

**1000 MARTIN LUTHER KING JR.
BOULEVARD 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

May 2020



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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 9,000 square feet (sf) of retail space, a 1,000-sf high-turnover (sit-down) restaurant, and 388 multifamily dwelling units. The development is expected to be fully constructed and occupied by the end of 2023. This document summarizes the traffic impacts associated with this redevelopment and improvements to the roadway network needed to mitigate those impacts.

Project Background

Two (2) site access points will be constructed: a right-turn in/right-turn out only (RIRO) access point at Martin Luther King Jr. Boulevard (NC 86), and a full movement access point at Estes Drive (SR 1750). The concept plan (Figure ES-2) illustrates the access points and long-term land-use plans for the site.

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 Estes Drive (SR 1750) (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)
- › Martin Luther King Jr. Boulevard (NC 86) at Airport Drive (Unsignalized)
- › Estes Drive (SR 1750) at Somerset Drive (Unsignalized)
- › Estes Drive (SR 1750) at Caswell Drive (Signalized)
- › Estes Drive (SR 1750) at Franklin Street (SR 1010) (Signalized)

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, PM, and Noon 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 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 Level of Service table on page viii.

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 NC 86 (Martin Luther King Jr Boulevard) 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 and one along Estes Drive. Martin Luther King Jr Blvd (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 NC 86 (Martin Luther King Jr Boulevard). A narrow, paved path is located on the south side of Estes Drive (SR 1750), east of NC 86 (Martin Luther King Jr Boulevard). Sidewalks are present on the east side of NC 86 (Martin Luther King Jr Boulevard), adjacent to the study area. Six bus stops are present within the study area and provide access to the site.

Crash Analysis

Five-year crash data (2/01/2015 - 1/31/2020) was obtained from the NCDOT Traffic Engineering Accident Analysis System (TEAAS) along Martin Luther King Jr Blvd (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 viii, all signalized intersections operate at an overall acceptable level of service (i.e., LOS D or better) during all peak hours. Stop-controlled southbound Somerset Drive at Estes Drive currently operates at LOS E during the PM peak hour. All other stop-controlled approaches operate acceptably during all 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 study 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 University Place Redevelopment. The site trips that are projected to be generated by these developments were used in the No-Build (2024) analysis.

One (1) background roadway improvement project was identified within the study area. The Estes Drive Extension plans to construct intersection and bicycle/pedestrian improvements at the existing signalized intersection of Martin Luther King Jr. Boulevard (NC 86) and Estes Drive. The committed background improvements from this project, as well as any approved background developments within the study area, were included in the No-Build (2024) analysis.

Level of Service Summary

As reported in the Summary Level of Service (LOS) table on page viii, all signalized intersections, except for one, are expected to continue to operate at acceptable levels during all peak hours. The signalized intersection at Martin Luther King Jr. Boulevard (NC 86) and Estes Drive is expected to deteriorate to LOS E during the PM peak hour. Additionally, stop-controlled southbound Somerset Drive is projected to operate at LOS E during the AM peak hour and LOS F during the PM peak hour.

Trip Generation

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*. ITE Land Use Codes (LUC) LUC 221 (Multifamily Housing (Mid-Rise)), LUC 820 (General Retail), and LUC 932 (High-Turnover (Sit-Down) Restaurant) 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 (BRT) 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 5% to account for the trips that will utilize the existing transit service stops near the development. The 5% reduction was determined based on travel demand model analysis. Table ES-1 shows the final external non-pass-by site trips generated by the new development.

The proposed development is to consist of the following:

- › 9,000 square feet of General Retail Space
- › 1,000 square feet High-Turnover (Sit-Down) Restaurant
- › 388 Apartments and Townhome Units

Table ES-1 Summary Level of Service Table

Land Use Code ¹	Land Use	Unit	ADT	AM Peak Hour			Noon Peak Hour			PM Peak Hour					
				Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total			
Non-Pass-by Site Trips															
221	Multifamily Housing (Mid-Rise)	388 du		31	89	120	42	55	97	81	56	137			
820	General Retail	9,000 sf		90	52	142	43	27	70	23	21	44			
932	High-Turnover (Sit-Down) Restaurant	1,000 sf		2	5	7	1	3	4	3	1	4			
<i>Development Total</i>							123	146	269	86	85	171	107	78	185

The resulting trip generation associated with this amount of development includes 2,887 daily external site trips, with 269 trips (123 entering, 146 exiting) occurring in the AM peak hour, 171 trips (86 entering, 85 exiting) occurring during the Noon peak hour and 185 trips (107 entering, 78 exiting) occurring in the PM peak hour. Trips generated during the Noon peak hour were calculated by taking 75% of the average of the AM and PM site generated trips. The generated site trips were distributed following 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 viii, the signalized intersection of Martin Luther King Jr. Boulevard (NC 86) is expected to continue to operate at LOS E during the PM peak hour. All other signalized intersections will operate acceptably during all peak hours with site trips in place. Stop-controlled southbound Somerset Drive at Estes Drive is expected to operate at LOS F during the AM and PM peak hours. Newly constructed Future Access #2 is expected to operate at LOS F during the AM and PM peak hours, and LOS E during the Noon peak hour.

Access Analysis

The proposed concept plan for the vehicular site access includes the following:

Site Access #1

Site Access #1 will be located approximately 300 feet north from the Martin Luther King Jr. Boulevard (NC 86) at Estes Drive (SR 1750) intersection as illustrated in the concept plan. Coordination with Chapel Hill Transit is necessary to assure the connectivity with the North-South BRT corridor.

Site Access #2

Site Access #2 will be located approximately 750 feet east from the Martin Luther King Jr. Boulevard (NC 86) at Estes Drive (SR 1750) intersection, as illustrated in the concept plan. In addition to the analysis of a stop-controlled intersection, a roundabout was analyzed at the driveway location. The results of the traffic control comparison at Estes Drive at Future Access #2 can be found in Table ES-2.

It should be noted that the projected maximum queues along westbound Estes Drive from the Martin Luther King Jr Boulevard (NC 86) intersection are projected to spillback to this intersection, which could create operational and vehicle conflict concerns within the roundabout.

The following driveway configuration is recommended for a stop-controlled driveway:

- › 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 right-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 through/right-turn lane along westbound Estes Drive with a minimum of 150 feet of full storage and appropriate taper.
- › Provide a high visibility painted crosswalk across the southbound driveway approach.

The following driveway configuration is recommended for a roundabout:

- › Provide one ingress lane and one egress lane at the full movement driveway.
- › Provide approximately 200 feet of storage for a shared westbound through/right-turn lane along Estes Drive.
- › Provide approximately 200 feet of storage for a shared eastbound through/left-turn lane along Estes Drive.

Table ES-2 Level of Service Comparison Table - Estes Dr at Future Access #2 (Traffic Control)

Intersection and Approach	Traffic Control	Build (2024) - Unsignalized			Build (2024) - Roundabout		
		AM	Noon	PM	AM	Noon	PM
Estes Drive and Future Access #2	Unsignalized/ Roundabout	-	-	-	A (0.7)	A (0.4)	A (0.6)
Eastbound		---	---	---	A-0.5	A-0.3	A-0.3
Westbound		---	---	---	A-0.4	A-0.3	A-0.5
Southbound		F-220.7	E-46.4	F-533.8	A-3.8	A-3.5	A-5.8

With the above-listed mitigation measures in place, the intersections will experience relatively minor queuing as noted in Table ES-3. A protected internal stem of 100 feet or more should be provided as part of the development to ensure vehicles can enter and exit the site with minimal disruption.

Table ES-3 Driveway Queuing (feet) Analysis

Intersection and Approach	Build (2024) Synchro 95th Queue (ft)			Build (2024) SIDRA 95th Queue (ft)		
	AM	Noon	PM	AM	Noon	PM
Martin Luther King Jr. Boulevard (NC 86) and Future Access #1						
Northbound Right	0	0	0	---	---	---
Westbound Right	10	5	13	---	---	---
Estes Drive and Future Access #2						
Eastbound Left	5	5	10	87.2	55.3	89
Westbound Right	---	---	---	52.4	48	112.1
Southbound Left	128	40	115	17.3	9.9	13.9
Southbound Right	5	3	5	17.3	9.9	13.9

Roadway Improvement Recommendations

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

NC 86 (Martin Luther King Jr Boulevard) at 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. Multiple turn lane additions were evaluated to bring operations for the intersection back down to LOS D during the PM peak hour. However, only significant widening along multiple approaches will provide enough of an improvement to achieve this goal. In the future, the intersection should be considered for a potential alternative intersection design (i.e., Quadrant Roadway intersection, Median U-Turn intersection). For the purposes of this study, the following improvement is recommending at the intersection:

- › Widen Estes Drive along the frontage of the development to provide a continuous westbound right-turn lane at Martin Luther King Jr. Boulevard (NC 86).
- › Incorporate any bicycle and/or pedestrian facilities improvements that may be integrated with roadway improvements along Estes Drive at the NC 86 (Martin Luther King Jr Boulevard) intersection.

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

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

The stop-controlled driveway is projected to operate at 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 westbound driveway approach

Estes Drive (SR 1750) at Site 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 with the traffic signal at Martin Luther King Jr. Boulevard (NC 86) nearby.

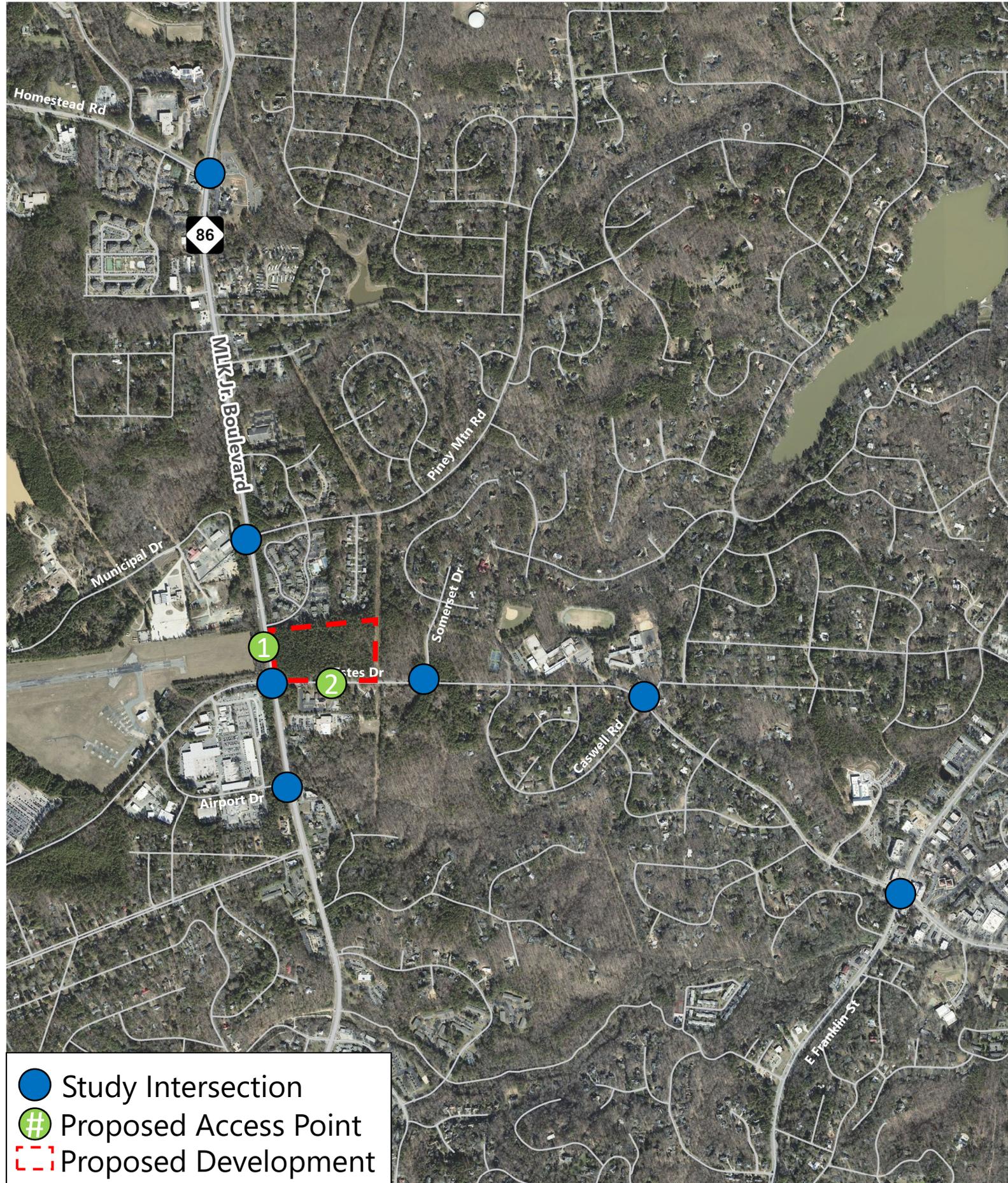
A roundabout was also analyzed at this intersection. It should be noted that the projected maximum queues along westbound Estes Drive from the Martin Luther King Jr Boulevard (NC 86) intersection are projected to spillback to this intersection, which could create operational and vehicle conflict concerns within the roundabout.

The Town of Chapel of Hill and the Applicant should evaluate the two analyzed configurations of the Estes Drive and Site Access #2 intersection to determine the desired traffic control at this location.

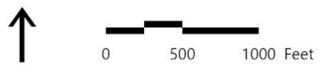
Table ES-4 Summary Level of Service Table

Intersection and Approach	Traffic Control	Existing (2020)			No-Build (2024)			Build (2024)			Build (2024) with Improvements		
		AM	Noon	PM	AM	PM	PM	AM	PM	PM	AM	PM	PM
Martin Luther King Jr. Boulevard (NC 86) and Airport Road	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Eastbound		C-18.5	B-12.7	C-17.7	C-19.6	B-13.1	C-18.8	C-20.1	B-13.2	C-19.0	C-20.1	B-13.2	C-19.0
Martin Luther King Jr. Boulevard (NC 86) and Estes Drive	Signalized	D (39.0)	C (30.2)	D (52.7)	D (37.8)	C (31.9)	E (58.7)	D (39.9)	C (33.4)	E (64.2)	D (39.9)	C (33.4)	E (64.2)
Eastbound		E-57.0	E-73.6	E-63.0	E-58.1	E-58.5	E-66.5	E-58.7	E-58.9	E-67.6	E-58.7	E-58.9	E-67.6
Westbound		D-37.5	D-38.6	E-76.3	D-51.2	D-36.8	E-69.6	D-52.0	D-39.0	E-73.8	D-52.0	D-39.0	E-73.8
Northbound		D-45.3	C-21.7	D-49.7	D-37.1	C-29.0	E-67.2	D-40.4	C-30.7	E-70.5	D-40.4	C-30.7	E-70.5
Southbound		C-29.8	B-11.7	C-31.9	C-23.0	B-15.0	C-33.5	C-26.0	B-16.7	D-45.7	C-26.0	B-16.7	D-45.7
Martin Luther King Jr. Boulevard (NC 86) and Municipal Drive/Piney Mountain Road	Signalized	A (8.4)	A (5.4)	B (11.1)	A (8.6)	A (4.7)	B (10.9)	A (8.8)	A (4.8)	B (11.1)	A (8.8)	A (4.8)	B (11.1)
Eastbound		E-60.9	E-59.3	E-71.8	E-60.9	E-59.3	E-76.1	E-60.9	E-59.3	E-76.1	E-60.9	E-59.3	E-76.1
Westbound		E-65.3	E-57.5	E-70.9	E-65.5	E-57.7	E-78.5	E-65.5	E-57.8	E-78.9	E-65.5	E-57.8	E-78.9
Northbound		A-4.2	A-2.8	A-3.8	A-3.5	A-2.1	A-3.5	A-4.2	A-2.2	A-3.7	A-4.2	A-2.2	A-3.7
Southbound		A-2.8	A-1.2	B-11.7	A-3.8	A-0.9	B-11.1	A-4.0	A-1.0	B-11.4	A-4.0	A-1.0	B-11.4
Martin Luther King Jr. Boulevard (NC 86) and Homestead Road/Church Driveway	Signalized	C (23.9)	B (17.9)	B (18.6)	C (22.2)	B (17.6)	B (18.7)	C (22.7)	B (17.3)	B (18.7)	C (22.7)	B (17.3)	B (18.7)
Eastbound		D-52.4	D-44.7	E-55.0	E-58.3	D-44.6	E-58.9	E-58.5	D-44.6	E-59.0	E-58.5	D-44.6	E-59.0
Westbound		D-51.3	D-45.5	E-58.6	D-51.7	D-45.4	E-60.4	D-51.7	D-45.4	E-60.4	D-51.7	D-45.4	E-60.4
Northbound		B-13.9	B-10.8	A-9.8	A-9.5	B-10.2	B-10.8	B-10.5	A-9.6	B-10.9	B-10.5	A-9.6	B-10.9
Southbound		C-20.3	B-13.2	B-18.6	B-18.4	B-14.0	B-16.5	B-18.8	B-14.3	B-16.4	B-18.8	B-14.3	B-16.4
Estes Drive and Somerset Drive	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Southbound		D-26.9	C-18.3	E-40.6	E-40.9	D-28.5	F-156.1	F-50.1	D-31.3	F-195.2	F-50.1	D-31.3	F-195.2
Estes Drive and Casewll Drive	Signalized	B (12.9)	A (8.5)	B (17.5)	B (13.4)	A (9.0)	C (22.7)	B (13.8)	A (9.2)	C (24.7)	B (13.7)	A (9.2)	C (24.7)
Eastbound		A-5.3	A-2.4	A-6.2	A-6.5	A-1.8	B-11.3	A-7.2	A-2.2	B-13.1	A-7.2	A-2.2	B-13.1
Westbound		A-4.1	A-2.1	B-13.2	A-6.5	A-7.1	C-20.4	A-7.6	A-7.5	C-22.5	A-7.3	A-7.5	C-22.5
Northbound		D-47.2	D-51.6	D-47.2	D-47.0	D-51.4	D-50.2	D-47.0	D-52.0	D-50.5	D-47.0	D-52.0	D-50.5
Southbound		E-66.5	E-65.7	E-70.1	E-66.7	E-65.9	F-85.4	E-66.4	E-66.0	F-88.9	E-66.4	E-66.0	F-88.9
Estes Drive and Franklin Street	Signalized	D (42.7)	D (37.4)	D (49.2)	C (35.0)	D (36.1)	D (44.0)	D (35.8)	D (36.4)	D (45.1)	D (35.8)	D (36.4)	D (45.1)
Eastbound		D-53.0	D-45.3	E-63.6	D-43.1	D-42.2	D-46.0	D-42.7	D-41.4	D-46.3	D-42.7	D-41.4	D-46.3
Westbound		D-44.8	D-39.7	D-45.6	D-41.9	D-40.7	D-46.1	D-43.0	D-40.6	D-46.8	D-43.0	D-40.6	D-46.8
Northbound		C-34.7	C-34.7	D-43.4	C-29.8	C-30.4	D-43.0	C-32.0	C-31.7	D-45.3	C-32.0	C-31.7	D-45.3
Southbound		D-38.7	C-32.7	D-49.0	C-27.3	C-30.9	D-41.7	C-27.7	C-31.3	D-42.6	C-27.7	C-31.3	D-42.6
Martin Luther King Jr. Boulevard (NC 86) and Future Access #1	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Westbound		---	---	---	---	---	---	B-13.8	B-12.7	C-22.8	B-13.6	B-12.6	C-22.5
Estes Drive and Future Access #2	Unsignalized	-	-	-	-	-	-	-	-	-	-	-	-
Southbound		---	---	---	---	---	---	F-220.7	E-46.4	F-533.8	F-153.2	E-41.8	F-330.7

X (X sec/veh) = 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





SHADOWWOOD APTS.

9789450097
COKER WOODS

MLK JR BLVD
ZONE U-1

ZONE R-5

BRT STOP

MAINT.

DOG PARK

TRASH

RCD

PROPOSED PUBLIC ROUNDABOUT

- C1.A - COMMERCIAL
- C1.B - COMMERCIAL
- C2 - COMMERCIAL
- 3 - LIVELWORK
- 4 - MULTIFAMILY
- 5 - MULTIFAMILY
- 6 - MULTIFAMILY
- 7 - MULTIFAMILY
- 8 - TOWNHOUSES
- 9 - TOWNHOUSES
- 10 - TOWNHOUSES
- 11 - TOWNHOUSES
- 12 - TOWNHOUSES

TABLETOP

PEDESTRIAN - BIKE TRAILS

ESTES DRIVE

EXISTING FIRE HYDRANT

Figure ES-2: CONCEPT PLAN

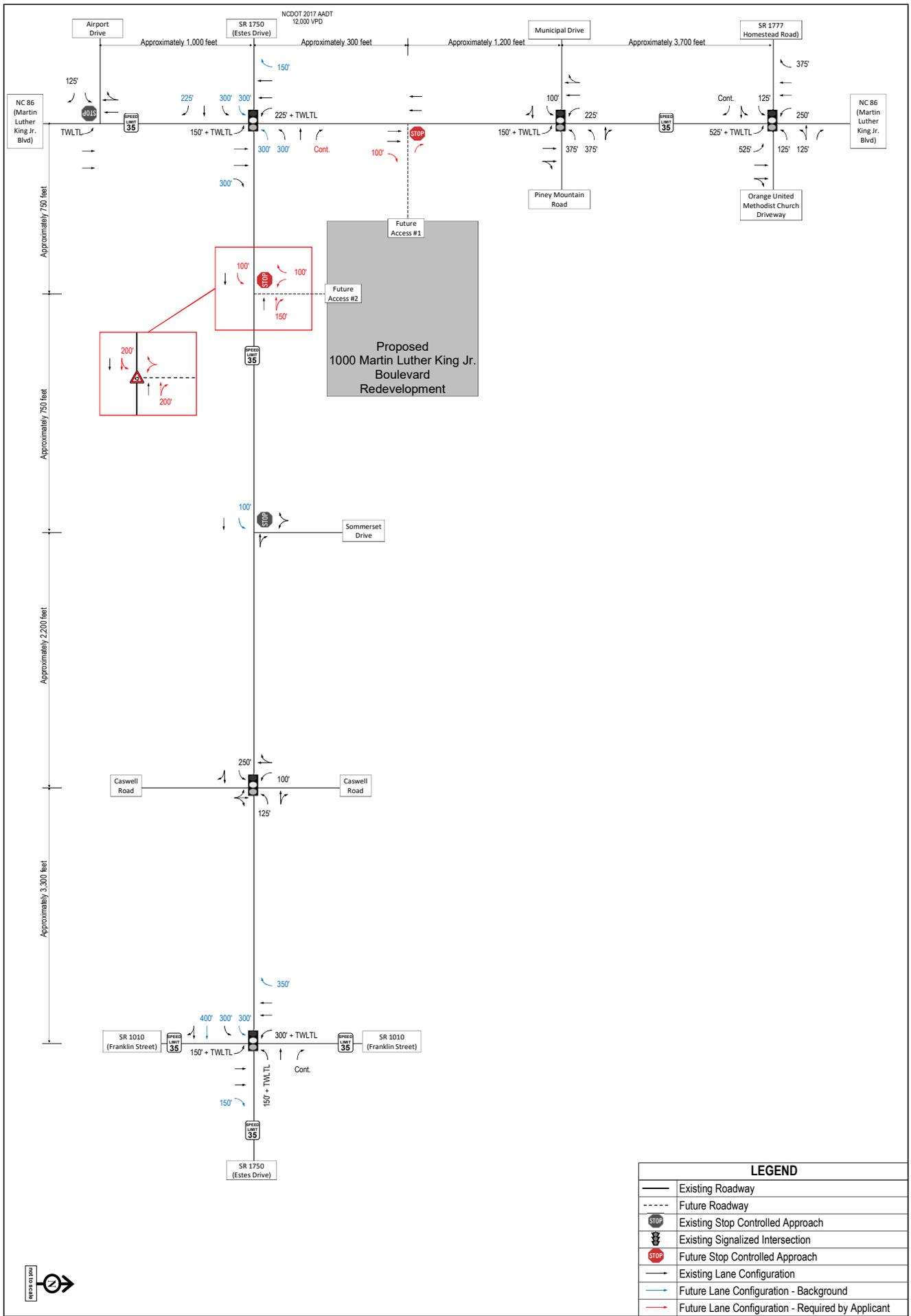


Figure ES-3
Build (2024) Lane Configurations and Traffic Control
With Improvements

1000 Martin Luther King Jr Boulevard
Traffic Impact Analysis
Chapel Hill, NC

