Appendix C-4: Proposed Refinements Transit Operating Plan Addendum

Durham-Orange Light Rail Transit Project

GO Triangle

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List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
DEIS	Draft Environmental Impact Statement
D-O	Durham-Orange
D-O LRT	Durham-Orange Light Rail Transit
I-40	Interstate 40
LRT	Light Rail Transit
mphps	miles per hour per second
NC	North Carolina
NCCU	North Carolina Central University
NCRR	North Carolina Railroad
NEPA	National Environmental Policy Act
ROD	Record of Decision
ROMF	Rail Operations and Maintenance Facility
Supplemental EA	Supplemental Environmental Assessment
UNC	University of North Carolina at Chapel Hill
US	United States
VA	Veteran Affairs

1. Introduction

This document supports the Supplemental Environmental Assessment (Supplemental EA) prepared to document the detailed evaluation of Proposed Refinements to the Durham-Orange Light Rail Transit Project (D-O LRT Project), referred to herein as the "Proposed Refinements." This document updates the operating plan prepared for the Previous Design (*Draft Environmental Impact Statement (DEIS), Appendix K1 Transit Operations Plan*).

This report addendum uses the same methods and same general assumptions as described in the *DEIS Appendix K1 Transit Operations Plan*. This report only addresses Proposed Refinements that would result in substantial changes to the operating plan. For example, the proposed addition of a light rail station would result in changes to the projected transit travel time.

While the Proposed Refinements would require minor adjustments to localized bus routings around stations due to changes in station locations and modifications to the roadway network, these changes would not change the bus frequency or overall travel time; the bus operating plan remains unaltered. Therefore, this report references the *DEIS Appendix K1 Transit Operations Plan*, as appropriate.

1.1 D-O LRT Project Previous Design

The National Environmental Policy Act (NEPA) documentation for the Previous Design, specifically the Amended Record of Decision (Amended ROD), defined the D-O LRT Project as a light rail transit (LRT) project that generally follows NC 54, I-40, US 15-501, and the North Carolina Railroad (NCRR) Corridor into downtown Durham and east Durham, with main features that include:

- Approximately 18 miles of LRT alignment and 18 LRT stations, connecting several key activity centers.
- LRT service with traffic signal pre-emption or crossing gate treatments at roadway intersections.
- LRT service operating seven days a week, from 5:30 a.m. to midnight on weekdays and Saturdays, and from 6:30 a.m. to midnight on Sundays. Weekday frequencies vary from every 10 minutes in the peak periods to every 20 minutes during off-peak periods. Weekend service frequencies vary between every 20 minutes and every 30 minutes, depending on the time of day.
- The elimination of duplicative bus service with modifications to the background bus network to provide connections to the LRT and the new feeder bus routes to support the LRT service. The adjustment of bus headways to provide more frequent bus service and minimize transfer waiting times. These services would also connect light rail passengers with other area transportation hubs, including park-and-ride lots and transfer centers (see *DEIS Appendix K1 Transit Operations Plan* for additional detail).
- The construction of a Rail Operations and Maintenance Facility (ROMF) to accommodate the D-O LRT fleet.

1.2 D-O LRT Project with Proposed Refinements

The D-O LRT Project with the Proposed Refinements would consist of 18 miles of light rail service from UNC Hospitals in Chapel Hill to NCCU in Durham. The light rail service frequencies would remain unaltered from the service plan described in *DEIS Appendix K1 Transit Operations Plan*. Under the Proposed Refinements, no stations would be eliminated. However, the track alignment and location of several stations, including the UNC Hospitals, Patterson Place, Gateway, and Martin Luther King Jr. Parkway

stations, would be shifted slightly to improve visibility and access to the stations. Additionally, the Proposed Refinements would add a station in downtown Durham at Blackwell/Mangum Streets; this change would bring the total number of light rail stations from 18 to 19 stations. These Proposed Refinements would affect light rail travel times, as presented in section **3.1.2**.

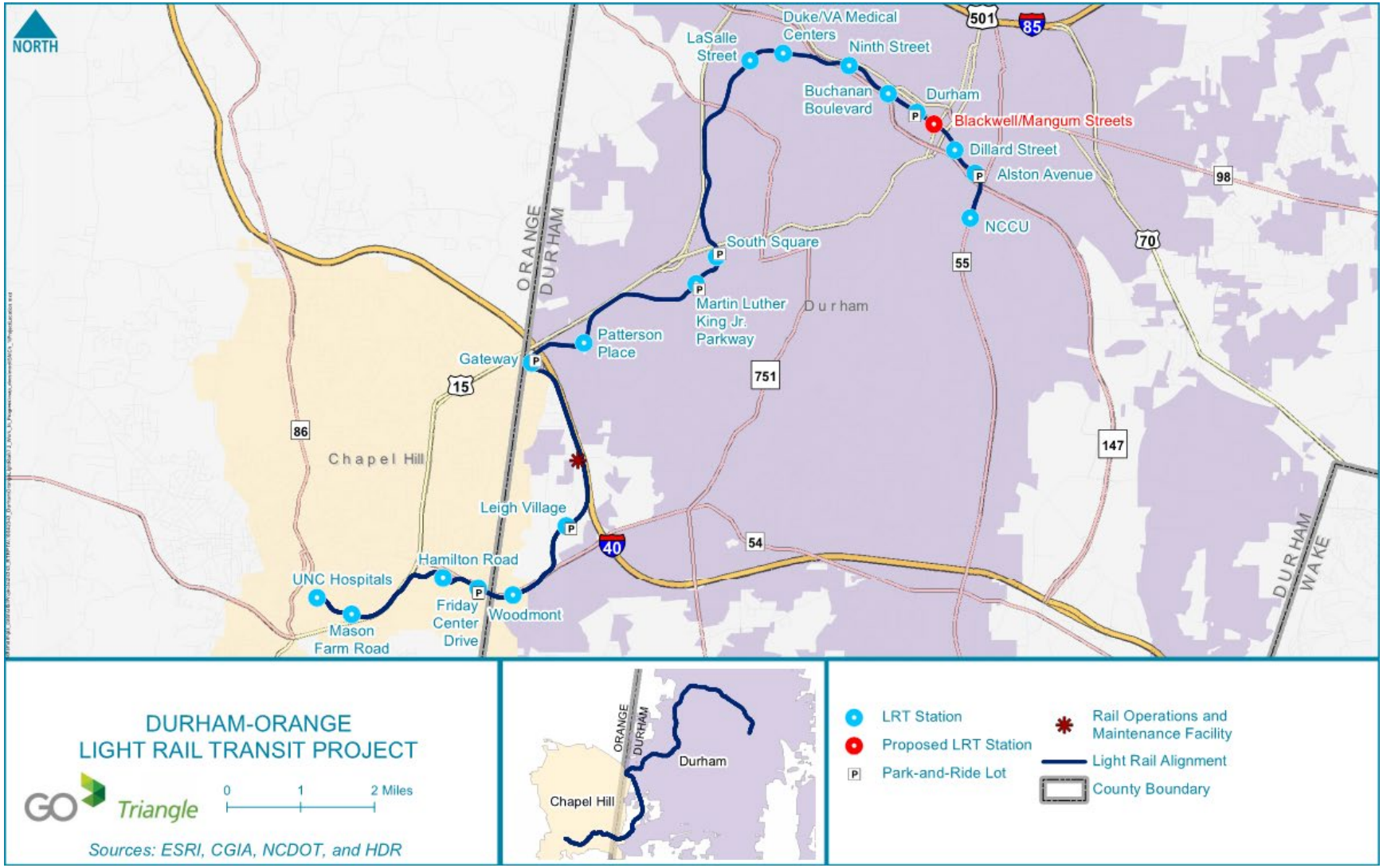
While the Proposed Refinements would also require minor adjustments to localized bus routings around stations due to changes in station locations and modifications to the roadway network, these changes would not change the proposed bus frequencies or overall bus travel times. Therefore, the bus operating plan in *DEIS Appendix K1 Transit Operations Plan* remains unaltered.

1.2.1 Description of Proposed Refinements to the D-O LRT Project

Figure 1-1 depicts the D-O LRT Project with the Proposed Refinements, which include:

- Modification to the station platform lengths;
- Adjustments to the location, configuration, and design of the station platforms, as well as corresponding refinements to the track alignments;
- Modifications to the planned park-and-ride lots;
- Inclusion of bicycle and pedestrian facilities throughout the project;
- Changing the traction power locations and reducing the number of Traction Power Substations;
- Reconfiguration of the ROMF and rail yard;
- Using single-track configuration for the segment that includes the New Hope Creek and Sandy Creek bridge crossings;
- Revising the alignment to pass underneath the intersection of University Drive and Shannon Road, rather than cross through the intersection at grade.
- Elevation of the alignment on Erwin Road;
- Addition of a new station at Blackwell/Mangum Streets;
- Modifications to the track grade along Pettigrew Street and changes to the adjacent roadway system; and
- Inclusion of drainage, grading, and site preparation throughout the project.

Figure 1-1: Overview of D-O LRT Project with Proposed Refinements



1.2.2 Stations

The D-O LRT Project with the Proposed Refinements would include 19 stations at the following locations:

- UNC Hospitals
- Mason Farm Road
- Hamilton Road
- Friday Center *
- Woodmont
- Leigh Village*
- Gateway*
- Patterson Place
- Martin Luther King Jr. Parkway*
- South Square*
- LaSalle Street
- Duke/VA Medical Center
- Ninth Street
- Buchanan Boulevard
- Durham*
- Blackwell/Mangum
- Dillard Street
- Alston Avenue*
- North Carolina Central University (NCCU)

(Note: Stations with "*" indicate light rail stations with park-and-ride facilities.)

2. Affected Environment

The affected environment is the same as described in the *DEIS Appendix K1 Transit Operations Plan*, Section 4.

3. Environmental Consequences

The Environmental Consequences described in Section 5 of the *DEIS Appendix K1 Transit Operations Plan*, remain unchanged, except as amended in the Amended ROD or described in the sections that follow.

3.1.1 Light Rail Transit Service Plan

The Proposed Refinements would not change the light rail transit service plan, including the operating days, hours of service, or service frequencies described in the *DEIS Appendix K1 Transit Operations Plan*. The D-O LRT Project with the Proposed Refinements would generally operate from 5:30 a.m. to 12:00

midnight on weekdays and Saturdays, and 6:30 a.m. to 12:00 midnight on Sundays. Light rail service frequencies by time period are noted in **Table 3-1**.

Table 3-1: D-O LRT Project with Proposed Refinements Service Frequencies

Day of Week	5:30-9:00 a.m.	9:00 a.m.-3:30 p.m.	3:30-7:00 p.m.	7:00 p.m.-Midnight
Weekdays	10 minutes	20 minutes	10 minutes	20 minutes
Saturdays	20 minutes	20 minutes	20 minutes	30 minutes
Sundays	30 minutes*	20 minutes	20 minutes	30 minutes

Note: Sunday Service would begin at 6:30 a.m.

3.1.2 Light Rail Travel Time Estimates

As a result of the Proposed Refinements, projected station-to-station rail transit travel times have been updated from the estimates completed for the NEPA documentation for the Previous Design. The projected travel time estimates reflect the proposed engineering design associated with the Proposed Refinements and take into consideration horizontal curves, vertical grades, and operating environment (exclusive right-of-way versus mixed traffic).

Travel times were calculated for both directions of travel. The calculations include the following assumptions:

- A 20-second dwell time for each light rail station stop
- A 3.0 mile per hour per second (mphps) acceleration and deceleration rate
- Slight adjustments for consistency with power load distribution calculation estimates
- Potential delays when crossing at-grade intersections based on intersections likely to be gated, or that with partial or full priority given to light rail service

Table 3-2 provides a summary of travel time estimates for the refined UNC Hospitals - NCCU and incorporated into Triangle Regional Model transit network. For more information on the effects on ridership, see *Supplemental EA Appendix C-1: Proposed Refinements Travel Demand Methodology and Results Report*.

Table 3-2: Travel Time Estimates for the D-O LRT Project with Proposed Refinements

Station Pair	Eastbound	Westbound
UNC Hospitals-Mason Farm Road	0:02:06	0:01:50
Mason Farm Road-Hamilton Road	0:03:43	0:04:03
Hamilton Road-Friday Center Drive	0:02:07	0:02:05
Friday Center Drive-Woodmont	0:01:49	0:01:48
Woodmont-Leigh Village	0:03:17	0:03:16
Leigh Village-Gateway	0:05:07	0:05:18
Gateway-Patterson Place	0:03:23	0:03:18
Patterson Place-MLK Jr Parkway	0:05:14	0:05:16
MLK Jr Parkway-South Square	0:02:58	0:02:42
South Square-LaSalle Street	0:06:20	0:06:14

Table 3 2 (Cont'd): Travel Time Estimates for the D-O LRT Project with Proposed Refinements

Station Pair	Eastbound	Westbound
LaSalle Street – Duke/VA	0:01:51	0:01:50
Duke/VA-Ninth Street	0:03:10	0:03:04
Ninth Street-Buchanan Boulevard	0:02:23	0:02:02
Buchanan Boulevard-Durham	0:02:08	0:01:48
Durham-Blackwell/Mangum	0:01:41	0:01:28
Blackwell/Mangum-Dillard Street	0:02:20	0:02:02
Dillard Street-Alston Avenue	0:02:11	0:02:03
Alston Avenue-NCCU	0:02:12	0:02:25
Total	0:54:00	0:52:32

As a result of the Proposed Refinements, the projected travel time between UNC Hospitals and NCCU Station is now estimated at 52-54 minutes.

3.1.3 Train Requirements

The transit operating calculations assumed certain operating requirements for determining train requirements, including:

- A minimum 5-minute layover at each end-of-line terminal in order to provide for passenger alighting, operator relief, passenger boarding and operator adjustment to the new driving position.
- A 120-minute (2-hour) train cycle time is recommended when operating at the proposed 10-minute peak period frequency. This provides a layover/recovery time that averages just over 7 minutes at each of the two termini, providing for approximately 2 minutes of schedule recovery at each end of the line.

The Proposed Refinements would require 12 trains in service during the peak periods. Therefore, a 140-minute cycle would be recommended for the midday and evening time periods when 20-minute headway service is operated, requiring 7 trains in service. With 30-minute frequencies proposed on the weekends during the early and late operating periods, a 150-minute cycle time would be recommended for this time period (assumes 5 trains in service).

Current ridership forecasts, detailed further in *Supplemental EA Appendix C-1*, indicate that three of the six trains in the peak hour in the peak direction should operate as two-car trains to meet ridership demand projections. The remaining trains could operate as one-car trains. The peak load point would therefore occur westbound between the Hamilton Road and Friday Center stations.

An equal mix of one and two-car trains in the peak direction during the peak hour would generate an average load factor of less than 1.25 per car. The load factor is the maximum ridership in a rail car divided by the number of seats. **Table 3-3** presents estimated operating requirements for the D-O LRT Project with the Proposed Refinements.

Table 3-3: D-O LRT with Proposed Refinements Operating Requirements

From	To	Time (minutes)	Distance (miles)	Day	Frequency (Min.)				Train Consist				Vehicles		Annual			Train Requirements			
					AM	Mid	PM	Eve	AM	Mid	PM	Eve	Peak	Total	Car-Miles	Train-Hrs	Car-Hrs	AM	Mid	PM	Eve
NCCU	UNC Hospitals	0:52:55	17.74	M-F	10	20	10	20	1.3	1	1	1	15	18	757,253	44,477	47,490	12	7	12	7
				Sat	30	20	20	30	1	1	1	1	7	9	86,641	5,535	5,535	4	7	7	4
				Sun	30	20	20	30	1	1	1	1	7	9	82,951	5,327	5,327	4	7	7	4
Totals															**926,844**	**55,338**	**58,351**				

4. Mitigation

The D-O LRT Project with Proposed Refinements would result in increased access to transit. As a result, mitigation measures would not be warranted.