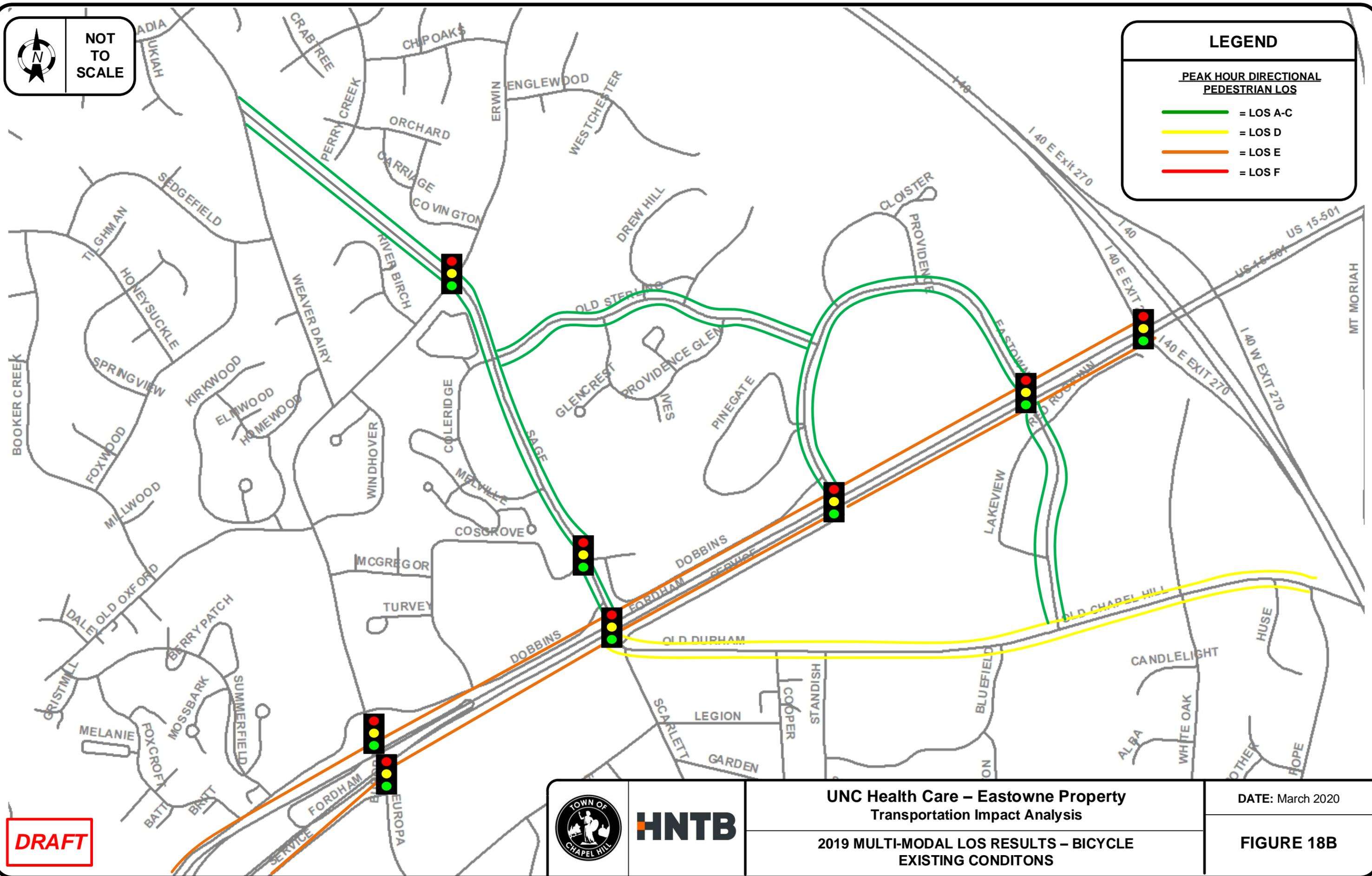


NOT TO SCALE

LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



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UNC Health Care – Eastowne Property Transportation Impact Analysis

2019 MULTI-MODAL LOS RESULTS – BICYCLE EXISTING CONDITONS

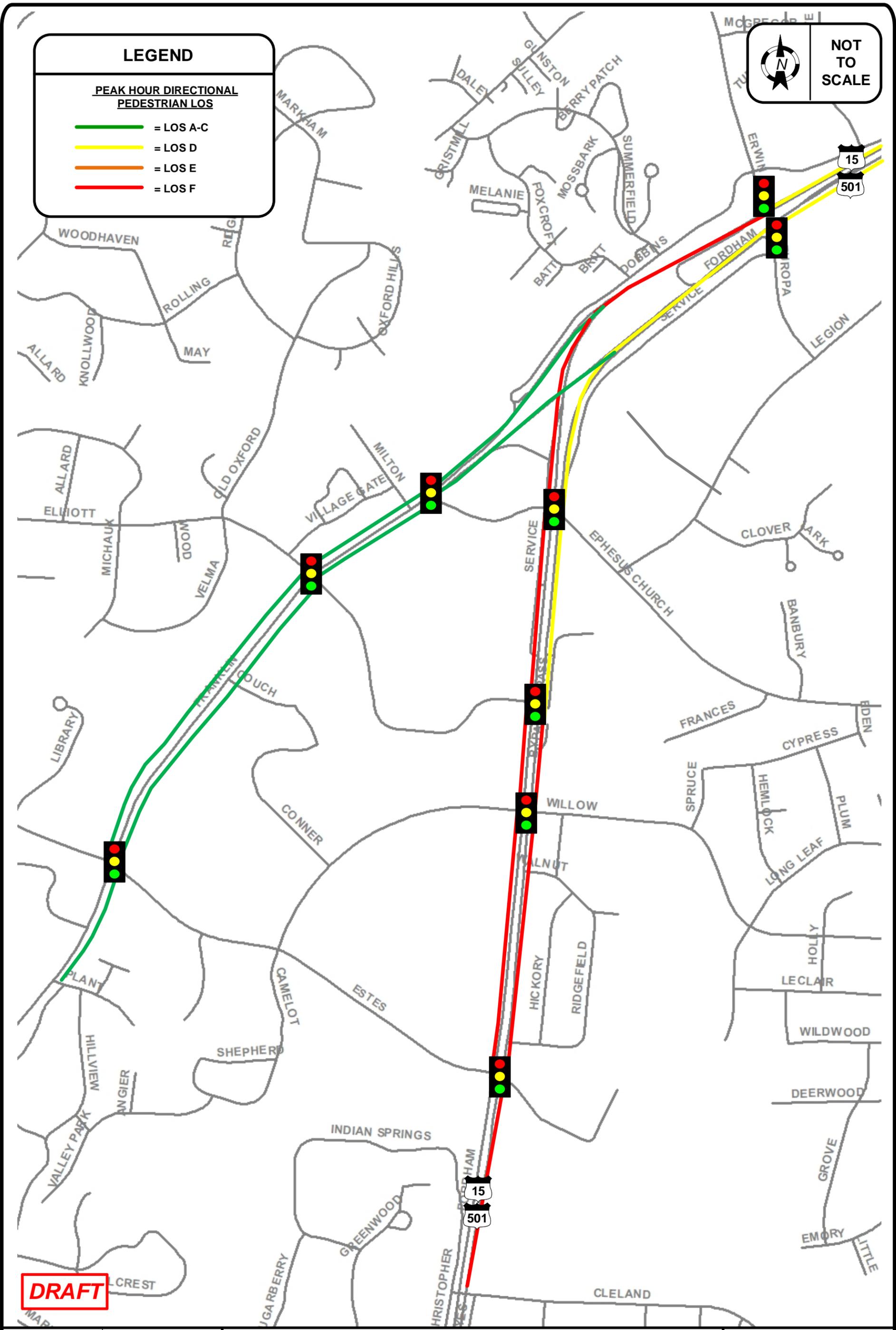
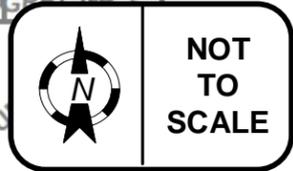
DATE: March 2020

FIGURE 18B

LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



DRAFT



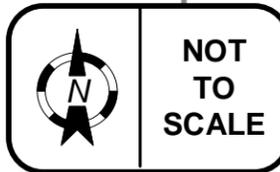
HNTB

**UNC Health Care – Eastowne Property
Transportation Impact Analysis**

2019 MULTI-MODAL LOS RESULTS – TRANSIT
EXISTING CONDITONS

DATE: March 2020

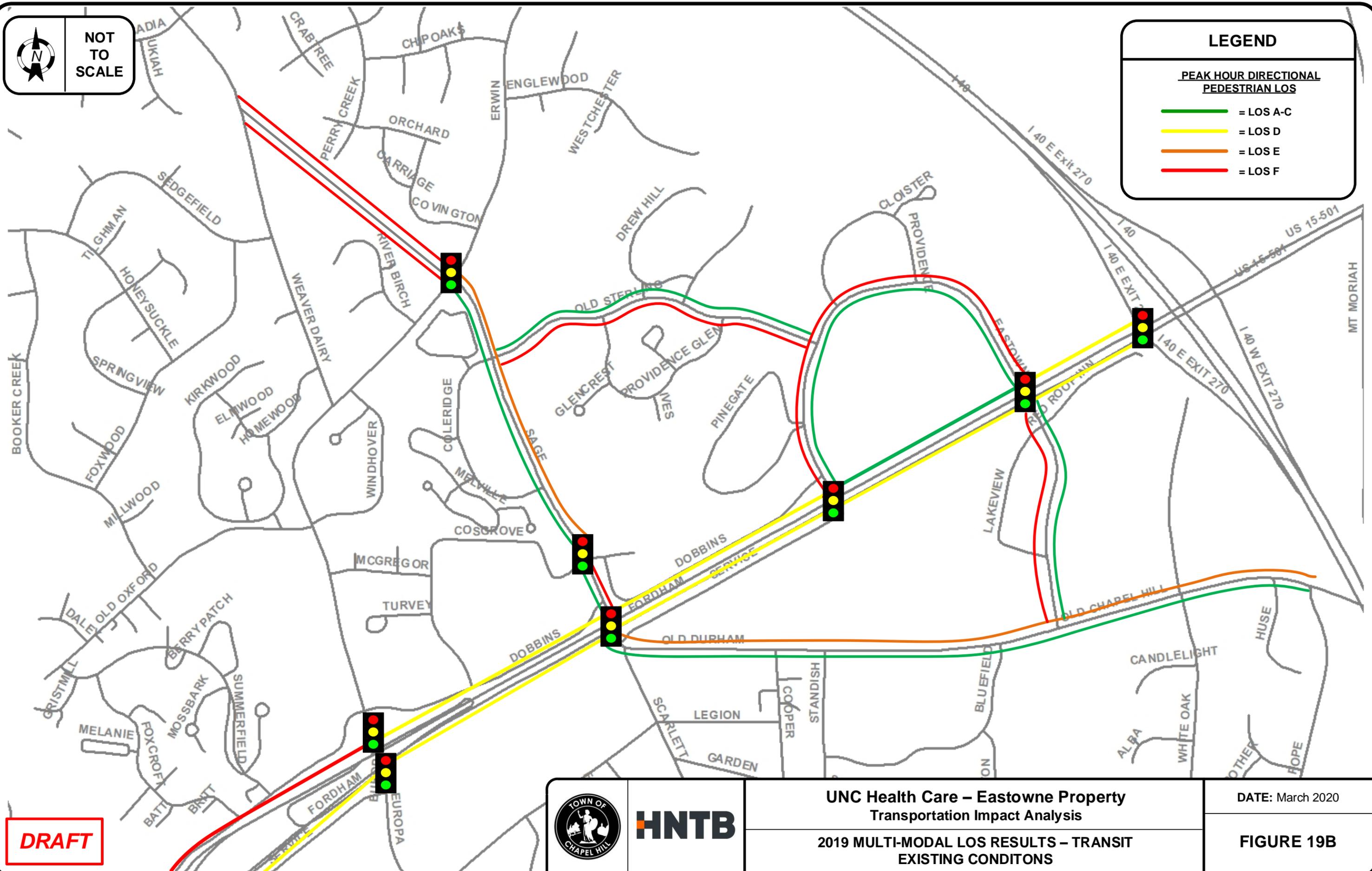
FIGURE 19A



LEGEND

PEAK HOUR DIRECTIONAL PEDESTRIAN LOS

- = LOS A-C
- = LOS D
- = LOS E
- = LOS F



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UNC Health Care – Eastowne Property
 Transportation Impact Analysis
 2019 MULTI-MODAL LOS RESULTS – TRANSIT
 EXISTING CONDITONS

DATE: March 2020

FIGURE 19B