

**AURA CHAPEL HILL
DEVELOPMENT**
TRAFFIC IMPACT STUDY - *DRAFT*

EXECUTIVE SUMMARY



Prepared for:

The Town of Chapel Hill
Public Works Department - Engineering

Prepared by:

VHB Engineering NC, P.C.

*940 Main Campus Drive, Venture 1
Suite 500
Raleigh, NC 27606*

NCBELS License #: C-3750

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Executive Summary

Trinsic Residential Group plans to develop a parcel of land in the northeast corner of Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750) in Chapel Hill, NC (Figure ES-1). The proposed development will consist of 58 townhomes, 361 mid-rise apartments, a 3,032-square foot small office building, and 8,564 square feet of retail space. The development is expected to be fully constructed and occupied by the end of 2023.

Project Background

Based on the conceptual site plan (Figure ES-2), access to the development is proposed via two (2) vehicular access points. The following are the proposed access points:

- › Future Access #1: right-in/right-out only access on Martin Luther King Jr. Boulevard (NC 86), approximately 450-feet north of Estes Drive (SR 1750).
- › Future Access #2: full movement access on Estes Drive (SR 1750), approximately 900-feet east of Martin Luther King Jr. Boulevard (NC 86).

Based on discussions with Town of Chapel Hill staff, the following intersections were included in the study area and analyzed for existing and future conditions, where appropriate:

- › Martin Luther King Jr. Boulevard (NC 86) at Airport Drive (unsignalized)
- › Martin Luther King Jr. Boulevard (NC 86) at Estes Drive (SR 1750/SR 1780) (signalized)
- › Martin Luther King Jr. Boulevard (NC 86) at Piney Mountain Road/Municipal Drive (signalized)
- › Martin Luther King Jr. Boulevard (NC 86) at Homestead Road (SR 1777) (signalized)
- › Estes Drive (SR 1750) at Somerset Drive (unsignalized)
- › Estes Drive (SR 1750) at Caswell Road (signalized)
- › Franklin Street (SR 1010) at Estes Drive (SR 1750) (signalized)

- › Martin Luther King Jr. Boulevard (NC 86) at Future Access #1 (future unsignalized)
- › Estes Drive (SR 1750) at Future Access #2 (future unsignalized)

The Town of Chapel Hill requires that future year analysis of the traffic conditions be conducted for the projected build year plus one (+1). Therefore, the analysis was performed under the following four (4) scenarios:

- › Existing (2020) Conditions
- › No-Build (2024) Conditions
- › Build (2024) Conditions
- › Build (2024) Conditions – With Improvements

The Existing (2020) scenario includes AM, Noon, and PM peak hour analysis based on turning movement count data collected in January 2020. The No-Build (2024) scenario includes existing traffic with an annual growth rate of one-half percent (0.5%) applied to the study area roadways between the base year (2020) and build year (2024). The No-Build (2024) scenario also includes background site trips generated by other proposed developments within the study area. The Build (2024) scenario includes the calculated No-Build (2024) volumes with the addition of site trips generated by the full build-out of the proposed development. The Build (2024) with Improvements scenario includes future conditions with any recommended improvements in place.

Intersection analyses were conducted using *Synchro/SimTraffic Version 10*. The overall level of service (LOS) and delay for each intersection and the approach LOS and delay are shown in the Summary LOS table on page vii.

Existing (2020) Conditions

Existing analyses were conducted based on current roadway geometrics and intersection turning movement counts. The existing traffic volume was obtained from turning movement counts collected in January 2020.

Study Area

The site is located in the northeast corner of the Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750) intersection in Chapel Hill, North Carolina. The site has two proposed access points, one along Martin Luther King Jr. Boulevard (NC 86) and one along Estes Drive (SR 1750). Martin Luther King Jr. Boulevard (NC 86) is a north-south principal arterial and Estes Drive (SR 1750) is an east-west minor arterial.

Currently, there are no bicycle lanes present along both Estes Drive (SR 1750) and Martin Luther King Jr. Boulevard (NC 86). A narrow, paved path is located on the south side of Estes Drive (SR 1750), east of Martin Luther King Jr. Boulevard (NC 86). Sidewalks are present on the east side of Martin Luther King Jr. Boulevard (NC 86), adjacent to the study area. Six (6) bus stops are present within the study area and provide access to the site.

Crash Analysis

Five-year crash data (February 1, 2015 – January 31, 2020) was obtained from the North Carolina Department of Transportation (NCDOT) Traffic Engineering Accident Analysis System (TEAAS) along Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750) adjacent to the site.

Level of Service Summary

As reported in the Summary Level of Service (LOS) table on page vii, all signalized intersections, except for one, operate at an overall acceptable LOS (i.e., LOS D or better) during all peak hours. The intersection of Franklin Street (SR 1010) and Estes Drive (SR 1750) operates at LOS E during the PM peak hour. Additionally, all stop-controlled approaches currently operate acceptably during both peak hours.

No-Build (2024) Conditions

Background Growth

A future growth rate of a half percent (0.5%) was derived from average daily traffic counts collected by the NCDOT. This annual growth rate is consistent with recent traffic impact studies near the around the area, and it was applied to the existing traffic volumes on all the roadways to account for growth between the base year (2020) and the build year (2024). Three (3) background developments were identified within the project study area: 1200 MLK Redevelopment, Retirement Residence at Somerset Drive, and the University Place Redevelopment. The site trips that are projected to be generated by these developments were accounted for in the No-Build (2024) analysis.

One (1) background roadway improvement project was identified within the study area. The Estes Drive Connectivity Project plans to construct intersection and bicycle/pedestrian improvements along Estes Drive (SR 1750) between Martin Luther King Jr. Boulevard (NC 86) and Caswell Road. The committed background improvements from this project were included in the No-Build (2024) analysis.

Level of Service Summary

As reported in the Summary LOS table on page viii, the signalized intersection of Franklin Street (SR 1010) and Estes Drive (SR 1750) is expected to continue to operate at LOS E during the PM peak hour. All other signalized intersections are expected to operate acceptably, with slight decreases in delay observed at the intersection of Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750) due to the background roadway improvements. All stop-controlled approaches within the study area will maintain acceptable operations.

Trip Generation and Assignment

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *ITE Trip Generation Manual, 10th Edition* and the suggested method of

calculation in the NCDOT's *"Rate vs. Equation" Spreadsheet*. The proposed development is to consist of approximately 58 townhomes, 361 mid-rise apartments, a 3,032-square foot small office building, and 8,564 square feet of retail space; ITE LUC 220 (Multifamily Housing (Low-Rise)), LUC 221 (Multifamily Housing (Mid-Rise)), LUC 712 (Small Office Building), and LUC 820 (General Retail) were used based on NCDOT guidance.

A transit reduction was taken for the proposed trip generation to account for the current transit service to the area. The new Bus Rapid Transit system is proposed along Martin Luther King Jr. Boulevard (NC 86), but construction will not begin until 2024; therefore, no additional transit reductions were applied to the generated trips. The external site trips were reduced by 10% to account for the trips that will utilize the existing transit service stops near the development. This reduction also accounts for non-motorized travel, such as bicycle and pedestrian trips to and from the site. A sidewalk currently runs along the east side of Martin Luther King Jr. Boulevard (NC 86), and the Estes Drive Connectivity Project will improve bicycle and pedestrian facilities along Estes Drive (SR 1750). Table ES-1 shows the final external non-pass-by and pass-by site trips generated by the new development.

Table ES-1 Trip Generation Rates (Vehicle Trips)

Land Use Code ¹	Land Use	Unit	ADT	AM Peak Hour			Noon Peak Hour ⁵			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Total Site Trips²												
220	Multifamily Housing (Low-Rise)	58 du	398	6	22	28	15	17	32	23	13	36
221	Multifamily Housing (Mid-Rise)	361 du	1,966	31	89	120	62	74	136	93	59	152
712	Small Office Building	3,032 sf	49	6	4	10	6	5	11	5	6	11
820	General Retail	8,564 sf	1,130	51	31	82	47	38	85	42	46	88
<i>Development Total</i>			3,543	94	146	240	130	134	264	163	124	287
Trip Reduction Due to Internal Capture³												
220	Multifamily Housing (Low-Rise)	58 du	23	0	0	0	1	1	2	2	1	3
221	Multifamily Housing (Mid-Rise)	361 du	111	1	1	2	5	3	8	9	5	14
712	Small Office Building	3,032 sf	12	0	1	1	2	1	3	3	1	4
820	General Retail	8,564 sf	120	2	1	3	3	6	9	4	11	15
<i>Development Total</i>			265	3	3	6	11	11	22	18	18	36
Total External Site Trips without Transit Reduction												
220	Multifamily Housing (Low-Rise)	58 du	375	6	22	28	14	16	30	21	12	33
221	Multifamily Housing (Mid-Rise)	361 du	1,855	30	88	118	57	71	128	84	54	138
712	Small Office Building	3,032 sf	37	6	3	9	4	4	8	2	5	7
820	General Retail	8,564 sf	1,010	49	30	79	44	32	76	38	35	73
<i>Development Total</i>			3,277	91	143	234	119	123	242	145	106	251
Total External Site Trips with 10% Transit Reduction												
220	Multifamily Housing (Low-Rise)	58 du	338	5	20	25	13	14	27	19	11	30
221	Multifamily Housing (Mid-Rise)	361 du	1,670	27	79	106	51	64	115	76	49	125
712	Small Office Building	3,032 sf	33	5	3	8	4	4	8	2	5	7
820	General Retail	8,564 sf	909	44	27	71	40	29	69	34	32	66
<i>Development Total</i>			2,950	81	129	210	108	111	219	131	97	228
Total External Pass-by Site Trips⁴												
220	Multifamily Housing (Low-Rise)	58 du		0	0	0	0	0	0	0	0	0
221	Multifamily Housing (Mid-Rise)	361 du		0	0	0	0	0	0	0	0	0
712	Small Office Building	3,032 sf		0	0	0	0	0	0	0	0	0
820	General Retail	8,564 sf		0	0	0	0	0	0	11	11	22
<i>Development Total</i>				0	0	0	0	0	0	11	11	22
Total External Non-Pass-by Site Trips												
220	Multifamily Housing (Low-Rise)	58 du		5	20	25	13	14	27	19	11	30
221	Multifamily Housing (Mid-Rise)	361 du		27	79	106	51	64	115	76	49	125
712	Small Office Building	3,032 sf		5	3	8	4	4	8	2	5	7
820	General Retail	8,564 sf		44	27	71	40	29	69	23	21	44
<i>Development Total</i>				81	129	210	108	111	219	120	86	206

Notes:

1. Land Use Code and trip generation rates are determined based on *ITE Trip Generation, 10th Edition*.
2. Total site trips are determined based on the suggested method in the NCDOT Rate vs Equation Spreadsheet.
3. Internal capture was based on NCHRP 684 method and NCDOT IC calculation spreadsheet (1,000 ft maximum between uses).
4. Unconstrained pass-by trips are calculated based on *ITE Trip Generation Handbook, 3rd Edition*. The final projections are not expected to exceed 10% of adjacent street volumes.
5. Noon peak hour trips assumed to be an average of the AM and PM peak hour trips.

As a result, the proposed development is projected to generate 2,950 daily weekday site trips, with 210 trips (81 entering, 129 exiting) occurring in the AM peak hour, 219 trips (108 entering, 111 exiting) occurring in the Noon peak hour, and 228 trips (131 entering, 97 exiting) occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

Build (2024) Conditions

The volumes associated with the No-Build (2024) scenario were utilized and the generated site trips were distributed through the network based on existing turning movement counts and current land uses to calculate the volumes for the Build (2024) scenario.

Level of Service Summary

As shown on the Summary LOS table on page vii, the signalized intersection of Franklin Street (SR 1010) and Estes Drive (SR 1750) is expected to continue to operate at LOS E during the PM peak hour. All other signalized intersections are expected to operate acceptably. Stop-controlled southbound Future Access #2 will operate at LOS F during the AM and PM peak hours and LOS E during the Noon peak hour. All other stop-controlled approaches will operate acceptably.

Roadway Improvement Recommendations

The proposed development is expected to impact operations at multiple study intersections under Build (2024) conditions. To improve operations at these locations, the following offsite improvements should be considered and were analyzed within the Build (2024) with Improvements scenario. The proposed intersection configurations are shown in Figure ES-3.

Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750) (signalized)

The existing signalized intersection is projected to operate at LOS D during the AM and PM peak hours under Build (2024) conditions. For this development, the following improvements are recommended:

- › Extend the storage of the existing westbound right-turn lane to at least 500 feet of full storage with appropriate taper.
- › Incorporate bicycle and pedestrian facility accommodations along the site's Estes Drive (SR 1750) frontage.
- › Incorporate pedestrian facility improvements along the site's Martin Luther King Jr. Boulevard (NC 86) frontage and incorporate a bus stop and related amenities for transit riders.

Franklin Street (SR 1010) and Estes Drive (SR 1750) (signalized)

The existing signalized intersection is projected to operate at LOS E during the PM peak hour under Build (2024) conditions. To improve overall operations at the intersection, and help mitigate the site's impacts, the following roadway improvement is recommended with this development:

- › Construct an exclusive southbound right-turn lane with a minimum of 350 feet of storage with appropriate taper.

In addition to offsite improvements, the following driveway configurations should be considered.

Martin Luther King Jr. Boulevard (NC 86) at Future Access #1

The stop-controlled driveway is projected to operate at LOS B during the AM and Noon peak hours and LOS C during the PM peak hour under Build (2024) conditions. The following driveway configuration is recommended:

- › Provide one ingress lane and one egress lane along the driveway. Restrict access along the driveway to right-in/right-out only.
- › Construct an exclusive northbound right-turn lane along Martin Luther King Jr. Boulevard (NC 86) with at least 100 feet of full storage and appropriate taper.
- › Provide a high-visibility painted crosswalk across the driveway.

Estes Drive (SR 1750) at Future Access #2

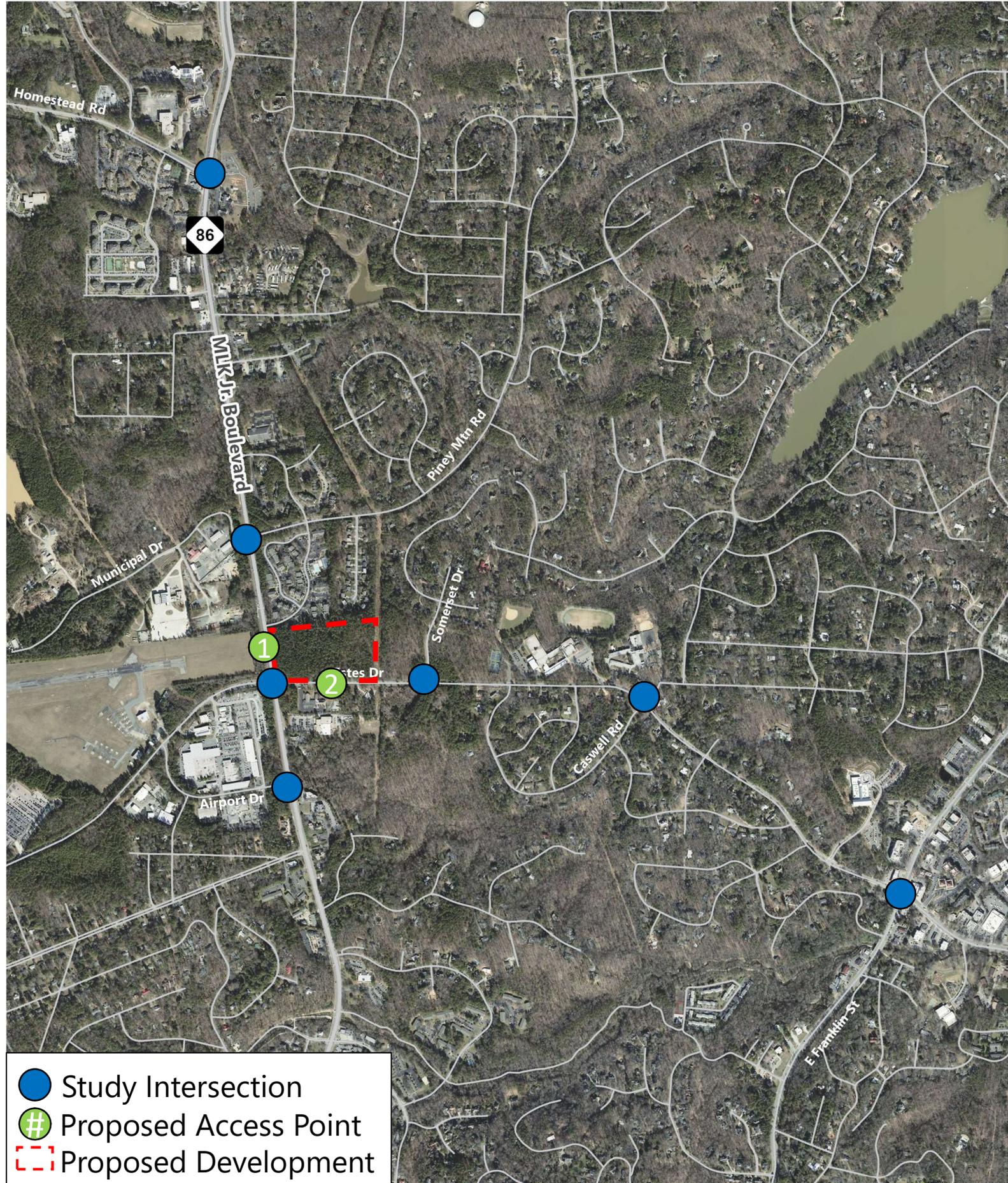
The stop-controlled driveway is projected to operate at LOS F during the AM and PM peak hours under Build (2024) conditions. The projected site generated trips are not expected to meet signal warrants after the buildout of the development, and signalization would not be recommended given the proximity of the existing traffic signal at Martin Luther King Jr. Boulevard (NC 86). The crash history along Estes Drive (SR 1750) does not show a pattern of a high rate of frontal impact crashes within the vicinity of the proposed driveway; therefore, there are no concerns with providing a full movement driveway along Estes Drive (SR 1750). The following lane configurations are recommended with the driveway for Future Access #2:

- › Provide one ingress lane and two egress lanes at the full movement driveway. Provide a minimum of 100 feet of storage for an exclusive southbound left-turn lane along the driveway.
- › Construct an exclusive eastbound left-turn lane with a minimum of 100 feet of full storage with appropriate taper.
- › Construct an exclusive right-turn lane along westbound Estes Drive (SR 1750) with a minimum of 100 feet of full storage and appropriate taper.
- › Provide a high-visibility painted crosswalk across the driveway.

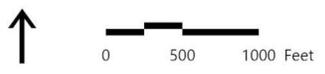
Table ES-2 Summary Level of Service Table

Intersection and Approach	Traffic Control	Existing (2020)			No-Build (2024)			Build (2024)			Build (2024) with Improvements		
		AM	Noon	PM	AM	Noon	PM	AM	Noon	PM	AM	Noon	PM
Martin Luther King Jr. Boulevard (NC 86) and Airport Road	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Eastbound		C-18.0	B-12.8	C-16.4	C-18.9	B-13.3	C-17.6	C-19.2	B-13.4	C-17.8	C-19.2	B-13.4	C-17.8
Martin Luther King Jr. Boulevard (NC 86) and Estes Drive (SR 1750/SR 1780)	Signalized	D (38.4)	C (32.6)	D (54.2)	D (35.4)	C (30.1)	D (48.8)	D (36.2)	C (31.8)	D (52.3)	D (36.2)	C (31.7)	D (52.3)
Eastbound		E-56.6	D-53.2	E-63.4	E-57.8	D-43.8	E-64.3	E-58.4	D-44.1	E-66.5	E-58.4	D-44.1	E-66.5
Westbound		D-37.0	D-43.5	F-82.3	D-47.3	D-48.7	E-68.3	D-48.8	D-48.5	E-69.9	D-48.8	D-48.5	E-69.9
Northbound		D-42.4	C-25.1	D-52.5	C-31.1	C-22.8	D-48.4	C-33.4	C-24.9	D-50.3	C-33.4	C-24.7	D-50.3
Southbound		C-29.5	C-21.1	C-28.1	C-23.6	B-16.8	C-25.6	C-23.5	C-20.1	C-33.5	C-23.5	B-20.0	C-33.5
Martin Luther King Jr. Boulevard (NC 86) and Piney Mountain Road/Municipal Drive	Signalized	A (8.4)	A (5.4)	B (10.3)	A (8.6)	A (5.1)	B (10.6)	A (8.6)	A (5.1)	B (10.8)	A (8.6)	A (5.1)	B (10.8)
Eastbound		E-61.0	E-59.4	E-71.8	E-61.0	E-59.4	E-72.0	E-61.0	E-59.4	E-72.0	E-61.0	E-59.4	E-72.0
Westbound		E-65.3	E-57.6	E-70.9	E-65.5	E-57.7	E-71.3	E-65.4	E-58.0	E-71.3	E-65.4	E-58.0	E-71.3
Northbound		A-3.9	A-2.5	A-4.2	A-4.6	A-2.2	A-5.2	A-4.3	A-2.4	A-5.5	A-4.3	A-2.4	A-5.5
Southbound		A-3.0	A-1.3	A-8.9	A-3.0	A-1.5	A-8.3	A-3.3	A-1.2	A-8.6	A-3.3	A-1.2	A-8.6
Martin Luther King Jr. Boulevard (NC 86) and Homestead Road (SR 1777)/Church Driveway	Signalized	C (22.6)	C (21.3)	C (20.2)	C (23.2)	C (21.1)	C (20.6)	C (23.2)	C (21.8)	C (20.7)	C (23.2)	C (21.8)	C (20.7)
Eastbound		D-53.1	D-46.3	D-54.8	D-53.1	D-46.5	D-54.7	D-53.1	D-46.6	D-54.6	D-53.1	D-46.6	D-54.6
Westbound		D-51.3	D-45.5	E-58.6	D-51.3	D-45.5	E-58.6	D-51.3	D-45.5	E-58.6	D-51.3	D-45.5	E-58.6
Northbound		B-10.4	B-18.4	B-12.8	B-11.0	B-18.0	B-13.3	B-10.9	B-19.6	B-13.3	B-10.9	B-19.6	B-13.3
Southbound		B-19.9	B-12.6	B-18.6	C-21.0	B-13.0	B-19.3	C-21.4	B-13.3	B-19.6	C-21.4	B-13.3	B-19.6
Estes Drive and Somerset Drive	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Southbound		C-18.2	C-15.4	D-25.8	C-19.7	C-16.9	D-32.2	C-21.1	C-18.2	E-36.1	C-21.1	C-18.2	E-36.1
Estes Drive and Casewell Drive	Signalized	B (13.9)	A (9.7)	B (18.6)	B (14.3)	A (9.8)	B (19.6)	B (14.7)	A (9.9)	C (21.1)	B (14.7)	A (9.9)	C (21.1)
Eastbound		A-6.7	A-3.3	A-6.6	A-7.1	A-3.6	A-7.3	A-7.8	A-3.8	A-8.0	A-7.8	A-3.8	A-8.0
Westbound		B-12.9	A-8.4	B-19.7	B-13.7	A-8.8	C-21.7	B-14.3	A-9.3	C-24.6	B-14.3	A-9.3	C-24.6
Northbound		C-34.5	D-37.0	C-34.2	C-34.3	D-36.9	C-34.8	C-34.4	D-37.3	C-35.0	C-34.4	D-37.3	C-35.0
Southbound		D-48.8	D-46.4	D-54.0	D-48.9	D-46.6	E-56.8	D-48.9	D-46.7	E-57.3	D-48.9	D-46.7	E-57.3
Franklin Street (SR 1010) and Estes Drive (SR 1750)	Signalized	D (48.5)	D (47.9)	E (58.0)	D (49.8)	D (49.1)	E (64.0)	D (52.9)	D (50.2)	E (69.3)	D (43.1)	D (46.4)	E (59.6)
Eastbound		E-66.0	E-55.9	E-67.0	E-66.1	D-54.6	E-69.2	E-70.1	D-53.4	E-72.7	D-47.8	D-53.4	E-70.0
Westbound		D-49.5	D-49.6	E-62.5	D-47.1	D-47.7	E-68.6	D-42.0	D-46.9	F-81.7	D-45.7	D-46.9	E-66.0
Northbound		D-37.3	D-44.2	D-54.2	D-39.2	D-48.0	E-63.0	D-42.7	D-51.1	E-61.8	D-46.1	D-51.1	E-68.4
Southbound		D-39.7	D-43.5	D-52.7	D-43.0	D-46.7	E-58.2	D-48.4	D-49.7	E-65.1	D-36.1	D-36.4	D-40.0
Martin Luther King Jr. Boulevard (NC 86) and Future Access #1	Unsignalized	N/A	N/A	N/A									
Westbound		---	---	---	---	---	---	B-13.3	B-12.5	C-23.2	B-13.2	B-12.4	C-22.8
Estes Drive (SR 1750) and Future Access #2	Unsignalized	N/A	N/A	N/A									
Southbound		---	---	---	---	---	---	F-60.5	E-36.0	F-166.5	E-45.6	D-29.4	F-97.3

X (XX.X) = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay.



- Study Intersection
- # Proposed Access Point
- - - Proposed Development



Project Area | **MLK Boulevard TIA**

Figure ES-1
Vicinity Map





LEGEND	
	Existing Roadway
	Future Roadway
	Existing Stop Controlled Approach
	Proposed Stop Controlled Approach
	Existing Signalized Intersection
	Proposed Roundabout Approach
	Existing Lane Geometric
	Background Lane Geometric Improvement
	Proposed Lane Geometric

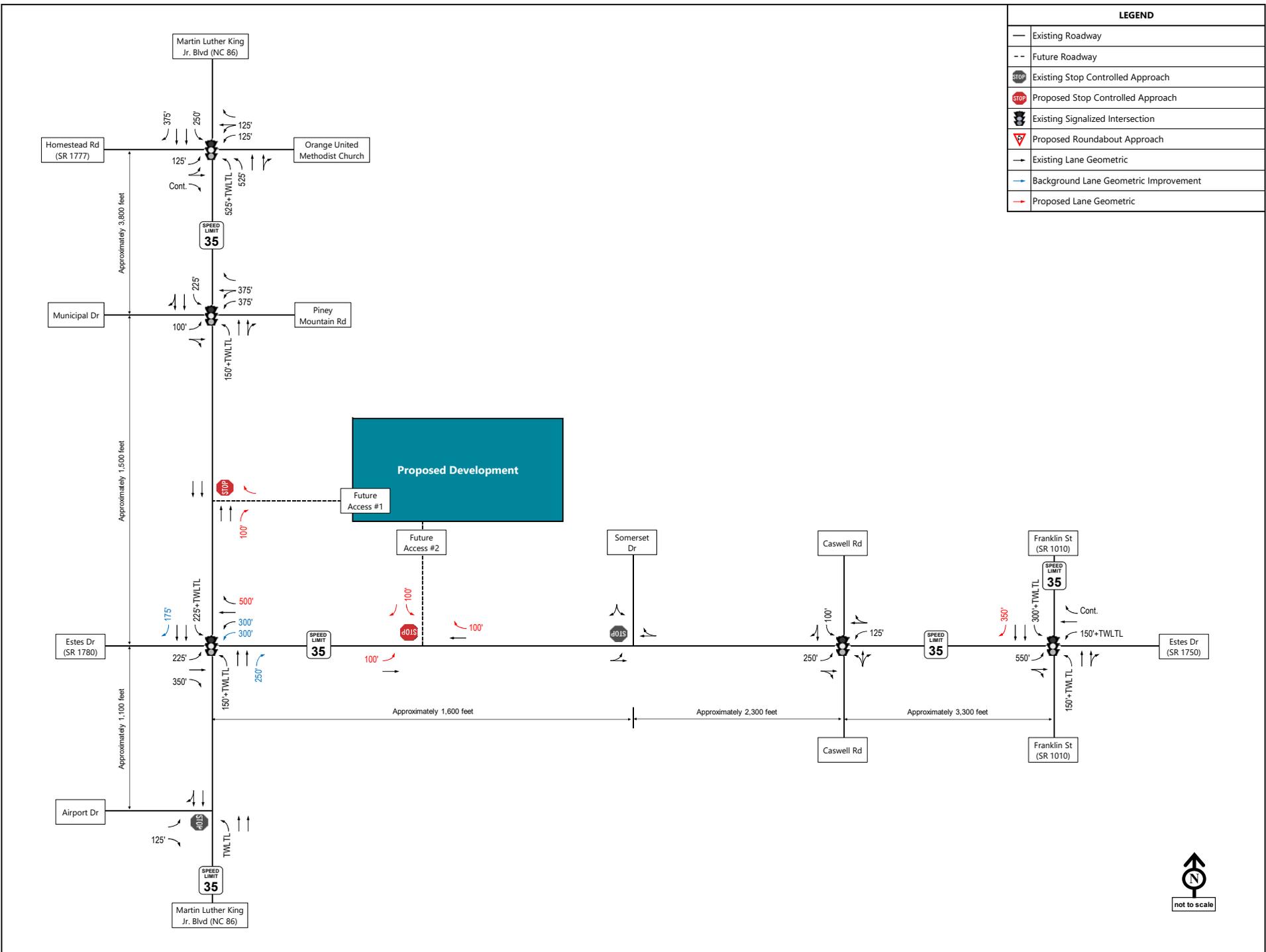


Figure ES-3
Build (2024) with Improvements Lane Geometrics and Traffic Control

Aura Chapel Hill Development
Chapel Hill, NC