DESIGN NOISE REPORT

I-40 Widening from I-85 in Orange County to the Durham County Line

Orange County

STIP Project No. I-3306A
WBS No. 34178.3.GV3

Prepared for:

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise and Air Quality Group

Date of Public Knowledge: March 29, 2019
In compliance with the 2016 NCDOT Traffic Noise Policy

Prepared by:

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440 S. Church Street, Suite 1000
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July 2023

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Traffic Noise and Air Quality Group
Environmental Analysis Unit

Executive Summary

The North Carolina Department of Transportation (NCDOT) is constructing the I-3306A Design-Build Project in Orange County, which is widening I-40 from I-85 to the Durham County Line, a distance of approximately 11.4 miles. The Project will provide a six-lane facility and improve the I-40 / NC 86 interchange. The project is included in the State Transportation Improvement Program (STIP) as I-3306A. Federal funds are used for this project. A Traffic Noise Report (TNR) was prepared in March 2019 and addended in June 2021. This Design Noise Report (DNR) reexamines the impacts and mitigation at all noise sensitive land uses within the I-3306A project limits using the final design data and geometry.

The project Date of Public Knowledge is the March 29, 2019 approval date of the Categorical Exclusion (CE). In accordance with NCDOT Policy, federal and state governments are not responsible for providing noise abatement measures for traffic noise impacts for which building permits were issued after the Date of Public Knowledge.

The following are design construction elements of the project:

- Typical section consisting of six-lane divided facility with a 22-foot barrier protected median
- Minimum 14-foot outside shoulders (12-foot useable shoulder width plus two feet)
- 10-foot inside median shoulders along I-40
- I-40 / NC 86 interchange reconfiguration and improvements
- Design speed of 70 mph and posted speed of 65 mph

Because this project involves the construction of new through-traffic lanes, it is a Type I project per FHWA 23 CFR 772 and NCDOT Policy.

Figure 1 shows the study area map for the project. There are 36 Noise Study Areas (NSAs), labeled 01 through 35 including 22a and 22b. Each NSA contains noise-sensitive land uses with similar noise environments.

This DNR documents the project final design noise analysis of predicted traffic noise impacts and noise abatement assessments. The noise analysis was performed utilizing validated computer models created with the Federal Highway Administration Traffic Noise Model® (FHWA TNM v.2.5) to predict future noise levels in areas where traffic noise is dominant, and to define impacted receptors in the project vicinity. A total of 784 discrete receptor locations were modeled. One receptor was modeled to represent each of the 646 residences and 138 receptor locations were modeled to represent 25 non-residential Equivalent Receptors (ERs). The project final design will require acquisition of one residence represented by one modeled receptor for right-of-way.

Design Year 2045 build condition traffic noise is predicted to impact 109 residences and 4 non-residential ERs represented by 24 discrete modeled receptor locations for a total of 113 impacts. Noise abatement was considered for all predicted traffic noise impacts. Fourteen noise walls under the Build Alternative were evaluated for their ability to feasibly and reasonably reduce noise levels at impacted receptors.

With a total length of 5,760 feet and a total area of 96,858 square feet, the following four noise abatement measures for the corresponding predicted traffic noise impacts in the I-3306A project vicinity are recommended for construction, pending completion of the public involvement process:

- **Noise Wall 06 (NW06) –** Adjacent to I-40 westbound between SR 1006 (Orange Grove Road) and I-85: With a length of 1,440 feet and an area of 19,427 square feet, the optimal NW06 configuration will benefit 17 total receptors, including 16 of 23 predicted traffic noise impacts, and 15 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 1,143 square feet per benefit, NW06 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Section 11 and Figures 2-2 and 2-2A-1 for additional information pertaining to NW06 analysis.
- **Noise Wall 13 (NW13) –** Adjacent to I-40 westbound east of SR 1009 (Old NC 86): With a length of 1,155 feet and an area of 24,880 square feet, the optimal NW13 configuration will benefit 25 total receptors, including 10 of 10 predicted traffic noise impacts, and 11 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 995 square feet per benefit, NW13 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Section 11 and Figures 2-5 and 2-6 for additional information pertaining to NW13 analysis.
- **Noise Wall 22b (NW22b) –** Adjacent to NC 86 southbound north of the access to Hilltop Mobile Home Park: With a length of 420 feet and an area of 5,753 square feet, the optimal NW22b configuration will benefit four total receptors, including four of four predicted traffic noise impacts, and four receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 1,438 square feet per benefit, NW22b will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Section 11 and Figures 2-11 and 2-12 for additional information pertaining to NW22b analysis.
- **Noise Wall 32 (NW32) –** Adjacent to I-40 eastbound between SR 1732 (Sunrise Road) and SR 1734 (Erwin Road): With a length of 2,745 feet and an area of 46,798 square feet, the optimal NW32 configuration will benefit 40 total receptors, including 19 of 19 predicted traffic noise impacts, and 24 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 1,170 square feet per benefit, NW32 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Section 11 and Figures 2-16 and 2-17 for additional information pertaining to NW32 analysis.

The following ten noise abatement measures for the following predicted traffic noise impacts are not feasible and reasonable and will not be constructed:

- **Noise Wall 02 (NW02) –** Adjacent to I-40 westbound west of SR 1134 (Dimmocks Mill Road): With a length of 765 feet and an area of 22,950 square feet, the optimal NW02 configuration would benefit 2 total receptors, including 2 of 2 predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW02 configuration would be acoustically feasible and acoustically reasonable, however, at 11,475 square feet per benefit NW02 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figure 2-1 for additional information pertaining to NW02 analysis.
- **Noise Wall 03 (NW03) –** Adjacent to I-40 eastbound east of SR 1134 (Dimmocks Mill Road): With a length of 1,380 feet and an area of 41,400 square feet, the optimal NW03 configuration would benefit only one receptor, including one of the two predicted traffic

noise impacts. The optimal NW03 configuration would not meet the Policy acoustical feasibility criterion. Refer to Section 11 and Figures 2-1 and 2-2 for additional information pertaining to NW03 analysis.

- **Noise Wall 09 (NW09) –** Adjacent to I-40 westbound east of SR 1006 (Orange Grove Road): With a length of 300 feet and an area of 3,080 square feet, the optimal NW09 configuration would benefit two total receptors, including two of three predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW09 configuration would be acoustically feasible and acoustically reasonable; however, at 1,540 square feet per benefit NW09 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figure 2-3 for additional information pertaining to NW09 analysis.
- **Noise Wall 12 (NW12) –** Adjacent to the on-ramp from SR 1009 (Old NC 86) to I-40 eastbound: With a length of 540 feet and an area of 5,132 square feet, the optimal NW12 configuration would benefit two total receptors, including two of four predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW12 configuration would be acoustically feasible and acoustically reasonable; however, at 2,566 square feet per benefit NW12 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-5 and 2-6 for additional information pertaining to NW12 analysis.
- **Noise Wall 14 (NW14) –** Adjacent to I-40 westbound north of SR 1723 (New Hope Church Road): With a length of 3,960 feet and an area of 72,960 square feet, the optimal NW14 configuration would benefit four total receptors, including three of three predicted traffic noise impacts, and four receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW14 configuration would be acoustically feasible and acoustically reasonable; however, at 18,240 square feet per benefit NW14 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-6 and 2-7 for additional information pertaining to NW14 analysis.
- **Noise Wall 17 (NW17) –** Adjacent to I-40 westbound south of SR 1723 (New Hope Church Road): With a length of 1,080 feet and an area of 16,216 square feet, the optimal NW17 configuration would benefit seven total receptors, including six of 11 predicted traffic noise impacts, and two receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW17 configuration would be acoustically feasible and acoustically reasonable; however, at 2,317 square feet per benefit NW17 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-8, 2-9, and 2-10 for additional information pertaining to NW17 analysis.
- **Noise Wall 20 (NW20) –** Adjacent to I-40 westbound over SR 1725 (Millhouse Road): With a length of 900 feet and an area of 10,969 square feet, the optimal NW20 configuration would benefit six total receptors, including five of five predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW20 configuration would be acoustically feasible and acoustically reasonable; however, at 1,828 square feet per benefit NW20 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-10 and 2-11 for additional information pertaining to NW20 analysis.

- **Noise Wall 22a (NW22a) –** Adjacent to I-40 westbound north of NC 86 (Martin Luther King Jr. Boulevard): With a length of 1,080 feet and an area of 14,301 square feet, the optimal NW22a configuration would benefit two total receptors, including two of two predicted traffic noise impacts, and two receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW22a configuration would be acoustically feasible and acoustically reasonable; however, at 7,150 square feet per benefit NW22a would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-11 and 2-12 for additional information pertaining to NW22a analysis.
- **Noise Wall 22b2 (NW22b2) –** Adjacent to the onramp from NC 86 (Martin Luther King Jr. Boulevard) to I-40 westbound: With a length 1,530 feet and an area of 40,348 square feet, the optimal NW22b2 configuration would benefit 15 total receptors, including three of three predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW22b2 configuration would be acoustically feasible and acoustically reasonable; however, at 2,690 square feet per benefit NW22b2 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-11 and 2-12 for additional information pertaining to NW22b2 analysis.
- **Noise Wall 26 (NW26) –** Adjacent to I-40 westbound east of NC 86 (Martin Luther King Jr. Boulevard): With a length of 1,680 feet and an area of 22,566 square feet, the optimal NW26 configuration would benefit six total receptors, including five of five predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW26 configuration would be acoustically feasible and acoustically reasonable; however, at 3,761 square feet per benefit NW26 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Section 11 and Figures 2-14 and 2-15 for additional information pertaining to NW26 analysis.

The final decision on the installation of an abatement measure shall be made upon completion of the public involvement process.

The major construction elements of this project are expected to be earth removal, tree clearing, hauling, grading, bridge construction, and paving. General construction noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be expected particularly from paving operations, pile driving at bridges, and earth moving equipment during grading operations.

Construction noise impacts may occur due to the close proximity of numerous noise-sensitive receptors to project construction activities. It is the recommendation of this DNR that all reasonable efforts should be made to minimize exposure of noise-sensitive areas to construction noise impact.

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1 Project Location, Description, and Background

The North Carolina Department of Transportation (NCDOT) is constructing the I-3306A Design-Build Project in Orange County, which is widening I-40 from I-85 to the Durham County Line, a distance of approximately 11.4 miles. The Project will provide a six-lane facility and improve the I-40 / NC 86 interchange. The project is included in the State Transportation Improvement Program (STIP) as I-3306A. Federal funds are used for this project.

The project Date of Public Knowledge is the March 29, 2019 approval date of the Categorical Exclusion (CE). In accordance with NCDOT Policy, federal and state governments are not responsible for providing noise abatement measures for traffic noise impacts for which building permits were issued after the Date of Public Knowledge. NCDOT advocates the use of local government authority to regulate land development, planning, design and construction in such a way that noise impacts are minimized.

Because this project involves the addition of through-traffic lanes, it is a Type I project per FHWA 23 CFR 772 and NCDOT Policy.

A Traffic Noise Report (TNR) was accepted in March 2019 and was addended with analysis for additional areas in June 2021. The purpose of this DNR is to reexamine the I-3306A project using the final design data and geometry. This report documents the evaluation of noise impacts and assessment of traffic noise abatement for noise sensitive land uses in the project, and has been prepared in accordance with 23 CFR 772, the NCDOT Traffic Noise Policy effective October 6, 2016 (Policy), and the accompanying NCDOT Traffic Noise Manual effective October 6, 2016, updated January 2017 (Manual).

For this DNR, final designs were utilized for build-condition traffic noise modeling and evaluation with a design year of 2045. The new roadway will construct a six-lane, divided freeway with paved shoulders and a double-faced barrier-divided median in order to improve roadway connectivity, reduce traffic congestion, improve mobility, and enhance safety. The total project length is approximately 11.4 miles. The proposed design speed is 70 miles per hour (mph) with a posted speed of 65 mph. This DNR uses a 70 mph design speed. All noise abatement measures analyzed herein have been evaluated for feasibility and reasonableness. It was assumed that the surrounding roadways would maintain their existing speed limits.

The following are design construction elements of the project:

- Typical section consisting of six-lane divided facility with a 22-foot barrier protected median
- Minimum 14-foot outside shoulders (12-foot useable shoulder width plus two feet)
- 10-foot inside median shoulders along I-40
- I-40 / NC 86 interchange reconfiguration and improvements
- Design speed of 70 mph and posted speed of 65 mph

1.1 Land Uses and Noise Study Areas

Figure 1 shows the study area map for the project. A total of 784 discrete receptor locations were modeled. One receptor was modeled to represent each of the 646 residences and 138 receptor locations were modeled to represent 25 non-residential Equivalent Receptors (ERs). The project final design will require acquisition of one residence represented by one modeled receptor location, for right-of-way. Each noise study area (NSA) is included on the map. There are 36 NSAs, labeled 01 through 35 including 22a and 22b. Each NSA contains noise-sensitive land uses with similar noise environments. Receptors within each NSA are shown in Figure 2.

Noise Study Area 01

NSA 01 includes the area south of I-40 west of SR 1134 (Dimmocks Mill Road). NSA 01 contains one single-family residence. The receptor within NSA 01 appears in Figure 2-1.

Noise Study Area 02

NSA 02 includes the area north of I-40 west of SR 1134 (Dimmocks Mill Road). NSA 02 contains two single-family residences. The receptors within NSA 02 appear in Figure 2-1.

Noise Study Area 03

NSA 03 includes the area south of I-40 east of SR 1134 (Dimmocks Mill Road). NSA 03 contains two single-family residences. The receptors within NSA 03 appear in Figures 2-1 and 2-2.

Noise Study Area 04

NSA 04 includes the area north of I-40 east of SR 1134 (Dimmocks Mill Road). NSA 04 contains two single-family residences. The receptors within NSA 04 appear in Figure 2-1.

Noise Study Area 05

NSA 05 includes the area south of I-40 between the interchange with I-85 and SR 1006 (Orange Grove Road). NSA 05 contains 1 receptor representing Cedar Ridge High School, and 47 receptor points representing the school athletic field, which represent 0.02 ER each, rounding up to 1 ER. The receptors within NSA 05 appear in Figure 2-2.

Noise Study Area 06

NSA 06 includes the area east of I-40 north of SR 1006 (Orange Grove Road). NSA 06 contains 91 single-family residences. The receptors within NSA 06 appear in Figures 2-2, 2A-1, and 3A-1.

Noise Study Area 07

NSA 07 includes the area west of I-40 south of SR 1006 (Orange Grove Road). NSA 07 contains 12 single-family residences. The receptors within NSA 07 appear in Figures 2-2 and 2-3.

Noise Study Area 08

NSA 08 includes the area east of I-40 south of SR 1006 (Orange Grove Road) and north of SR 1133 (Oakdale Drive). NSA 08 contains 43 single-family residences. The receptors within NSA 08 appear in Figures 2-2, 2-3, and 3A-1.

Noise Study Area 09

NSA 09 includes the area east of I-40 south of SR 1133 (Oakdale Drive). NSA 09 contains 26 single-family residences. The receptors within NSA 09 appear in Figures 2-3, 2-4, and 3A-1.

Noise Study Area 10

NSA 10 includes the area south of I-40 west of SR 1009 (Old NC 86). NSA 10 contains five single-family residences. The receptors within NSA 10 appear in Figure 2-5.

Noise Study Area 11

NSA 11 includes the area north of I-40 west of SR 1009 (Old NC 86). NSA 11 contains one single-family residence. The receptor within NSA 11 appears in Figure 2-5.

Noise Study Area 12

NSA 12 includes the area south of I-40 east of SR 1009 (Old NC 86). NSA 12 contains six single-family residences. The receptors within NSA 12 appear in Figures 2-5 and 2-6.

Noise Study Area 13

NSA 13 includes the area north of I-40 east of SR 1009 (Old NC 86). NSA 13 contains 48 single-family residences and one receptor representing the UNC Hospitals Hillsborough Campus. The receptors within NSA 13 appear in Figures 2-5 and 2-6.

Noise Study Area 14

NSA 14 includes the area east of I-40 south of NSA 13 and north of SR 1723 (New Hope Church Road). NSA 14 contains three single-family residences and 16 receptors representing the Blackwood Farm Park Trail, which represent 0.01 ER each, rounding up to 1 ER. The receptors within NSA 14 appear in Figures 2-6 and 2-7.

Noise Study Area 15

NSA 15 includes the area west of I-40 north of SR 1723 (New Hope Church Road). NSA 15 contains two single-family residences. The receptors within NSA 15 appear in Figure 2-8.

Noise Study Area 16

NSA 16 includes the area west of I-40 south of SR 1723 (New Hope Church Road). NSA 16 contains three single-family residences. The receptors within NSA 16 appear in Figures 2-8 and 2-9.

Noise Study Area 17

NSA 17 includes the area east of I-40 south of SR 1723 (New Hope Church Road). NSA 17 contains three receptors representing Sunrise Church and its outdoor areas of human use, and 26 single-family residences. The receptors within NSA 17 appear in Figures 2-8, 2-19, and 2-10.

Noise Study Area 18

NSA 18 includes the area east of I-40 north of SR 1725 (Millhouse Road). NSA 18 contains six single-family residences. The receptors within NSA 18 appear in Figure 2-10.

Noise Study Area 19

NSA 19 includes the area west of I-40 north of SR 1725 (Millhouse Road). NSA 19 contains one receptor representing the playground of Emerson Waldorf School. The receptor within NSA 19 appears in Figure 2-10.

Noise Study Area 20

NSA 20 includes the area east of I-40 south of SR 1725 (Millhouse Road). NSA 20 contains six single-family residences. The receptors within NSA 20 appear in Figure 2-10.

Noise Study Area 21

NSA 21 includes the area south of I-40 west of NC 86 and north of SR 1727 (Eubanks Road). NSA 21 contains one single-family residence. The receptor within NSA 21 appears in Figure 2-13.

Noise Study Area 22a

NSA 22a includes the area east of I-40 along SR 2200 (Clyde Road). NSA 22a contains three single-family residences. The receptors within NSA 22a appear in Figure 2-11.

Noise Study Area 22b

NSA 22b includes the area north of I-40 west of NC 86. NSA 22b contains 33 single-family residences. The receptors within NSA 22b appear in Figures 2-11 and 2-12.

Noise Study Area 23

NSA 23 includes the area north of SR 1730 (Whitfield Road). NSA 23 contains six single-family residences. The receptors within NSA 23 appear in Figures 2-12 and 2-14.

Noise Study Area 24

NSA 24 includes the area west of NC 86 and south of SR 1727 (Eubanks Road). NSA 24 contains 18 single-family residences and two receptors representing North Chapel Hill Baptist Church and its outdoor seating area. The receptors within NSA 24 appear in Figures 2-12, 2-13, and 2-14.

Noise Study Area 25

NSA 25 includes the area south of I-40 east of NC 86. NSA 25 contains one receptor representing a restaurant with outdoor seating, 114 receptors representing apartment residences, and 24 receptor points representing outdoor recreational areas associated with the apartment community, including a basketball court, dog park, garden, patio, playground, picnic areas, and trails. A total of eight ERs are represented by the 24 recreational area receptor points. The receptors within NSA 25 appear in Figures 2-14 and 2-14A-1 through 2-14A-4.

Noise Study Area 26

NSA 26 includes the area north of I-40 east of SR 1730 (Whitfield Road). NSA 26 contains eight single-family residences. The receptors within NSA 26 appear in Figures 2-14 and 2-15.

Noise Study Area 27

NSA 27 includes the area south of I-40 from Vilcom Center Drive to Essex Drive. NSA 27 contains 28 receptors representing apartment residences, and one receptor representing St. Benedict's Anglican Church. The receptors within NSA 27 appear in Figures 2-14, 2-15, and 2-15A-1.

Noise Study Area 28

NSA 28 includes the area north of I-40 between NSA 26 and NSA 30. NSA 28 contains 18 single-family residences. The receptors within NSA 28 appear in Figures 2-15, 2-16, and 2-15A-1.

Noise Study Area 29

NSA 29 includes the area south of I-40 east of NSA 27 and west of SR 1732 (Sunrise Road). NSA 29 contains 25 receptors representing apartment, cottage, duplex cottage, and townhome residences in the Carol Woods development, and 40 receptor points representing recreational uses in the development, including a dog park, gardens, and trails. A total of 4 ERs are represented by the 40 recreational area receptor points. The receptors within NSA 29 appear in Figures 2-15 and 2-15A-1.

Noise Study Area 30

NSA 30 includes the area north of I-40 east of NSA 28 and west of SR 1732 (Sunrise Road). NSA 30 contains five single-family residences. The receptors within NSA 30 appear in Figure 2-16.

Noise Study Area 31

NSA 31 includes the area north of I-40 east of SR 1732 (Sunrise Road). NSA 31 contains two single-family residences and the Chapel Hill Wesleyan Church. The receptors within NSA 31 appear in Figure 2-16.

Noise Study Area 32

NSA 32 includes the area south of I-40 between SR 1732 (Sunrise Road) and SR 1734 (Erwin Road). NSA 32 contains 95 single-family residences. The receptors within NSA 32 appear in Figures 2-16 and 2-17.

Noise Study Area 33

NSA 33 includes the area north of I-40 at the end of SR 1897 (Dry Creek Road). NSA 33 contains two single-family residences. The receptors within NSA 33 appear in Figure 2-17.

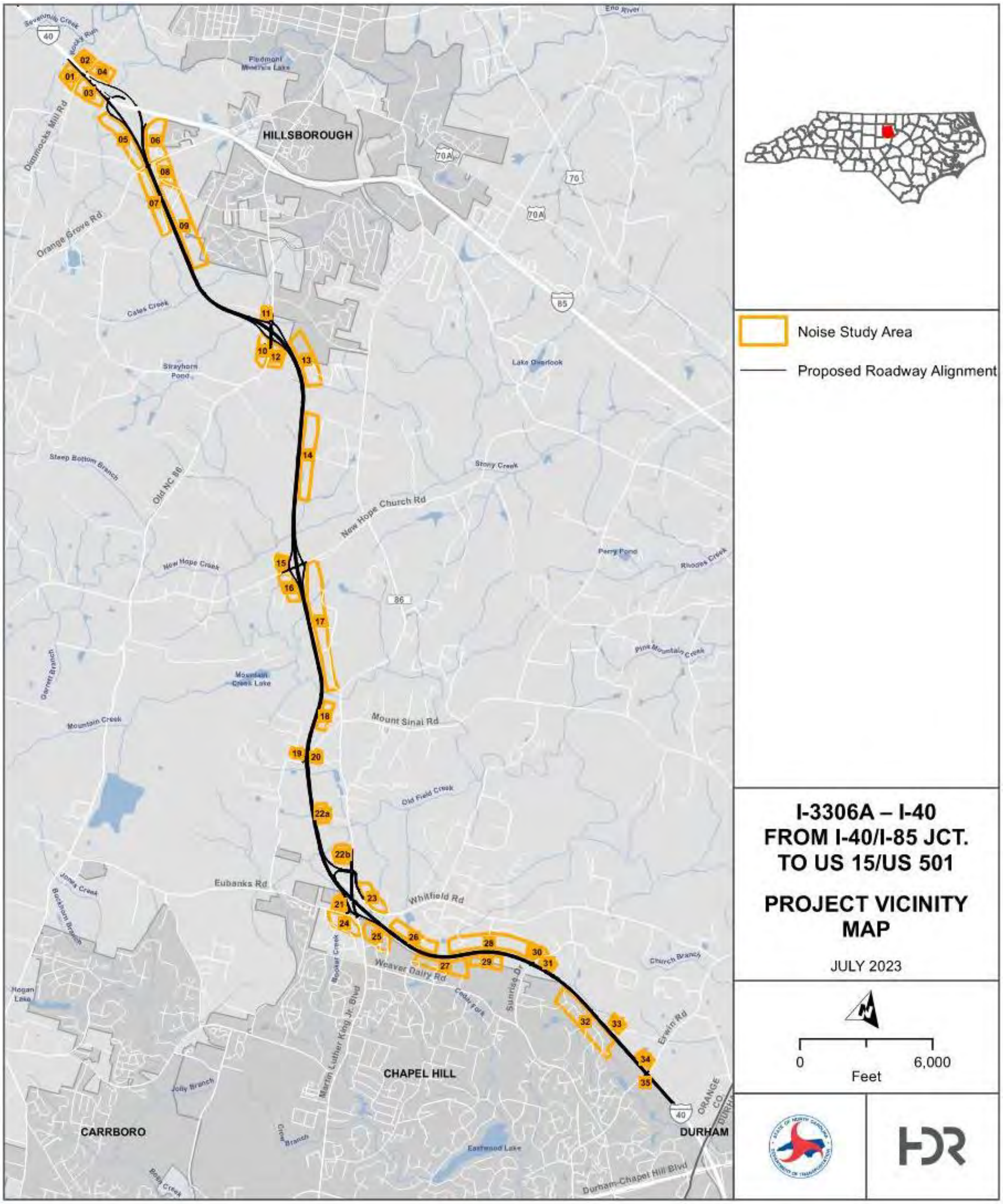
Noise Study Area 34

NSA 34 includes the area north of I-40 west of SR 1734 (Erwin Road). NSA 34 contains two single-family residences. The receptors within NSA 34 appear in Figure 2-18.

Noise Study Area 35

NSA 35 includes the area south of I-40 east of SR 1734 (Erwin Road). NSA 35 contains one single-family residence. The receptor within NSA 35 appears in Figure 2-18.

Figure 1. Project Vicinity Map



2 Procedure

This DNR documents the Final Design Noise Analysis of the predicted traffic noise impacts and assessment of acceptable noise abatement measures for the I-40 Widening from I-85 in Orange County to the Durham County Line project (TIP#: I-3306A).

The analysis herein has been prepared in accordance with the NCDOT Policy and the accompanying Manual, as well as Title 23 Code of Federal Regulations, Part 772 (23 CFR 772). The Policy is applicable to projects with a Date of Public Knowledge on or after the effective date of the Policy. Accordingly, the Policy and accompanying Manual were used in this DNR analysis to assess traffic noise impacts and evaluate noise abatement measures. Where FHWA has given highway agencies flexibility in executing the 23 CFR 772 standards, Policy describes the NCDOT approach to implementation.

The noise measurement procedures that were used considered the methodologies contained in the FHWA publication *Noise Measurement Handbook* (FHWA-HEP-18-065). These measurements assisted in validating the project noise modeling, and in establishing baseline ambient noise levels. The short-term measurements were conducted on November 15-18, 2021 and January 18-19, 2022.

In accordance with the Manual, the FHWA Traffic Noise Model® (TNM v.2.5) was used to predict base year 2019 existing and design year 2045 hourly equivalent traffic noise levels, $L_{eq(h)}$, for the noise-sensitive land uses along the project corridor in areas where traffic noise is dominant. TNM models for the build case were created using the final project design.

The NCDOT noise abatement criteria and the increase over base year 2019 existing levels were used to evaluate potential noise impacts (see Section 10). Once impacts were identified, NCDOT criteria were applied to evaluate noise abatement feasibility and reasonableness (see Section 11).

Project-related construction noise is discussed in Section 13.

3 Characteristics of Noise

Noise can be described as unwanted or excessive sound that may interfere with communication or disturb the community. It is emitted from many sources including airplanes, factories, railroads, commercial businesses, and highway vehicles. Roadway vehicle noise (traffic noise) consists of three primary parts: tire noise, engine noise, and exhaust noise. Of these sources, tire noise is typically the most offensive at unimpeded travel speeds.

The magnitude of noise is usually described by a ratio of its sound pressure to a reference sound pressure, which is usually 20 micropascals (20μPa). Since the range of sound pressure ratios varies greatly over many orders of magnitude, a base-10 logarithmic scale is used to express sound levels in dimensionless units of decibels (dB). The commonly accepted limits of human hearing to detect sound magnitudes are between the threshold of hearing at 0 dB and the threshold of pain at 140 dB.

Sound frequencies are represented in units of Hertz (Hz), which correspond to the number of vibrations per second of a given tone. A cumulative sound level is equivalent to ten times the base-10 logarithm of the ratio of the sum of the sound pressures of all frequencies to the reference sound pressure. To simplify the mathematical process of determining sound levels, sound frequencies are grouped into ranges, or bands. Sound levels are then calculated by adding the cumulative sound pressure levels within each band – which are typically defined as either one octave or 1/3 octave of the sound frequency spectrum.

The commonly accepted limitation of human hearing to detect sound frequencies is between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz and 6,000 Hz. Although people are generally not as sensitive to lower-frequency sounds as they are to higher frequencies, most people lose the ability to hear high frequency sounds as they age. To accommodate varying receptor sensitivities, frequency sound levels are commonly adjusted, or filtered, before being logarithmically added and reported as a single sound level magnitude of that filtering scale. For traffic noise purposes the A-weighted scale is used, which provides a single number measure that weighs different frequencies in a manner similar to the sensitivity of the human ear. Thus, the A-weighted sound level in decibels, expressed in dB(A), provides a simple measure of intensity and frequency that correlate well with the human response to environmental noise.

The A-weighted decibel filtering scale applies numerical adjustments to sound frequencies to emphasize the frequencies at which human hearing is sensitive, and to minimize the frequencies to which human hearing is not as sensitive. This concept is demonstrated for a truck in Table 1, below.

Table 1. Comparison of Unweighted vs. A-Weighted Sound Levels for a Truck

Octave-Band Center Frequency (Hz)	A	B	C = A + B
	Unweighted Sound Level from a Truck (dB)	**Adjustment of Unweighted Sound to Represent What Human Ear Hears (dB)**	**Sound Level that Human Ear Perceives = A-Weighted Sound Level or dB(A)**
31	75	-39	36
63	78	-26	52
125	83	-16	67
250	84	-9	75
500	81	-3	78
1000	75	0	75
2000	71	1	72
4000	63	1	64
8000	54	-1	53
	89		**82**
	Total Unweighted Sound Level in dB		**Total A-Weighted Sound Level in dB(A)**

Source: Table 3.1, *Traffic Noise Manual*, NCDOT. October 6, 2016. Revised January 2017.

The A-weighted scale is commonly used in highway traffic noise studies because the typical frequency spectrum of traffic noise is higher in magnitude at the frequencies at which human hearing is most sensitive (1,000 Hz to 6,000 Hz). Several examples of noise levels, expressed in dB(A), are listed in Table 2.

Review of Table 2 indicates that most individuals in urbanized areas are exposed to high levels of noise from many sources as they go about their daily activities. The degree of disturbance or annoyance of unwanted sound depends essentially on three things:

- The amount and nature of the intruding noise.
- The relationship between the background noise and the intruding noise.
- The type of activity occurring when the noise is heard.

In considering the first of these factors, it is important to note that individuals have varying sensitivity to noise. Loud noises bother some people more than other people, and some individuals become increasingly upset if an unwanted noise persists. The time patterns of noise also enter into perception as to whether or not a noise is an annoyance. For example, noises that occur during nighttime (sleeping) hours are usually considered more annoying than the same noises in the daytime.

With regard to the second factor, individuals tend to judge the annoyance of an unwanted noise in terms of its relationship to noise from other sources (background noise). The blowing of a car horn at night when background noise levels are approximately 45 dB(A) would generally be more objectionable than the horn blowing in the afternoon when background noises might be 55 dB(A).

The third factor is related to the interference of noise with activities of individuals. In a 60 dB(A) environment, normal conversation would be possible, while sleep might be difficult. Work activities requiring high levels of concentration may be interrupted by loud noises, while activities requiring manual effort may not be interrupted to the same degree. Over time, if the noises occur at predicted intervals, individuals tend to accept the noises that intrude into their lives, i.e., regularly scheduled trains or subways in a city. Attempts have been made to regulate many of these types of noises including airplane noise, factory noise, railroad noise, and highway noise. In relation to highway traffic noise, methods of analysis and control have developed rapidly in recent years.

Table 2. Common Indoor and Outdoor Noise Levels

Common Outdoor Noise Levels	Noise Level (dB(A))	Common Indoor Noise Levels
	110	Rock Band
Jet Flyover at 1,000 feet	100	Inside Subway Train (NY)
Gas Lawn Mower at 3 feet		
Diesel Truck at 50 feet	90	Food Blender at 3 feet
Noisy Urban Daytime	80	Garbage Disposal at 3 feet
Gas Lawn Mower at 100 feet	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Small Theater, Large Conference Room (Background)
Quiet Suburban Nighttime		Library
	30	
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	20	
		Broadcast and Recording Studio
	10	
	0	Threshold of Hearing

Source: Table 3.2, *Traffic Noise Manual*, NCDOT. October 6, 2016. Revised 2017. Adapted from Guide on Evaluation and Attenuation of Traffic Noise, American Association of State Highway and Transportation Officials (AASHTO). 1974 (revised 1993).

Lastly, the noise level descriptor used by NCDOT is the equivalent sound pressure level (L_{eq}). L_{eq} is defined as the continuous steady sound level that would have the same total A-weighted sound energy as the real fluctuating sound measured over a given period of time. Traffic noise levels are measured with the hourly equivalent sound pressure level, expressed as $L_{eq(h)}$.

4 Noise Abatement Criteria

4.1 Title 23 Code of Federal Regulations, Part 772 (23 CFR 772)

Under Title 23 CFR 772 the FHWA has developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways. The purpose of Title 23 CFR Part 772 is:

> *To provide procedures for noise studies and noise abatement measures to help protect the public's health, welfare and livability, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to Title 23 United States Code(U.S.C.)* (23 CFR 772.1).

The NAC and procedures are set forth in Title 23 CFR Part 772, which also states:

In determining and abating traffic noise impacts, primary consideration is to be given to exterior areas of frequent human use.

4.2 North Carolina Department of Transportation Traffic Noise Policy

Because the CE was approved on March 29, 2019, the NCDOT *Traffic Noise Policy* effective October 6, 2016 (Policy), establishes official policy on highway noise for this project. This policy sets guidelines for determining traffic noise impacts and abatement measures, including general criteria and specific factors that determine feasibility and reasonableness of noise abatement measures on NCDOT highway projects. This policy is included as Appendix G of this report. Feasibility and reasonableness criteria for noise abatement are defined in Section 11.1.

4.3 Noise Abatement Criteria

The two categories of traffic noise impacts are defined as:

1) Predicted traffic noise levels that “approach” or exceed the FHWA Noise Abatement Criteria (NAC). An approaching noise level is defined by NCDOT as being 1 dB(A) less than the noise level listed as the FHWA NAC for Activity Categories A through E in Table 3.
2) Predicted traffic noise levels that “substantially increase” over existing noise levels. NCDOT defines a “substantial increase” when the predicted future hourly equivalent noise level exceeds existing ambient noise levels by 10 dB(A).

A summary of the NAC for various land uses is presented in Table 3.

Table 3. Noise Abatement Criteria

Hourly Equivalent A-Weighted Sound Level (decibels (dB(A)))			
Activity Category	**Activity Criteria[1] $L_{eq(h)}$[2]**	**Evaluation Location**	**Activity Description**
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67	Exterior	Residential
C[3]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	Undeveloped lands that are not permitted.

Source: Table 9.2, *Traffic Noise Manual*, NCDOT. October 6, 2016. Revised January 2017.

[1] The $L_{eq(h)}$ Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

[2] The equivalent steady-state sound level, which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with $L_{eq(h)}$ being the hourly value of L_{eq}.

[3] Includes undeveloped lands permitted for this activity category.

For Category D receptors, interior noise levels were evaluated using Table 4. All six Category D receptors in the study area were determined to be of masonry construction with single glazed windows or light frame construction with storm windows, for an outdoor to indoor noise reduction of 25 dB.

Table 4. Building Noise Reduction Factors

Building Type	Window Condition[1]	Noise Reduction Due to Exterior of the Structure
All	Open	10 dB
Light Frame	Ordinary Sash (closed)	20 dB
	Storm Windows	25 dB
Masonry	Single Glazed	25 dB
	Double Glazed	35 dB

Source: Table 8.3, *Traffic Noise Manual*, NCDOT. October 6, 2016. Revised January 2017.

[1] The windows shall be considered open unless there is firm knowledge that the windows are in fact kept closed almost every day of the year.

5 Ambient Noise Levels

Ambient noise is the combination of all noise sources that occur in an area, typically described for a specific environment, location, and/or period of time. Ambient noise level data are obtained to quantify the existing acoustic environment, provide a basis for assessing the existing loudest-hour traffic noise levels, define noise levels in the areas for which traffic and/or construction noise may create an impact or impacts, and define noise levels in the areas for which traffic and/or construction noise does not create impacts.

5.1 Ambient Noise Level Monitoring

Noise monitoring along the project corridor was performed during two periods: November 15-18, 2021, and January 18-19, 2022. The measurements were used to validate the use of FHWA's Traffic Noise Model.

Noise measurements and concurrent traffic data were collected at 73 individual monitoring sites during 40 short-term monitoring sessions on November 15-18, 2021, and January 18-19, 2022. Representative field measurement sites along the project corridor were chosen based on proximity and area characteristics or noise-sensitive receptors. Depending on the presence of traffic noise sources, each location consisted of either a single sound level meter (SLM) or an array of two or three SLMs. Measured noise levels ranged from 50 dB(A) to 72 dB(A). See Appendix A for detailed information for each measurement including start and stop times, weather conditions, traffic data collected, photographs of meter set-ups, and documentation of any other contributing noise sources or events.

The short-term measurements were performed with three Larson Davis 831C Type I SLMs. Calibration certificates are included in Appendix A. The results from the short-term measurements were used in noise model validation.

Because noise barriers can only reduce traffic noise levels and per Manual definition of Noise Level Reduction (NLR), with-barrier sound levels were screened against measured or otherwise quantified noise sources. Collected ambient levels for each NSA with measurement source designations are shown in Table 5 below.

Table 5. Ambient Noise Levels

NSA	Ambient Sound Level (dBA)	Measurement Source
05	59	M5.1
06	55	M6.3
13	54	M13.6
17	54	M17.2
22b	55	M22b.3
32	50	M32.6

Additional noise measurement data, including site photographs, field monitoring logs, and annual laboratory calibration sheets, are included in Appendix A.

5.2 Classified Traffic Counts and Vehicle Speed Data

Traffic counts and vehicle speed data were noted on the log sheets for each short-term measurement, which can be found in Appendix A. During the traffic noise measurements, the speeds of passing vehicles were measured by handheld radar speed detector.

5.3 Weather

Weather conditions during all fieldwork periods were generally clear with dry pavement and low wind speeds. Weather conditions for individual measurements were noted on the log sheets for each measurement, which can be found in Appendix A.

6 Noise Model Validation

Title 23 CFR 772.11(d)(2) requires that the analysis of traffic noise impacts, for projects on new or existing alignments, validate predicted noise levels through comparison between measured and predicted levels. A TNM model is considered ‘validated’ if it is a reasonable representation of the existing noise sensitive area and/or project area, and the TNM-predicted noise levels are within the acceptable tolerance of the noise level data obtained in the field. The NCDOT-accepted tolerance for TNM model validation is ±3.0 decibels (±3.0 dB(A)).

In accordance with Policy, this DNR utilized validated computer models created with TNM v.2.5 to predict noise levels (baseline and future conditions) and define impacted receptors along the project. Validation results are located in Appendix A. TNM predicted traffic noise levels to within ±3.0 dB(A) for 71 of the 72 short-term monitoring locations for which traffic was the dominant noise source. The TNM-predicted traffic noise level at M6.3 was more than -3.0 dB(A) below the monitored level because traffic was not the dominant source at M6.3 during noise monitoring. The TNM-predicted traffic noise level at M22b.3 of more than +3.0 dB(A) above the monitored level is considered aberrant. Since TNM-predicted traffic noise levels at M22b.1 and M22b.2 (much closer to NC 86) were well within the ±3.0 dB(A) validation tolerance, the aberrant validation result at M22b.3 does not affect considerations for NSA 22b noise abatement.

7 Procedure for Predicting Existing Noise Levels

Base year 2019 existing noise conditions within the study area were evaluated to assist in determining the noise impacts of the proposed project. Noise levels have been predicted for the hour of the day when the vehicle volume, operating speed and number of heavy trucks combine to produce the worst traffic noise conditions. This condition usually occurs at the Level of Service (LOS) C/D threshold. A traffic forecast was prepared for the project to develop future traffic volumes in 2045 and is documented in the *Traffic Forecast Update for I-3306A* dated July 2019. The forecasted traffic volumes for the base year 2019 existing and design year 2045 build conditions were converted to peak hour volumes utilizing the K factors provided in the report to determine the highest two-way volume anticipated along each roadway segment throughout the day (Design Hourly Volumes).

7.1 Noise-Sensitive Sites

A receptor is a discrete or representative location of a noise-sensitive site or area for any of the land use categories listed in Table 3. Noise-sensitive land use in the project were represented by a total of 784 discrete receptor locations. One receptor was modeled to represent each of the 646 residences and 138 receptor locations were modeled to represent 25 non-residential Equivalent Receptors (ERs). The project final design will require acquisition of one residence represented by one modeled receptor for right-of-way. The receptors were grouped into 36 NSAs, as described in Section 1.1.

In determining traffic noise impacts, primary consideration is given to exterior areas where frequent human use occurs. If no exterior areas of frequent human use exist, no further analysis is required, with the exception being any impacted Category D land uses. At least one receptor was modeled for each noise-sensitive property within the study area, with some non-residential exterior areas of frequent human use modeled as a grid or array of receptors according to the guidance in the Manual. ER values for non-residential receptors were calculated based on usage data or assumptions for receptors that were impacted and/or included in noise wall analyses. For other non-residential receptors, ERs were assigned by dividing one ER across all points representing a given use[1]. The location of each receptor is shown on the detailed mapping figures presented in Section 16.

For this DNR, base year 2019 existing loudest-hour noise levels were assessed as the TNM-predicted noise levels in areas where traffic noise was dominant. The TNM-predicted noise levels were based on existing loudest-hour traffic estimates for each of these NSAs and the receptors contained within.[2] Under the base year 2019 existing conditions, exterior L_{eq} sound levels range from 43 dB(A) to 74 dB(A) and are a result of a given sensitive receptor's proximity to traffic on existing roadways.

[1] For example, a trail with 10 receptor points that was not impacted or included in a noise wall analysis would have an ER value of 1/10=0.1 for each point, for 1 ER total.

[2] Existing noise levels are defined as "the worst noise hour resulting from a combination of natural and mechanical sources and human activity usually present in a particular area."

8 Traffic Data

Traffic noise consists of three primary parts: tire/pavement noise, engine noise, and exhaust noise. Of these sources, tire noise is typically the most offensive at unimpeded travel speeds. Sporadic traffic noises such as horns, squealing brakes, screeching tires, etc. are considered aberrant and are not included within the predictive model algorithm. Traffic noise is not constant; it varies in time depending upon the number, speed, type, and frequency of vehicles that pass by a given receptor. Furthermore, since traffic noise emissions are different for various types of vehicles, the TNM algorithm distinguishes between the source emissions from the following vehicle types: automobiles, medium trucks, heavy trucks, buses, and motorcycles (see Table 6).

Table 6. Traffic Noise Model (TNM) Vehicle Classification Types

TNM Vehicle Type	Description
Autos	All vehicles with two axles and four tires, including passenger cars and light trucks, weighing 10,000 pounds or less
Medium Trucks	All vehicles having two axles and six tires, weighing between 10,000 and 26,000 pounds
Heavy Trucks	All vehicles having three or more axles, weighing more than 26,000 pounds
Buses	All vehicles designed to carry more than nine passengers
Motorcycles	All vehicles with two or three tires and an open-air driver/passenger compartment

Sources: FHWA Measurement of Highway-Related Noise, § 5.1.3 Vehicle Types
FHWA Traffic Monitoring Guide § 4.1 Classification Schemes

TNM modeled traffic volumes were calculated from the "*Traffic Forecast Update for I-3306A (I-40 widening) in Durham and Orange Counties*" dated July 2019. In accordance with Manual §8.4, the number of automobiles, medium trucks, and heavy trucks for a given roadway segment were calculated as the Average Annual Daily Traffic multiplied by the Design Hour Volume (AADT x DHV). Truck restrictions are not anticipated for any through-traffic lanes throughout the project; therefore, predicted volumes of the three vehicle classifications were distributed evenly across all modeled lanes for each roadway segment.

Numerous empirical evaluations and theoretical assessments have confirmed a widely accepted relationship between the loudest traffic hour and the cap of "Level of Service" (LOS) C traffic volumes. If traffic volumes exceed LOS C, vehicles must slow down, and noise emissions are reduced. For roadway segments for which traffic is predicted to exceed LOS C, TNM traffic volume inputs are limited by LOS C thresholds according to 'Hourly Volumes for Level of Service C' from Level of Service C Volumes for Traffic Noise Modeling (Institute for Transportation Research and Education (ITRE) / North Carolina State University. September 19, 2018). Refer to Appendix F for the modeled roadway segments for which TNM traffic volume inputs were limited by LOS C thresholds.

A design speed of 70 mph was used in the modeling for the final design. See Appendix F for the traffic data used in this study.

Final plans of the project improvements were used for the DNR. According to guidance from the Manual, the predictions documented in this report are based on Design Year 2045 Build-condition traffic conditions resulting in the loudest predicted hourly-equivalent traffic noise levels for each receptor.

The traffic parameters used in the noise model for prediction of existing and predicted noise levels for Design Year (2045) are presented in Appendix F.

9 Procedure for Predicting Future Noise Levels

Traffic noise emission comprises several variables, including the number, types, and travel speeds of the vehicles, as well as the geometry of the roadway(s) on which the vehicles travel. Additionally, variables such as meteorological conditions and intervening topography affect the transmission of traffic noise from the vehicles to noise-sensitive receptors. In accordance with industry standards and accepted best practices, computer models were created using the FHWA TNM v.2.5. These standards and practices were used to determine traffic noise levels for receptors located near the project, and worst-hour future noise levels were predicted using TNM and the calculated ambient noise level at receptors based on the measurements.

The traffic noise prediction model uses the number and type of vehicles on the planned roadway, their speeds (posted for all conditions), the physical characteristics of the road (e.g., curves, hills, depressed, elevated, etc.), receptor location and height, and if applicable, noise wall type, noise wall ground elevation, and noise wall segment top elevations. Final project plans for the recommended design alternative were used in this DNR. According to FHWA guidance, the predictions documented in this report are based upon the proposed roadway alignment design and 2045 traffic conditions used to predict the loudest hourly-equivalent traffic noise levels for each receptor.

10 Traffic Noise Impacts

NCDOT considers traffic noise impacts to occur when the predicted traffic noise levels either:

1) Approach or exceed the NAC; with “approach” meaning within 1 dB(A) of the NAC values shown in Table 3.

   or

2) Substantially increase over existing noise levels, with “substantial increase” meaning a 10-dB(A) increase over the existing noise level.

Traffic noise levels were modeled for the existing conditions (2019) and future (Design Year 2045) conditions at 784 discrete receptor locations. One receptor was modeled to represent each of the 646 residences and 138 receptor locations were modeled to represent 25 non-residential Equivalent Receptors (ERs). Table 7 provides a summary of the impacts for the Build Alternative and Appendix B provides the detailed Hourly Traffic Noise levels table. The results of the noise analysis predict that traffic-related noise impacts would occur for 109 residences and four non-residential ERs represented by 24 discrete modeled receptor locations under the Build Alternative, for a total of 113 impacts. All noise impacts were due to noise levels approaching or exceeding the NAC; there were no impacts due to a substantial increase in noise levels. Modeled receptors are shown on the detailed mapping figures presented in Section 16.

Table 7. Traffic Noise Impact Summary for Design Year 2045 Build Condition

Reason for Noise Impact	Summary of Impacted Receptors[7]							
	By Activity Category							
	A	B	C	D	E	F[5]	G[6]	All Activity Categories
Based on NAC Criteria Only[1]	0	109	4	0	0	--	--	113
Based on Substantial Increase Criteria Only[2]	0	0	0	0	0	--	--	--
Based on Both Criteria[3]	0	0	0	0	0	--	--	--
Total Impacts[4]	**0**	**109**	**4**	**0**	**0**	**--**	**--**	**113**

[1] Predicted traffic noise impact due to approaching or exceeding NAC (refer to Table 3).

[2] Predicted substantial increase noise impact (refer to Section 10).

[3] Predicted traffic noise level impacts due to both 1 and 2 above.

[4] The number of predicted impacts is not duplicated if receptors are predicted to be impacted by more than one criterion (e.g., if a receptor is impacted by NAC criteria and also by Substantial Increase criteria, it is counted as only one impact).

[5] There are no impact criteria for land use facilities in this activity category and no analysis of noise impacts is required.

[6] There are no impact criteria for undeveloped lands but some noise levels may need to be provided to local officials to aid them in future land use planning efforts.

[7] Values noted for Activity Category C, D, and E represent ER values for these non-residential land uses. The total number of impacted ERs in each NSA are rounded up to the next whole number.

The ranges of predicted exterior and interior base year 2019 existing loudest-hour equivalent sound levels, $L_{eq(h)}$, are between 43 dB(A) to 74 dB(A), and between 35 dB(A) to 46 dB(A), respectively. The ranges of predicted exterior and interior design year 2045 build condition loudest-hour equivalent sound levels, $L_{eq(h)}$, are between 45 dB(A) to 76 dB(A), and between 35 dB(A) to 48 dB(A), respectively. The predicted increase in design year 2045 build condition over base year 2019 existing condition loudest-hour equivalent sound levels, $L_{eq(h)}$, will be +5 dB(A) for two receptors in the project vicinity (receptors 06-076 at 117 Binford Street and 12-003 at 3224 Old NC 86); however, will be between -2 dB(A) to +3 dB(A) — that is, between "no change" to "barely perceptible" — for all other noise-sensitive receptors (refer to Manual Table 3.4).

10.1 Traffic Noise Impacts by NSA

Noise Study Area 01

One receptor representing a single-family residence was impacted in NSA 01. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 02

Two receptors representing two single-family residences were impacted in NSA 02. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 03

Two receptors representing two single-family residences were impacted in NSA 03. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 04

One receptor representing a single-family residence was impacted in NSA 04. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 05

Seven receptor points representing the Cedar Ridge High School athletic field were impacted in NSA 05. At 0.02 ERs per point, a total of 0.14 ERs rounding up to 1 ER was impacted. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 06

27 receptors representing single-family residences were impacted in NSA 06. Noise abatement analysis for 23 of these impacts is described in Section 11.1. Because the other four impacted receptors (06-001 through 004) were primarily impacted by traffic noise from I-85 outside of the project limits and were located beyond the feasible length of the noise wall, noise abatement could not be analyzed for those receptors.

Noise Study Area 07

Two receptors representing single-family residences were impacted in NSA 07. These receptors were located at opposite ends of the NSA, far enough apart that a separate abatement measure would have to be considered for each. Noise abatement was not analyzed for these receptors because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 08

No noise impacts occurred in NSA 08.

Noise Study Area 09

Three receptors representing single-family residences were impacted in NSA 09. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 10

Three receptors representing single-family residences were impacted in NSA 10. Gaps in a barrier to maintain driveway access would render the barrier infeasible for construction.

Noise Study Area 11

No noise impacts occurred in NSA 11.

Noise Study Area 12

Four receptors representing single-family residences were impacted in NSA 12. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 13

10 receptors representing single-family residences were impacted in NSA 13. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 14

Two receptors representing single-family residences were impacted in NSA 14, as well as 13 receptor points representing a trail at Blackwood Farm Park. At 0.01 ERs per point, a total of 0.13 ERs rounding up to 1 ER were impacted, for a total of 3 impacts overall in NSA 14. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 15

No noise impacts occurred in NSA 15.

Noise Study Area 16

One receptor representing a single-family residence was impacted in NSA 16. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 17

11 receptors representing single-family residences were impacted in NSA 17. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 18

No noise impacts occurred in NSA 18.

Noise Study Area 19

No noise impacts occurred in NSA 19.

Noise Study Area 20

Five receptors representing single-family residences were impacted in NSA 20. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 21

No noise impacts occurred in NSA 21.

Noise Study Area 22a

Two receptors representing single-family residences were impacted in NSA 22a. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 22b

Seven receptors representing single-family residences were impacted in NSA 22b. Noise abatement analysis for these impacts is described in Section 11.1. Note that separate abatement was considered depending on whether the primary source of traffic noise for a receptor was I-40 (three receptors) or NC 86 (four receptors).

Noise Study Area 23

No noise impacts occurred in NSA 23.

Noise Study Area 24

One receptor representing outdoor use at North Chapel Hill Baptist Church with a value of 1 ER was impacted in NSA 24. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 25

Three receptor points representing outdoor uses including a dog park, a playground, and a basketball court at Chapel Hill North Apartments were impacted in NSA 25. At 0.3 ERs per point, a total of 0.9 ERs rounding up to 1 ER were impacted. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 26

Five receptors representing single-family residences were impacted in NSA 26. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 27

No noise impacts occurred in NSA 27.

Noise Study Area 28

One receptor representing a single-family residence was impacted in NSA 28. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 29

No noise impacts occurred in NSA 29.

Noise Study Area 30

One receptor representing a single-family residence was impacted in NSA 30. Noise abatement was not analyzed for this receptor because noise abatement measures must benefit at least two impacted receptors to be considered feasible.

Noise Study Area 31

No noise impacts occurred in NSA 31.

Noise Study Area 32

19 receptors representing single-family residences were impacted in NSA 32. Noise abatement analysis for these impacts is described in Section 11.1.

Noise Study Area 33

No noise impacts occurred in NSA 33.

Noise Study Area 34

No noise impacts occurred in NSA 34.

Noise Study Area 35

No noise impacts occurred in NSA 35.

11 Potential Traffic Noise Abatement Measures

Policy requires that, when traffic noise impacts are identified, noise abatement measures shall be considered and evaluated for feasibility for all impacted receptors and reasonableness for all benefited receptors. Measures typically considered include highway alignment selection, traffic systems management, buffer zones, proper use of land controls, noise walls and earth berms, and insulation of NAC D land use facilities.

11.1 Noise Barriers

Noise barriers are primarily constructed as earth berms or solid-mass, impervious walls adjacent to limited-access freeways that are in close proximity to noise-sensitive land uses. To be effective, a noise barrier must be long enough and tall enough to shield the impacted receptors. Generally, the noise barrier length should be eight times the distance from the noise barrier to the receptor. For example, if a receptor is 200 feet from the roadway, an effective noise barrier would be approximately 1,600 feet long – with the receptor in the horizontal center. On roadway facilities with direct access for driveways, noise barriers are typically not feasible because the openings undermine the noise barrier's ability unable to attenuate traffic noise sufficiently. Due to the requisite lengths for effectiveness, noise barriers are commonly not economical for secluded or most low-density areas, or for most uncontrolled access facilities. However, noise barriers occasionally are found to be feasible and reasonable for as few as two impacted receptors (if the noise barrier can benefit enough total receptors), and on some limited control of access highway facilities for which de-facto control of exists via a single access point serving numerous receptors (e.g. an entrance street to a residential subdivision).

The Manual outlines the criteria for determining if a noise abatement measure is feasible and reasonable. A noise barrier is considered feasible if it is predicted to reduce traffic noise levels by at least 5 dB(A) for at least two impacted receptors. Engineering feasibility of noise abatement considers adverse impacts to property access, drainage, topography, utilities, and safety and maintenance requirements. A noise barrier is evaluated for its reasonableness based on a maximum allowable base quantity of wall or berm, and its ability to reduce traffic noise effectively. The allowable base quantity of noise walls and/or earthen berms shall not exceed 1,500 square feet (ft^2) and 4,200 cubic yards (yd^3), respectively. Additionally, an incremental increase of up to 2,000 ft^2 for noise walls and 5,600 yd^3 for earthen berms shall be added to the base quantity to reflect the average degree of increase in dB(A) between existing and predicted exterior noise levels of all impacted receptors within each NSA, as shown in Table 8.

A noise reduction design goal (NRDG) of 7 dB(A) shall be evaluated for all benefited receptors. To be considered reasonable, at least one benefited receptor must achieve the NRDG of 7 dB(A) to indicate effective reduction of traffic noise. Preferences of property owners and tenants would also be considered to determine final reasonableness of any proposed abatement measure. Table 8 below provides the allowable noise abatement base quantities based on level of noise reduction.

With respect to the potential use of earth berms for the potential benefit of predicted traffic noise impacts in the project vicinity, adverse impacts that would be created to property access and/or to streams, wetlands, and other natural features will prevent the feasibility of earth berms. Furthermore, earth berms will not be reasonable due to the cost of right-of-way acquisition in comparison to the expense of solid-mass noise walls.

Table 8. Allowable Noise Abatement Base Quantities

Maximum Allowable Base Quantity	Noise Level Consideration	Noise Wall (1,500 ft^2)	Berm (4,200 yd^3)	Buffer Zone / Noise Insulation ($22,500)
Average dB(A) Increase between Existing and Future Build for All Impacted Receptors	<5 dB(A)	+0 ft^2	+0 yd^3	+$0
	5-10 dB(A)	+500 ft^2	+1,400 yd^3	+$7,500
	>10 dB(A)	+1,000 ft^2	+2,800 yd^3	+$15,000
Average Exposure to Absolute Noise Levels for All Impacted Receptors	5-10 dB(A) Over NAC Activity Category	+500 ft^2	+1,400 yd^3	+$7,500
	>10 dB(A) Over NAC Activity Category	+1,000 ft^2	+2,800 yd^3	+$15,000

Consideration for potentially feasible and reasonable noise abatement was given to all predicted traffic noise impacts. Fourteen (14) noise walls were assessed for the potential benefit of 96 impacted receptors. As documented below, noise abatement was not assessed for the potential benefit of 17 impacted receptors due to feasibility conflicts that abatement would cause due to adverse impacts created by or upon property access, drainage, topography, utilities, safety, and maintenance requirements, or because abatement is not acoustically feasible for isolated impacts. The noise walls were analyzed for the impacted receptors in NSAs 02, 03, 06, 09, 12, 13, 14, 17, 20, 22a, 22b (two walls), 26, and 32. Noise barriers for some impacted receptors located along cross streets and side streets could not be considered due to engineering feasibility issues regarding required gaps for driveway access. Maps of the locations of the evaluated noise walls are provided in Section 16. Detailed tabular results for the optimal configuration of each evaluated noise wall are provided in Appendix D. Table 9 below shows a summary of results for each investigated noise wall. Noise walls that are not recommended for construction are shaded in gray.

Table 9. Build Alternative Summary of Noise Wall Evaluations

Noise Wall	Length (feet)	Avg. Height (feet)	Area ($feet^2$)	Number of Impacted Receptors/ Number of Impacted Receptors Benefited	Number of Benefited Receptors/ Number of Benefits ≥ 7 dB(A) Reduction	Area per Benefited Receptor / Allowable Area per Benefited Receptor ($feet^2$)	Preliminary Recommendation for Construction
NW02	765	30	22,950	2 / 2	2 / 1	11,475 / 1,500	No
NW03	1,380	30	41,400	2 / 1	1 / 0	N/A[1]	No
NW06	1,440	13.5	19,427	23 / 16	17 / 15	1,143 / 1,500	Yes
NW09	300	10.3	3,080	3 / 2	2 / 1	1,540 / 1,500	No
NW12	540	9.5	5,132	4 / 2	2 / 1	2,566 / 1,500	No
NW13	1,155	21.5	24,880	10 / 10	25 / 11	995 / 1,500	Yes
NW14	3,960	18.4	72,960	3 / 3	4 / 4	18,240 / 1,500	No
NW17	1,080	15.0	16,216	11 / 6	7 / 2	2,317 / 1,500	No
NW20	900	12.2	10,969	5 / 5	6 / 1	1,828 / 1,500	No
NW22a	1,080	13.2	14,301	2 / 2	2 / 2	7,150 / 1,500	No
NW22b	420	13.7	5,753	4 / 4	4 / 4	1,438 / 1,500	Yes
NW22b2	1,530	26.4	40,348	3 / 3	15 / 1	2,690 / 1,500	No
NW26	1,680	13.4	22,566	5 / 5	6 / 1	3,761 / 1,500	No
NW32	2,745	17	46,798	19 / 19	40 / 24	1,170 / 1,500	Yes

1. Unable to meet acoustical feasibility criterion of providing benefits to two impacted receptors

Noise Wall 02 (NW02): NW02 was evaluated along westbound I-40 west of SR 1134 (Dimmocks Mill Road) for the potential benefit of up to two impacted receptors along Dimmocks Mill Road. No configuration of NW02 would meet all applicable Policy feasibility and reasonableness criteria.

With a length of 765 feet and an average height of 30 feet for an area of 22,950 square feet, the optimal NW02 configuration would benefit two total receptors including both traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. NW02 would be acoustically feasible and acoustically reasonable; however, at 11,475 square feet per benefit NW02 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-1, and Figure 2-1.

Noise Wall 03 (NW03): NW03 was evaluated along I-40 eastbound east of SR 1134 (Dimmocks Mill Road) for the potential benefit of up to two impacted receptors along Dimmocks Mill Road. No configuration of NW03 would meet all applicable Policy feasibility criteria.

With a length of 1,380 feet and an average height of 30 feet for an area of 41,400 square feet, the optimal NW03 configuration would benefit only one receptor, including one of the two predicted traffic noise impacts. Because the optimal NW03 configuration would not meet the Policy acoustical feasibility criterion, the Policy acoustical reasonableness and cost reasonableness criteria were not evaluated. Refer to Table 9, Table D-2, and Figures 2-1 and 2-2.

Noise Wall 06 (NW06): NW06 was evaluated along I-40 westbound between SR 1006 (Orange Grove Road) and I-85 for the potential benefit of up to 23 impacted receptors within the Timbers Manufactured Homes community and along Orange Grove Road. Receptors 06-001 through 06-004 were found to be primarily impacted by I-85 traffic and not from the I-3306A project; therefore, they were not included in the NW06 assessment. NW06 will meet all Policy feasibility and reasonableness criteria.

The optimal NW06 configuration was evaluated based on a maximum potentially feasible length with a southern terminus constrained by overhead utilities northwest of Orange Grove Road and a northern terminus constrained by stopping sight distance on the I-40 westbound ramp to I-85 northbound. The seven impacted receptors 06-022 through 06-026, 06-050 and 06-091 are outside the horizontal limits of the maximum potentially feasible NW06 length; therefore, these impacted receptors cannot be benefited. Impacted receptor 06-091 could not be benefited since the noise wall was required to stop short on the south end due to an overhead utility right-of-way (ROW) conflict. The utility owner will not allow encroachment into the utility easement. Extending NW06 further south would require relocating the overhead utility; therefore, extending NW06 further south end is not feasible. Extending NW06 further north was also investigated for the potential benefit of impacted receptors 06-022 through 06-026 and 06-050. For the 50 mph design speed, the minimum required stopping sight distance for the I-40 westbound ramp to I-85 northbound is 425 feet. Extending NW06 north to potentially benefit these impacted receptors would limit the stopping sight distance to 363 feet and create an unsafe driving condition; therefore, extending NW06 further north is not feasible.

With a length of 1,440 feet and average height of 13.5 feet for a total area of 19,427 square feet, the optimal NW06 configuration will benefit 17 total receptors, including 16 of 23 predicted traffic noise impacts, and 15 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction, meeting the Policy acoustical feasibility and reasonableness criteria. At 1,143 square feet per benefit, NW06 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Table 9, Table D-3, Figures 2-2 and 2-2A-1, and Appendix E.

Noise Wall 09 (NW09): Two configurations of NW09 were evaluated adjacent to I-40 westbound east of SR 1006 (Orange Grove Road) for the potential benefit of up to three impacted receptors along Oakdale Drive and Blair Drive. No configuration of NW09 would meet all applicable Policy feasibility and reasonableness criteria. The results of the two NW09 evaluations are as follows:

A NW09 configuration 1,020 feet long with an average height of 10.7 feet for a minimum area of 10,921 square feet would benefit three receptors, including all three impacted receptors, and three receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. This NW09 configuration would be acoustically feasible and acoustically reasonable; however, at 3,640 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

With a length of 300 feet and an average height of 10.4 feet for an area of 3,080 square feet, the optimal NW09 configuration with the lowest attainable area per benefit would benefit two total receptors including the traffic noise impacts 09-002 and 09-003, and one receptor would receive at least a 7 dB(A) noise level reduction. The optimal NW09 configuration would be acoustically feasible and acoustically reasonable; however, at 1,540 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. With respect to the degree to which NW09 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion, the optimal NW09 configuration was assessed to a resolution of 1’ height and 15’ length segments. The further reduction of 15 square feet from the optimal NW09 configuration area would result in losing at least one benefited impact, the one 7 dB(A) noise level reduction benefit, or both. Refer to Table 9, Table D-4 and Figure 2-3.

Noise Wall 12 (NW12): Two configurations of NW12 were evaluated adjacent to the onramp from SR 1009 (Old NC 86) to I-40 eastbound for the potential benefit of up to four impacted receptors along Old NC 86. No configuration of NW12 would meet all applicable Policy feasibility and reasonableness criteria. The results of the two NW12 evaluations are as follows:

A NW12 configuration 1,440 feet long with an average height of 30 feet for a maximum area of 43,200 square feet would only benefit two impacted receptors 12-001 and 12-003, and both receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. Benefiting the remaining two impacted receptors 12-002 and 12-004 will not be feasible due to direct driveway access to SR 1009 (Old NC 86). This NW12 configuration would be acoustically feasible and acoustically reasonable; however, at 21,600 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

With a length of 540 feet and an average height of 9.5 feet for an area of 5,132 square feet, the optimal NW12 configuration with the lowest attainable area per benefit would benefit two total receptors including the traffic noise impacts 12-001 and 12-003, and one receptor would receive at least a 7 dB(A) noise level reduction. NW12 would be acoustically feasible and acoustically reasonable; however, at 2,566 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-5, and Figures 2-5 and 2-6.

Noise Wall 13 (NW13): NW13 was evaluated along I-40 westbound east of SR 1009 (Old NC 86) for the potential benefit of up to 10 impacted receptors along Alice Loop. NW13 will meet all Policy feasibility and reasonableness criteria.

With a length of 1,155 feet and an average height of 21.5 feet for an area of 24,880 square feet, the optimal NW13 configuration will benefit 25 total receptors, including 10 of 10 predicted traffic noise impacts, and 11 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 995 square feet per benefit, NW13 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Table 9, Table D-6, Figures 2-5 and 2-6, and Appendix E.

Noise Wall 14 (NW14): NW14 was evaluated along I-40 westbound north of SR 1723 (New Hope Church Road) for the potential benefit of three impacted receptors, including two impacted residential receptors along East Scarlett Mountain Road and the Blackwood Farm Park trail. No configuration of NW14 would meet all applicable Policy feasibility and reasonableness criteria.

With a length of 3,960 feet and an average height of 18.4 feet for an area of 72,960 square feet, the optimal NW14 configuration would benefit four total receptors including three of three predicted traffic noise impacts, and four receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW14 configuration would be acoustically feasible and acoustically reasonable; however, at 18,240 square feet per benefit NW14 would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-7, and Figures 2-6 and 2-7.

Noise Wall 17 (NW17): Three configurations of NW17 were evaluated along I-40 westbound south of SR 1723 (New Hope Church Road) for the potential benefit of up to 11 impacted receptors along SR 1203 (Hideaway Drive). No configuration of NW17 would meet all applicable Policy feasibility and reasonableness criteria. The results of the three NW17 evaluations are as follows:

A NW17 configuration 4,320 feet long with an average height of 17.3 feet for an area of 74,719 square feet would benefit 17 receptors including 11 of 11 predicted traffic noise impacts, and six receptors would receive at least a 7 dB(A) noise level reduction. This NW17 configuration would be acoustically feasible and acoustically reasonable; however, at 4,395 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

A NW17 configuration 1,320 feet long with an average height of 17.3 feet for an area of 22,850 square feet would benefit five receptors including impacted receptors 17-024 through 17-026 and 17-029, and one receptor would receive at least a 7 dB(A) noise level reduction. This NW17 configuration would be acoustically feasible and acoustically reasonable; however, at 4,570 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

With a length of 1,080 feet and an average height of 15.0 feet for an area of 16,216 square feet, the optimal NW17 configuration with the lowest attainable area per benefit would benefit seven total receptors including the impacted receptors 17-006 through 17-011, and two receptors would receive at least a 7 dB(A) noise level reduction. NW17 would be acoustically feasible and acoustically reasonable; however, at 2,317 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-8, and Figures 2-8, 2-9, and 2-10.

Noise Wall 20 (NW20): Two configurations of NW20 were evaluated along I-40 westbound over SR 1725 (Millhouse Road) for the potential benefit of up to five impacted receptors in Homestead Mobile Home Park and along Millhouse Road. No configuration of NW20 would meet all applicable Policy feasibility and reasonableness criteria. The results of the two NW20 evaluations are as follows:

A NW20 configuration 1,980 feet long with an average height of 30 feet for a maximum area of 59,400 square feet would benefit six receptors including all five impacted receptors, and six receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. This configuration of NW20 would be acoustically feasible and acoustically reasonable; however, at 9,900 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

With a length of 900 feet and an average height of 12.2 feet for an area of 10,969 square feet, the optimal NW20 configuration would benefit six receptors including all five impacted receptors, and one receptor would receive at least a 7 dB(A) noise level reduction. The optimal configuration of NW20 would be acoustically feasible and acoustically reasonable; however, at 1,828 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-9, and Figures 2-10 and 2-11.

Noise Wall 22a (NW22a): NW22a was evaluated along I-40 westbound north of NC 86 (Martin Luther King Jr. Boulevard) for the potential benefit of up to two impacted receptors along Clyde Road. NW22a would not meet all applicable Policy feasibility and reasonableness criteria.

With a length of 1,080 feet and average height of 13.2 feet for an area of 14,301 square feet, the optimal NW22a configuration would benefit two receptors including two of two predicted traffic noise impacts, and two receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW22a configuration would be acoustically feasible and acoustically reasonable; however, at 7,150 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-10, and Figure 2-11.

Noise Wall 22b (NW22b): NW22b was evaluated along NC 86 southbound north of the access to Hilltop Mobile Home Park for the potential benefit of the four impacts within Hilltop Mobile Home Park for which NC 86 will be the dominant traffic noise source. NW22b will meet all Policy feasibility and reasonableness criteria.

With a length of 420 feet and an average height of 13.7 feet for an area of 5,753 square feet, the optimal NW22b configuration will benefit four total receptors, including all four predicted traffic noise impacts, and four receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 1,438 square feet per benefit, NW22b will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Table 9, Table D-11, Figures 2-11 and 2-12, and Appendix E.

Noise Wall 22b2 (NW22b2): NW22b2 was evaluated along the onramp from NC 86 to I-40 westbound for the potential benefit of the three impacts within Hilltop Mobile Home Park for which I-40 will be the dominant traffic noise source. NW22b2 would not meet all applicable Policy feasibility and reasonableness criteria.

A continuous noise wall in this location would conflict with the Duke Energy overhead transmission line, and any modification of the transmission line to facilitate noise wall installation would be in conflict with the RFP provision that “At the I-40 / NC 86 (Martin Luther King, Jr. Boulevard) interchange, the Design-Build Team shall not impact the existing Duke Energy Transmission Tower in Quadrant B." Therefore, a gap in the wall must be present at the transmission line corridor, which negatively affects the acoustical performance of the wall.

With a length of 1,530 feet and average height of 26.4 feet for an area of 40,348 square feet, the optimal NW22b2 configuration would benefit 15 receptors including all three predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW22b2 configuration would be acoustically feasible and acoustically reasonable; however, at 2,690 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-12, and Figures 2-11 and 2-12.

Noise Wall 26 (NW26): Two configurations of NW26 were evaluated along I-40 westbound east of NC 86 (Martin Luther King Jr. Boulevard) for the potential benefit of up to five impacted receptors along SR 1730 (Whitfield Road) and SR 2235 (Foxridge Road). No configuration of NW26 would meet all applicable Policy feasibility and reasonableness criteria. The results of the two NW26 evaluations are as follows:

A NW26 configuration 3,240 feet long with an average height of 30 feet for a maximum area of 97,200 square feet would benefit six receptors including all five impacted receptors, and six receptors would receive at least a 7 decibel (7 dB(A)) noise level reduction. This configuration of NW26 would be acoustically feasible and acoustically reasonable; however, at 16,200 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion.

With a length of 1,680 feet and an average height of 13.4 feet for an area of 22,566 feet, the optimal NW26 configuration would benefit six receptors including all five predicted traffic noise impacts, and one receptor would receive at least a 7 decibel (7 dB(A)) noise level reduction. The optimal NW26 configuration would be acoustically feasible and acoustically reasonable; however, at 3,761 square feet per benefit would exceed the allowable 1,500 square feet per benefit Policy cost reasonableness criterion. Refer to Table 9, Table D-13, and Figures 2-14 and 2-15.

Noise Wall 32 (NW32): NW32 was evaluated along I-40 eastbound between SR 1732 (Sunrise Road) and SR 1734 (Erwin Road) for the potential benefit of 19 impacted receptors along Sweeten Creek Road and Perry Creek Drive. NW32 is a noise abatement system that incorporates a noise wall in two segments (NW32A and NW32B), along with the existing high ground between them, for optimal and cost-effective traffic noise mitigation. NW32 will meet all Policy feasibility and reasonableness criteria.

With a length of 2,745 feet and an average height of 17.0 feet for an area of 46,798 square feet, the optimal NW32 configuration will benefit 40 total receptors, including all 19 predicted traffic noise impacts, and 24 receptors will receive at least a 7 decibel (7 dB(A)) noise level reduction. At 1,170 square feet per benefit, NW32 will meet the applicable area per benefit Policy cost reasonableness criterion of 1,500 square feet. Refer to Table 9, Table D-14, Figures 2-16 and 2-17, and Appendix E.

11.2 Highway Alignment Selection

Highway alignment selection involves the horizontal or vertical orientation of the proposed improvements in such a way as to minimize impacts and costs. The selection of alternative alignments for noise abatement purposes must consider the balance between noise impacts and other engineering and environmental parameters. For noise abatement, horizontal alignment selection is primarily a matter of constructing the proposed roadway at a sufficient distance from noise-sensitive areas. Appreciable reductions in traffic noise transmissions to sensitive receptors can also be achieved by adjusting the vertical highway alignment and/or section geometry. For example, lowering a roadway below existing grade creates a cut section (in-cut) which could act similarly to an earth berm, depending upon the relative location of noise-sensitive receptors. The selected alignment has been located to minimize impacts to residences, businesses, historic properties, and recreational areas.

11.3 Traffic System Management Measures

Traffic management measures such as prohibition of truck traffic, lowering speed limits, limiting of traffic volumes, and/or limiting times of operation were considered as possible traffic noise abatement measures. The purpose of the proposed project includes improving mobility, increasing roadway connectivity, and reducing congestion. Prohibition of truck traffic, speed limit reduction, or screening total traffic volumes would diminish the functional capacity of the highway facility and are not considered practicable.

11.4 Buffer Zones

Buffer zones are typically not practical nor cost effective for noise abatement due to the substantial amount of right of way required and would not be a feasible noise abatement measure for this project due to the proximity of existing development to the right of way.

11.5 Statement of Likelihood

Policy requires the identification as to whether it is “likely” or “unlikely” that noise abatement measures will be installed for each noise-sensitive area identified. “Likely” does not mean a firm commitment. The final decision on the installation of the abatement measures shall be made upon completion of the public involvement process.

With a total length of 5,760 feet and a total area of 96,858 square feet, the following four noise abatement measures for the corresponding predicted traffic noise impacts in the I-3306A project vicinity are recommended for construction, pending completion of the public involvement process:

- Noise Wall 6
- Noise Wall 13
- Noise Wall 22b
- Noise Wall 32.

12 Traffic Noise Levels for Undeveloped Lands Where No Building Permits Have Been Issued

According to Manual and FHWA regulation, noise contour lines shall not be used for determining highway traffic noise impacts. However, the 71 dB(A) and 66 dB(A) noise level contour information should assist local authorities in exercising land use control over the remaining undeveloped lands, so as to avoid development of lands for use by incompatible activities adjacent to the roadways within local jurisdiction.

Table 10 presents the approximate distance from the outer edge of the nearest travel lane reached by noise level contours correlating to the traffic noise impact thresholds for land uses for undeveloped areas. A 71 dB(A) hourly-equivalent noise level correlates to the NCDOT impact threshold for a NAC E land use. An hourly-equivalent noise level of 66 dB(A) correlates to the NCDOT impact threshold for NAC B and C land uses. The distances at which 71 dB(A) and 66 dB(A) hourly-equivalent traffic noise levels are predicted to occur vary depending on traffic conditions and elevations throughout the project area and were derived via TNM.

Table 10. Traffic Noise Contours for Land Use Planning

NSA	Location	Build Alternative Contour Distance from Edge of Nearest Travel Lane	
		66 dB(A)	71 dB(A)
07	I-40 eastbound, between SR 1221 (New Grady Brown School Road) and SR 1009 (Old NC 86)	347 ft	127 ft
15	I-40 eastbound, between SR 1009 (Old NC 86) and SR 1723 (New Hope Church Road).	437 ft	277 ft
19	I-40 eastbound, between SR 1723 (New Hope Church Road) and SR 1725 (Millhouse Road)	317 ft	187 ft
33	I-40 westbound, between SR 1732 (Sunrise Road) and SR 1734 (Erwin Road)	317 ft	147 ft

12.1 Proper Use of Land Controls

One of the most effective means to prevent future traffic noise impacts is the proper use of land controls. According to Policy, NCDOT strongly advocates the planning, design and construction of noise-compatible development and encourage its practice among planners, building officials, developers and others.

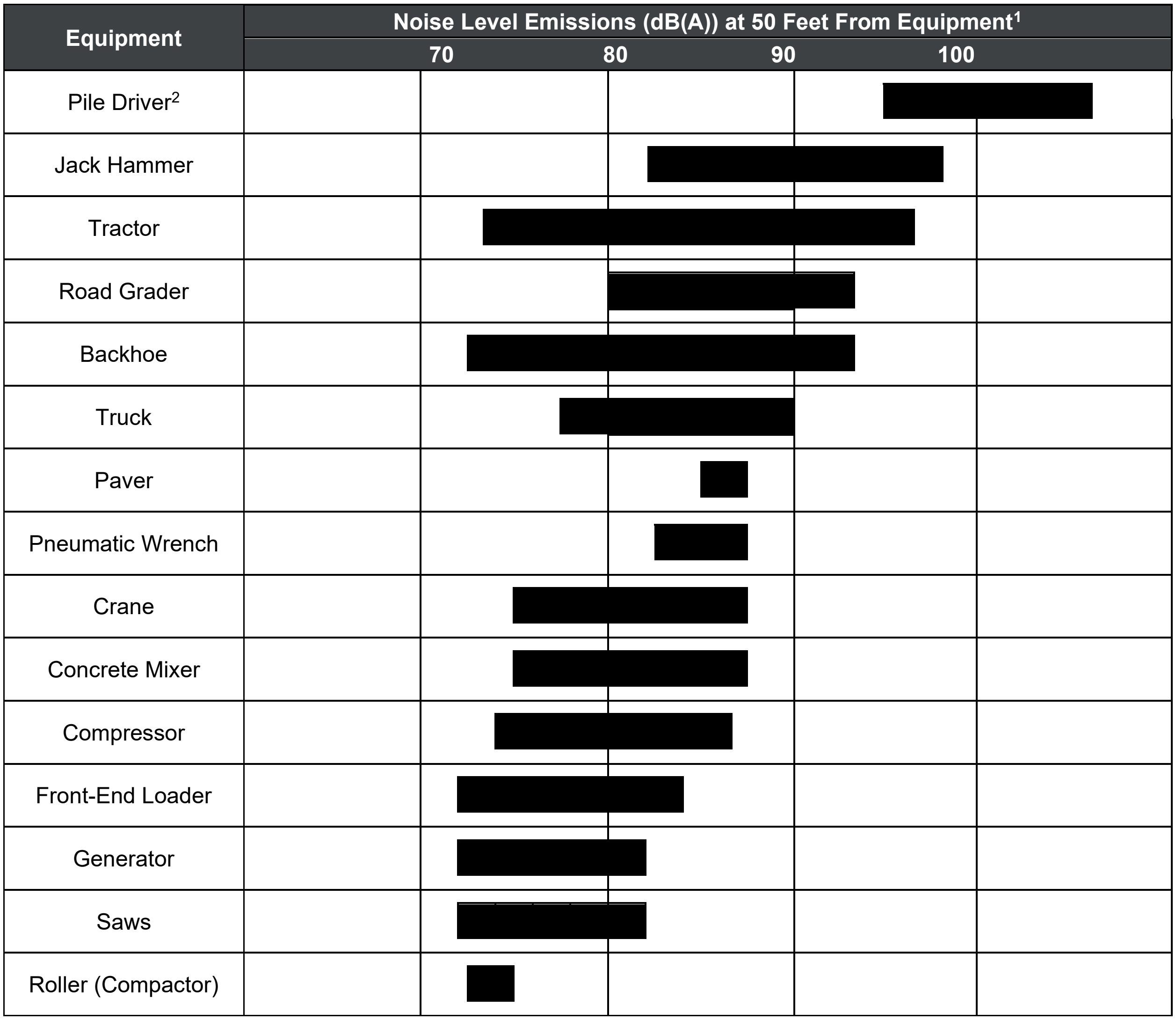
13 Construction Noise

The predominant construction activities associated with this project are expected to be earth removal, tree clearing, hauling, grading, bridge construction, and paving. General construction noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be expected particularly from paving operations, pile driving at bridges, and earth moving equipment during grading operations. Table 11 summarizes noise level ranges for a typical highway construction equipment.

During evening and nighttime hours, steady-state construction noise emissions such as from paving operations will be audible and may cause impacts to activities such as sleep. Sporadic evening and nighttime construction equipment noise emissions such as from backup alarms, lift gate closures ("slamming" of dump truck gates), etc., will be perceived as distinctly louder than the steady-state acoustic environment, and could cause impacts to the general peace and usage of noise-sensitive areas – particularly residences.

There are 783 noise-sensitive receptors representing 645 non-relocated residences and 25 non-residential ERs in the project noise study area that may be exposed to construction noise. Extremely loud construction noise activities such as usage of pile-drivers and impact-hammers (jackhammer, hoe-ram) will provide sporadic, temporary, and acute construction noise impacts in the near vicinity of those activities (refer to Table 11). Residences in proximity to the I-40 are most likely to be temporarily impacted by loud construction activities, including the demolition of the existing norther on/off ramps at NC86 and the construction of the proposed new I-40 westbound on/off ramp from NC86. Construction activities along I-40 will likely impact residences in close proximity to I-40, especially residences on Dimmocks Mill Road in NSA 01 and NSA 02, residences along Binford St and Orange Grove Road in NSA 06, residences close to I-40 on Sunshine Drive and Blair Drive in NSA 09, residences along Alice Loop in NSA 13, residences on Meadow Greer Road, Stoneywood Road, and Hideaway Drive in NSA 17, residences on Avery Way in NSA 20, residences on Clyde Road in NSA 22a, residences along NC 86 in NSA 22b, Chapel Hill North Apartments in NSA 25, residences along Foxridge Road in NSA 26, residences on Sedgewood Road and North Hill Drive in NSA 28, residences in Carol Woods Community in NSA 29, residences on Northridge Lane in NSA 30, residences along Sunrise Road in NSA 31, and residences along Sweeten Creek Road in NSA 32. It is the recommendation of this DNR that construction activities that will produce extremely loud noises be scheduled during times of the day when such noises will create as minimal disturbance as possible. Additionally, extra caution should be taken to minimize loud construction noises in the vicinity of Cedar Ridge High School in NSA 05 during the school hours/days.

Table 11. Construction Equipment Typical Noise Level Emissions



Source: Adapted from Noise Construction Equipment and Operations, Building Equipment, and Home Appliances. U.S. Environmental Protection Agency. Washington D.C. 1971.

[1] Cited noise level ranges are typical for the respective equipment. For "point sources" such as the construction equipment listed above, noise levels generally dissipate at a rate of -6 dB(A) for every doubling of distance. For example, if the noise level from a pile driver at a distance of 50 feet = 100 decibels (dB(A)), then at 400 feet, it might be 82 decibels (dB(A)) or less.

[2] Due to project safety and potential construction noise concerns, pile-driving activities are typically limited to daytime hours.

Construction activities that will produce extremely loud noises should be scheduled during times of the day when such noises will create as minimal disturbance as possible, typically weekday daytime hours.

Generally, low-cost and easily implemented construction noise control measures should be incorporated into the project plans and specifications to the extent possible. These measures include, but are not limited to, work-hour limits, equipment exhaust muffler requirements, haul-road locations, elimination of "tail gate banging", ambient-sensitive backup alarms, construction noise complaint mechanisms, and consistent and transparent community communication.

While discrete construction noise level prediction is difficult for a particular receptor or group of receptors, it can be assessed in a general capacity with respect to distance from known or likely project activities. For this project, earth removal, grading, hauling, paving, and pile driving are anticipated to occur near noise-sensitive areas along the entire length of the project. Although construction noise impact abatement should not place an undue burden upon the financial cost of the project or the project construction schedule, pursuant to the requirements of Title 23 CFR 772.19, it is the recommendation of this DNR that:

- Earth removal, tree clearing, grading, hauling, paving, and pile driving should be limited to weekday daytime hours.
- If meeting the project schedule requires that earth removal, tree clearing, grading, hauling and/or paving must occur during evening, nighttime and/or weekend hours in the vicinity of residential neighborhoods, daycare centers, places of worship, and schools, the Contractor shall notify NCDOT as soon as possible. In such instance(s), all reasonable attempts shall be made to notify and to make appropriate arrangements for the abatement of the predicted construction noise impacts upon the affected property owners and/or residents.
- Construction noise activities should be kept to a minimum when practicable in the vicinity of residential areas, which are found throughout the project study area. Nearby construction noise should also be kept to a minimum where practicable around Cedar Ridge High School, UNC Hospitals Hillsborough Campus, and Emerson Waldorf School.
- If construction noise activities must occur during context-sensitive hours in the vicinity of noise-sensitive areas, discrete construction noise abatement measures including, but not limited to portable noise walls and/or other equipment-quieting devices shall be considered.
- Some construction activities will create extreme noise impacts for nearby noise sensitive land uses. For example, pile-driving activities can create noise impacts for distances of up to 0.25 mile. It is the recommendation of this DNR that considerations be made for any nearby residences for all evening and/or nighttime periods (7:00 p.m. – 7:00 a.m.), and for all weekend hours throughout which extremely loud construction activities might occur.

For additional information on construction noise, please refer to the FHWA Construction Noise Handbook (FHWA-HEP-06-015) and the Roadway Construction Noise Model (RCNM), available online at https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/ and https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm2/.

14 Conclusion

Traffic noise and temporary construction noise can be a consequence of transportation projects, especially in areas in close proximity to high-volume and high-speed existing steady-state traffic noise sources. This analysis was conducted to evaluate the potential noise impacts associated with the I-40 Widening from I-85 in Orange County to the Durham County Line (STIP I-3306A). This DNR utilized computer models created with the FHWA TNM v.2.5 to predict existing and future noise levels in areas where traffic noise is dominant and define impacted receptors along the proposed new highway project. A total of 784 discrete receptor locations were modeled. One receptor was modeled to represent each of the 646 residences and 138 receptor locations were modeled to represent 25 non-residential Equivalent Receptors (ERs). The project final design will require acquisition of one residence represented by one modeled receptor for right-of-way.

Design Year 2045 build condition traffic noise is predicted to impact 109 residences and four non-residential ERs represented by 24 discrete modeled receptor locations for a total of 113 impacts. Noise abatement was considered for all predicted traffic noise impacts. Fourteen noise walls were evaluated under the Build Alternative for their ability to feasibly and reasonably reduce noise levels at impacted receptors. Of the fourteen walls that were evaluated, four walls (Noise Walls 6, 13, 22b, and 32) meet the NCDOT feasibility and reasonableness criteria and are recommended for construction, pending completion of the public involvement process. The other ten evaluated walls did not meet the NCDOT feasibility and reasonableness criteria and will not be constructed.

Construction noise impacts may occur due to the close proximity of noise-sensitive receptors to project construction activities. Construction noise control measures will be incorporated into the project plans and specifications.

15 References

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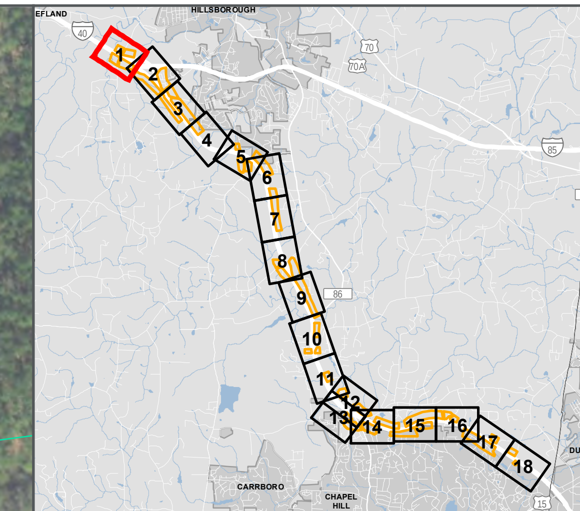
16 Detailed Study Area Maps



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

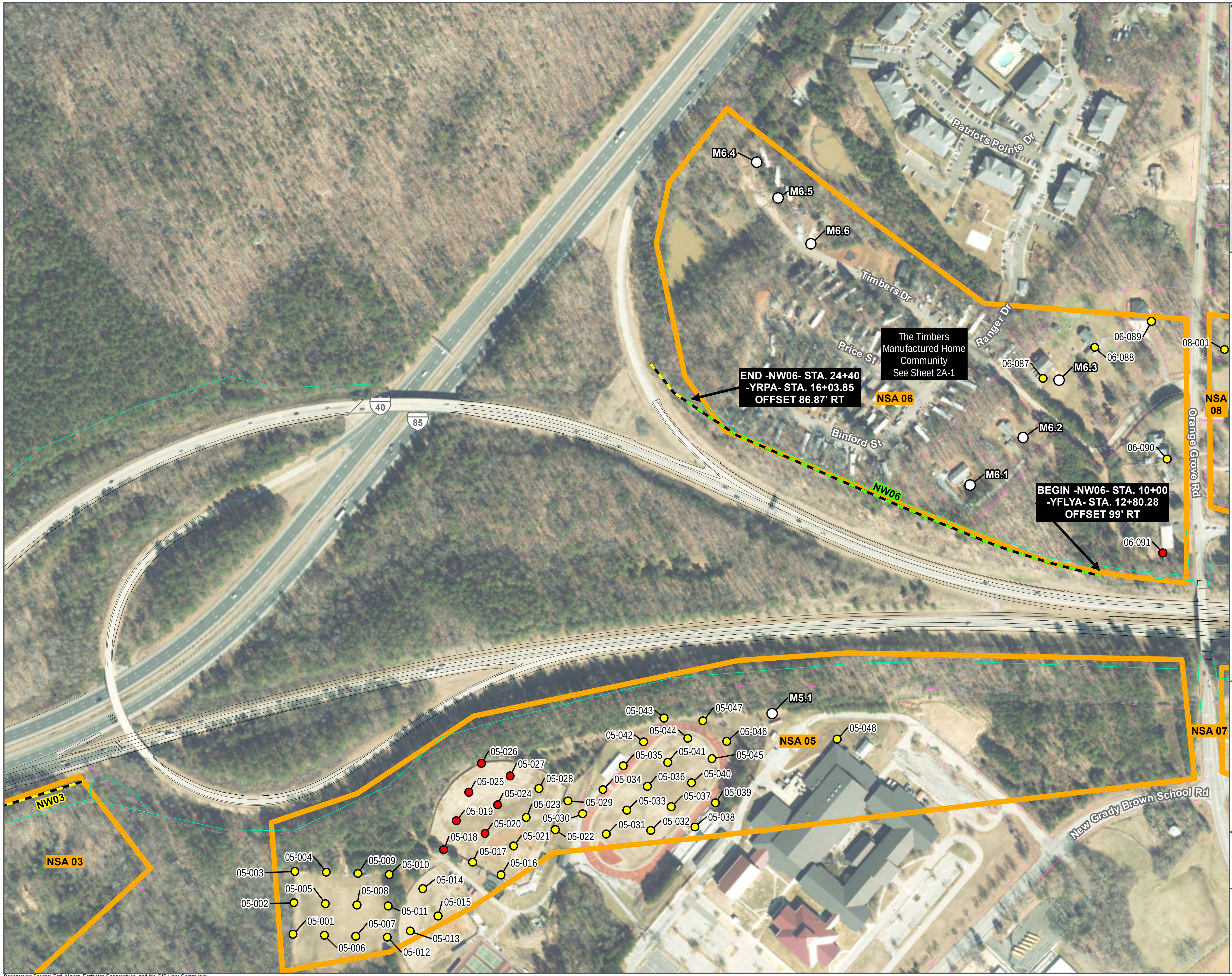
JUNE 2023

0 300
FEET

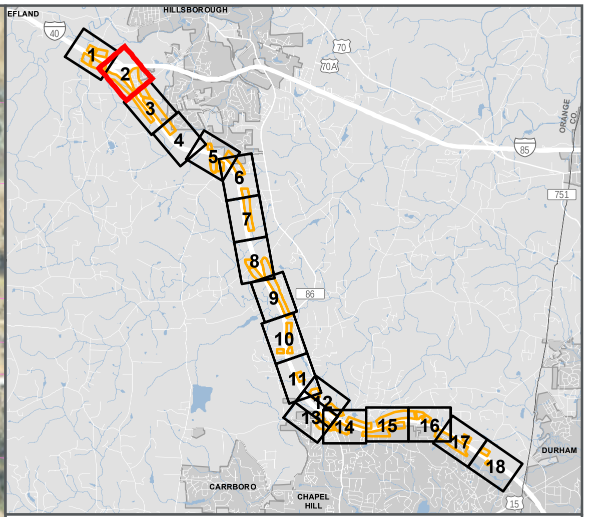
North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-1

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
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- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

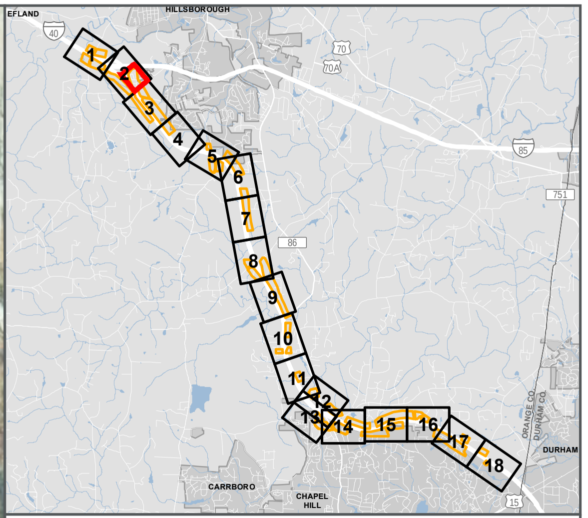
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-2

Background Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

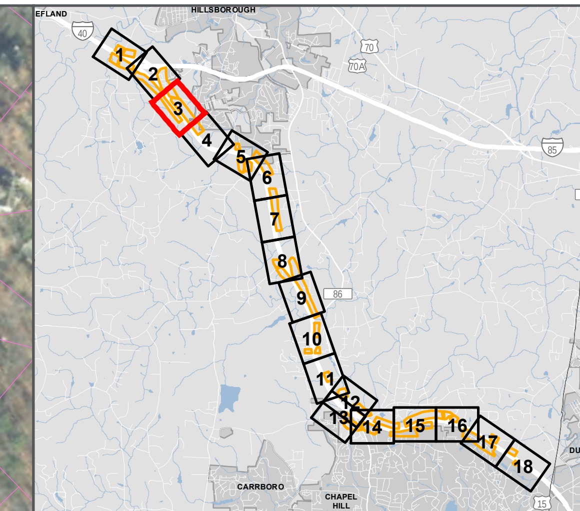
(The Timbers Manufactured Homes)

JUNE 2023

0 150
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-2A-1



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

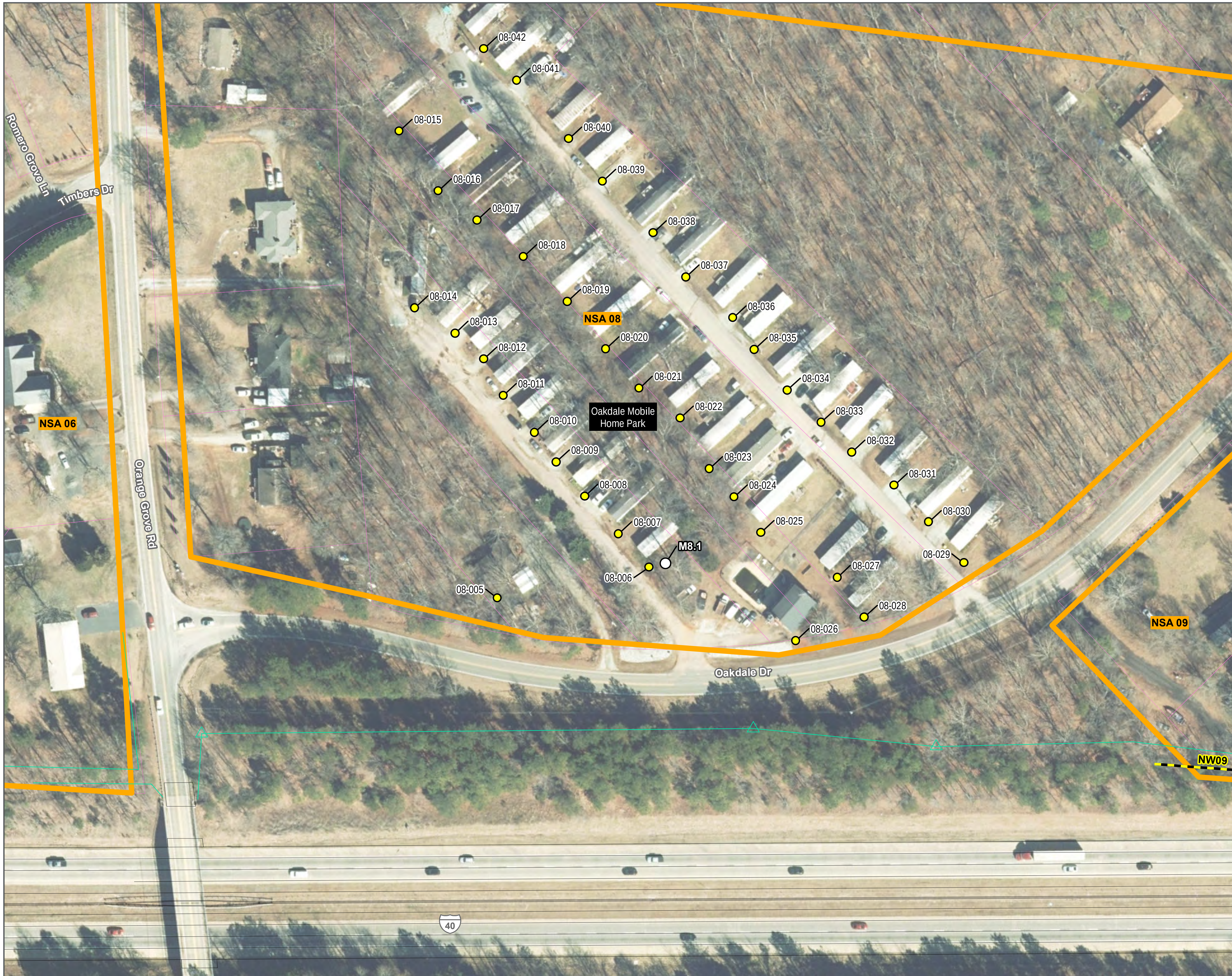
JUNE 2023

0 300
FEET

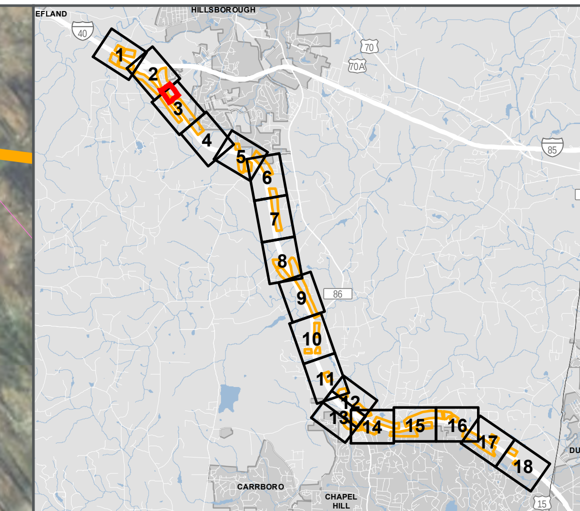
North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-3

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Wall
- Noise Wall Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

(Oakdale Mobile Home Park)

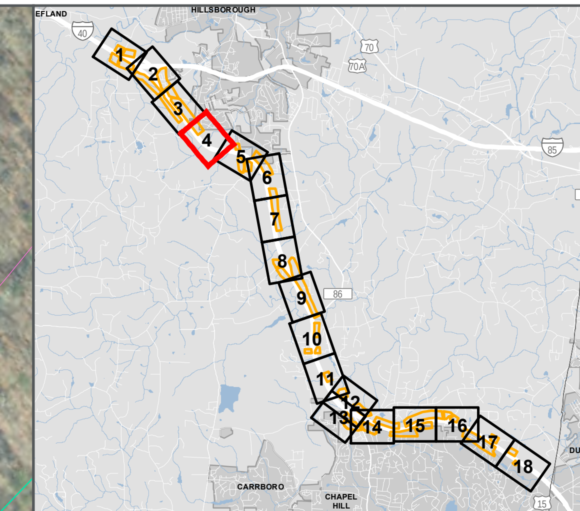
JUNE 2023

0 100
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-3A-1

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

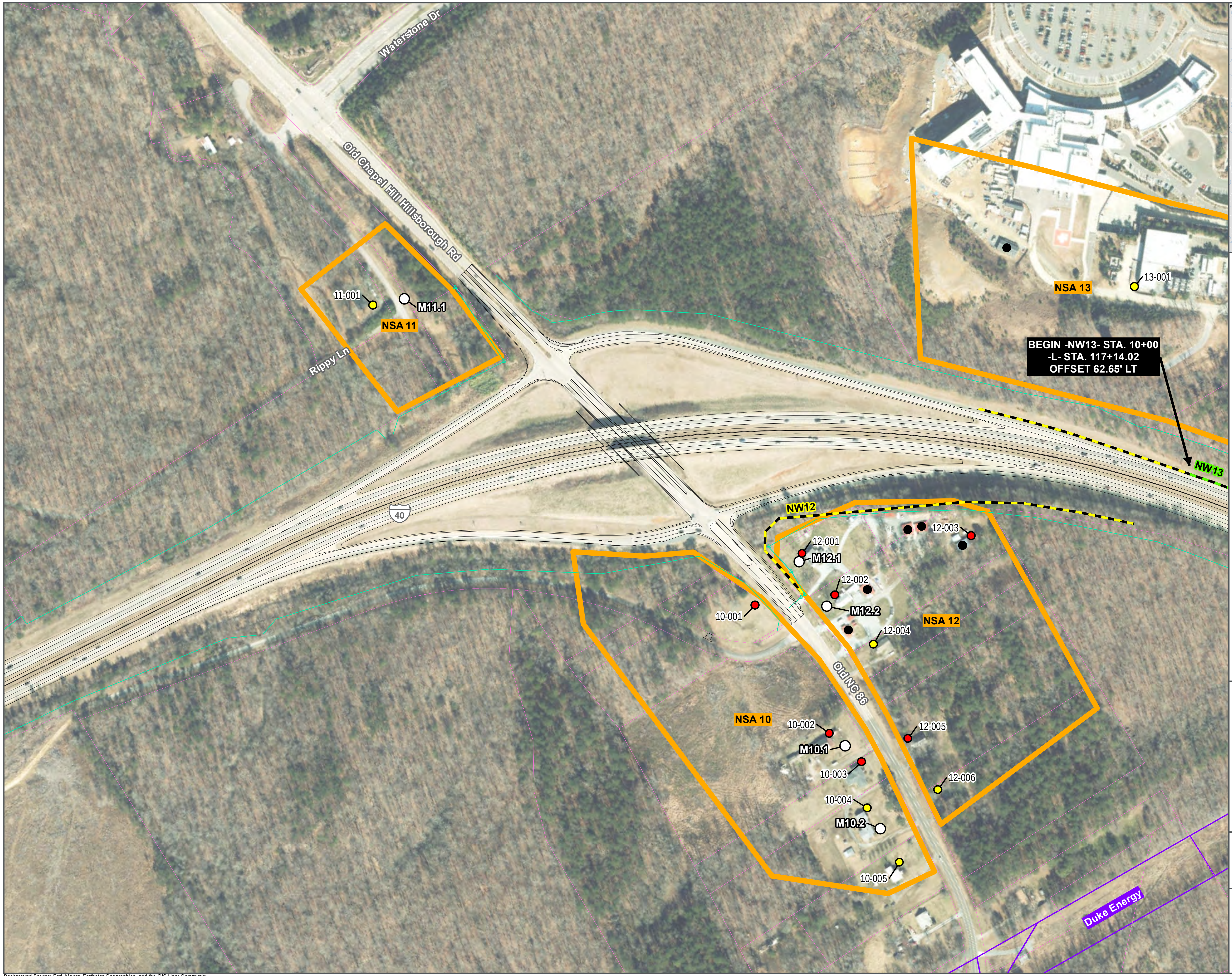
DETAILED STUDY AREA MAP

JUNE 2023

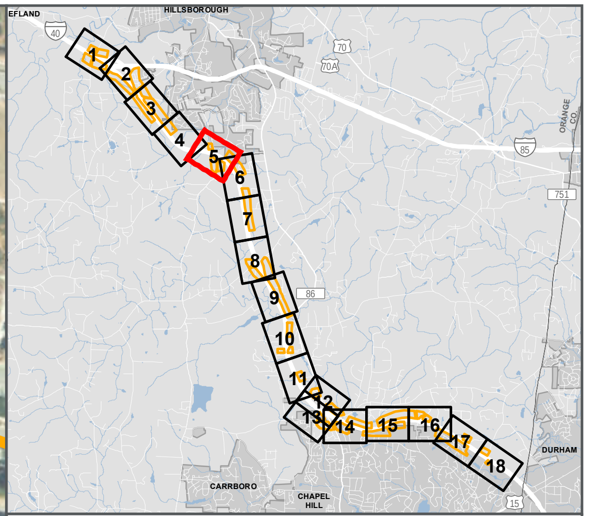
0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-4



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
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- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

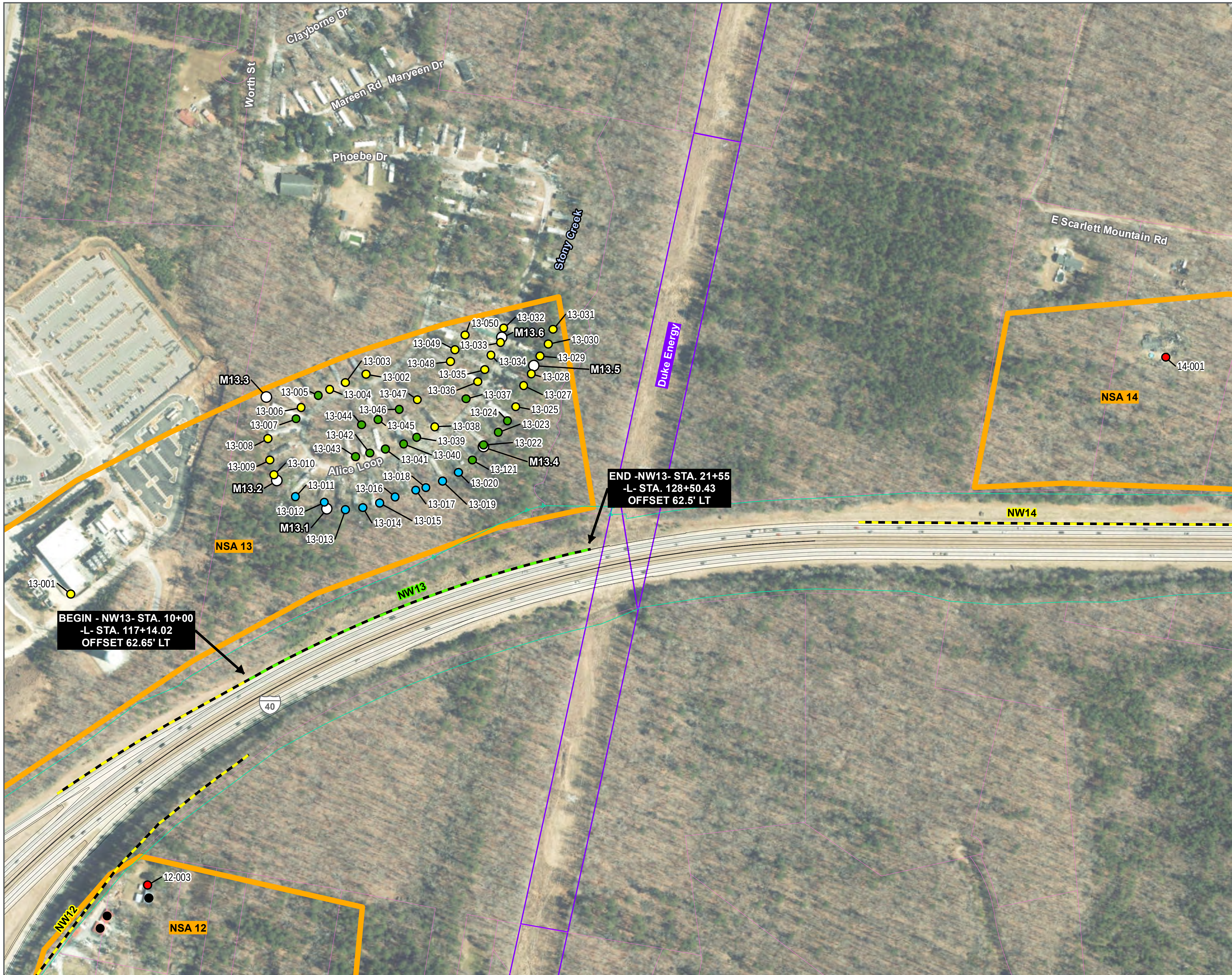
DETAILED STUDY AREA MAP

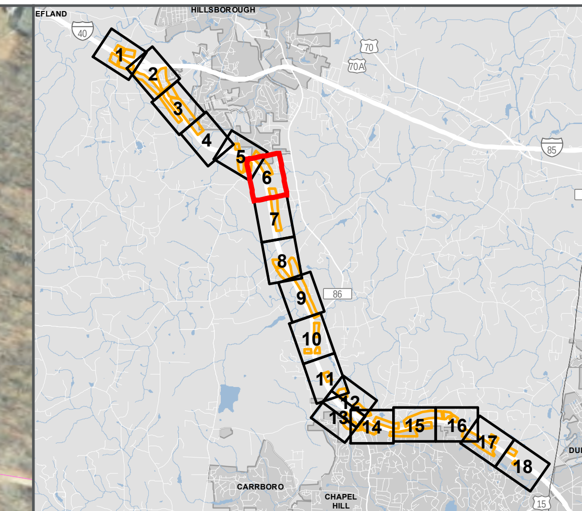
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-5





Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

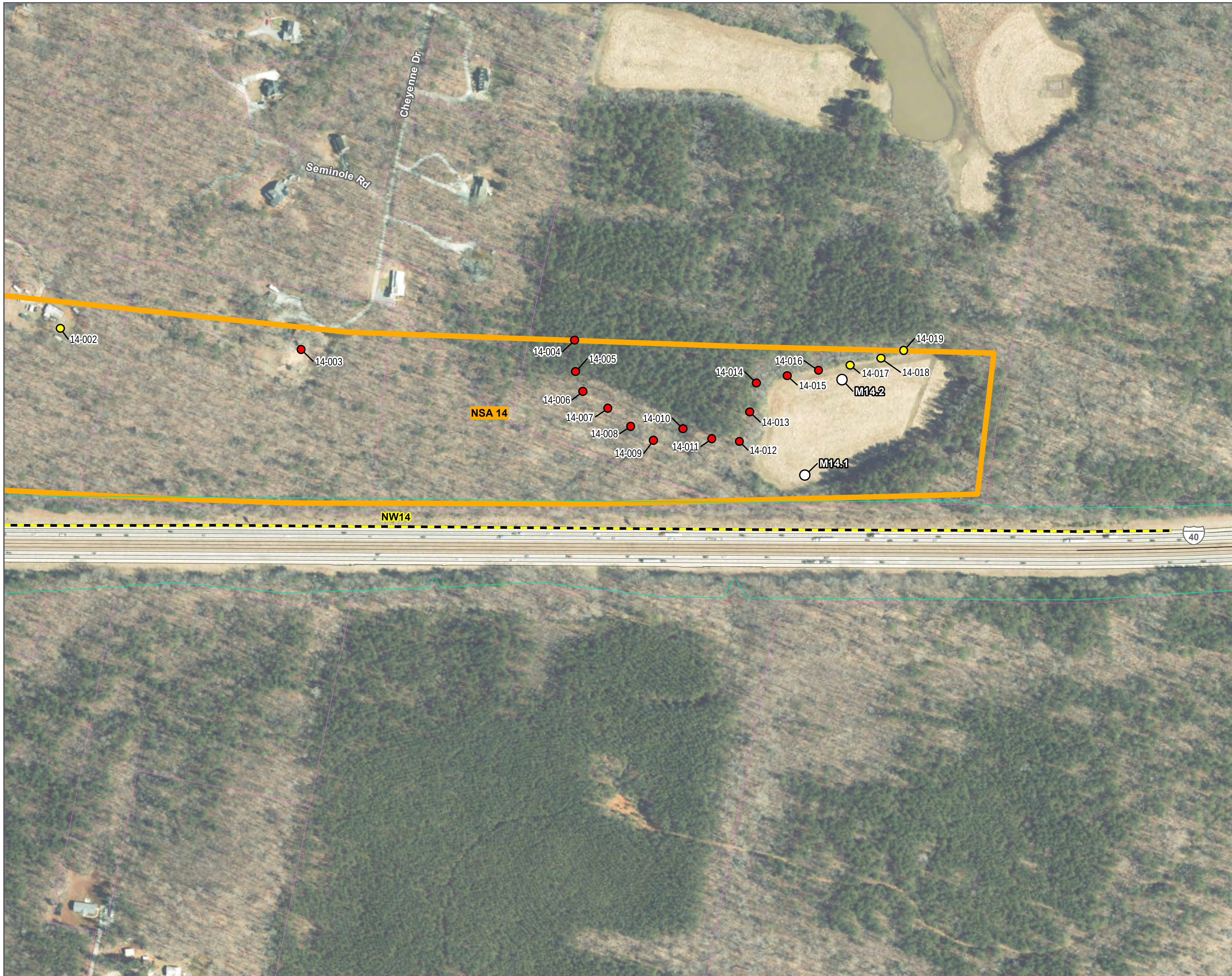
DETAILED STUDY AREA MAP

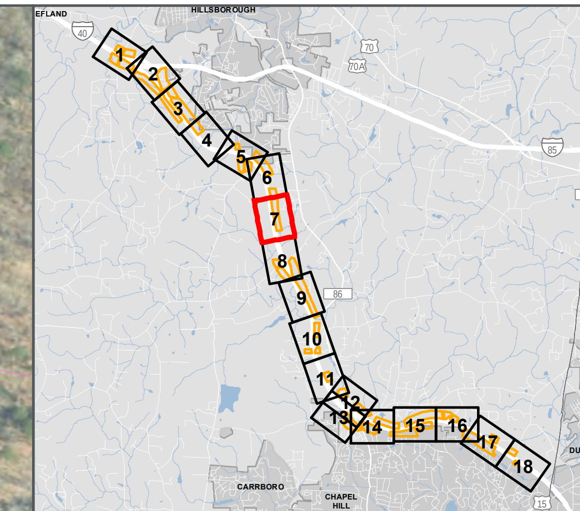
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-6





Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO
US 15/US 501

DETAILED STUDY AREA
MAP

JUNE 2023

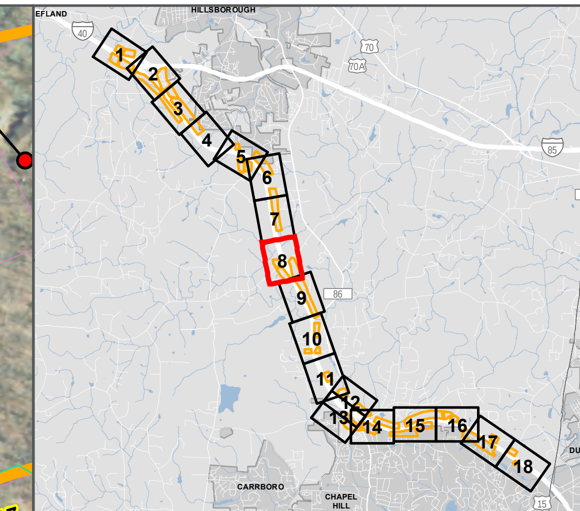
0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-7

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

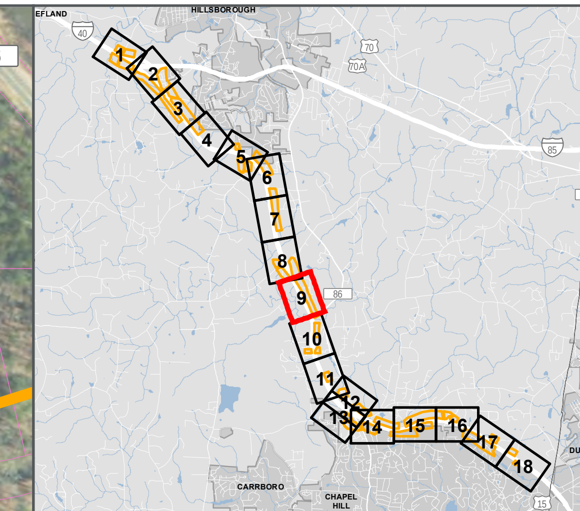
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-8

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

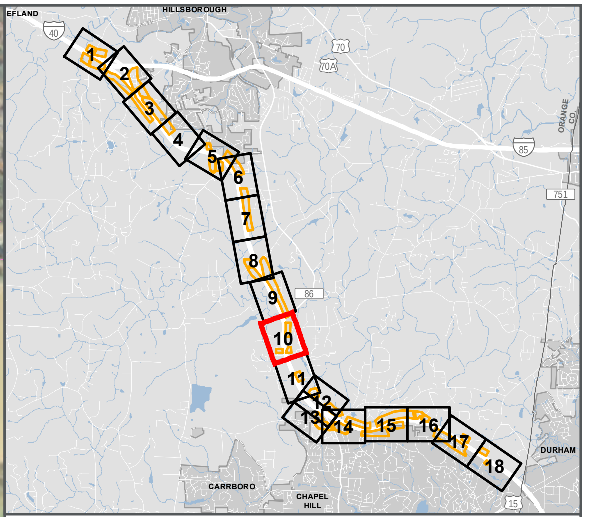
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-9

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO
US 15/US 501

DETAILED STUDY AREA
MAP

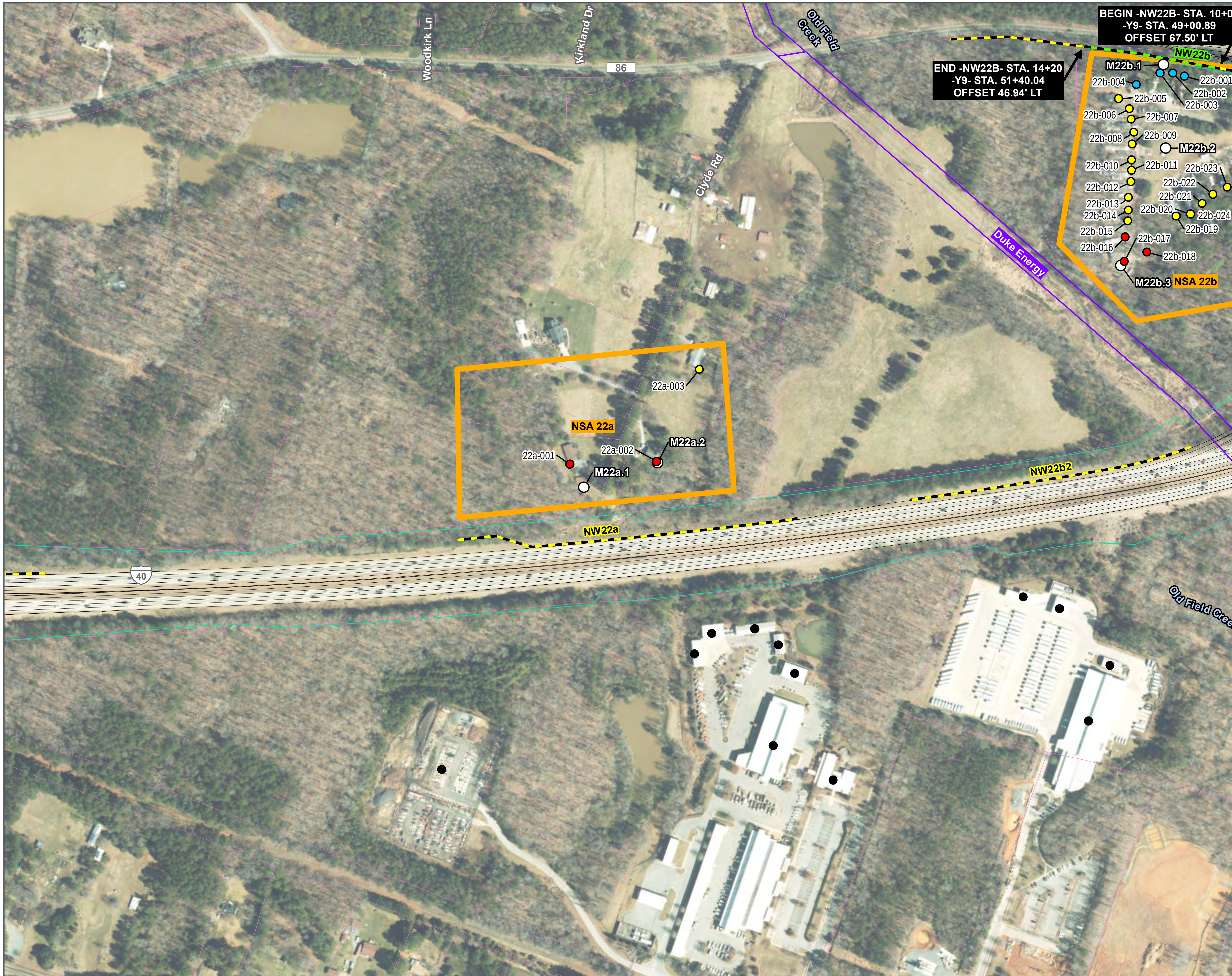
JUNE 2023

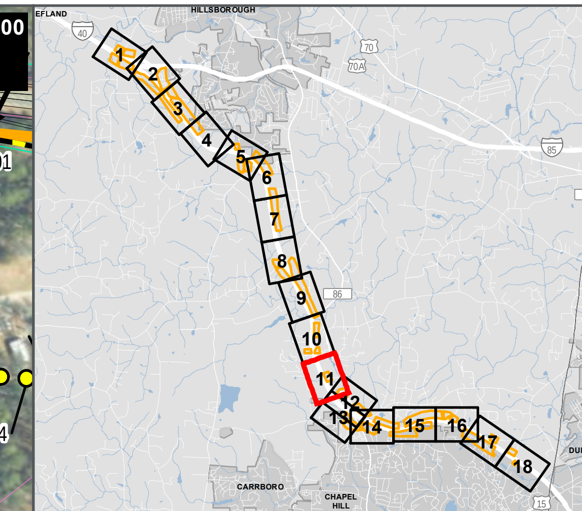
0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

HDR

FIGURE 2-10





Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Barrier
Noise Barrier Not Recommended

**I-3306A – I-40
FROM I-40/I-85 JUNCTION TO
US 15/US 501**

**DETAILED STUDY AREA
MAP**

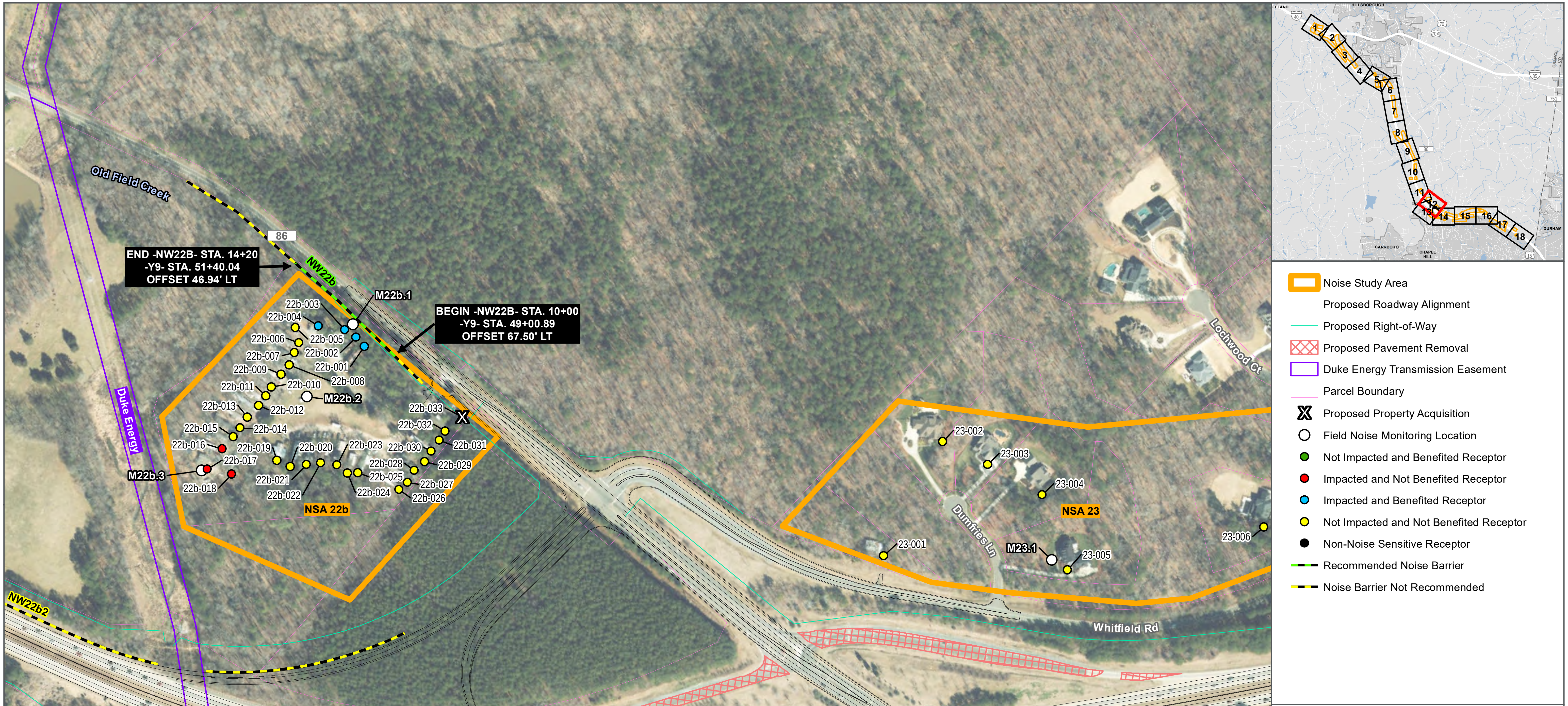
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-11

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

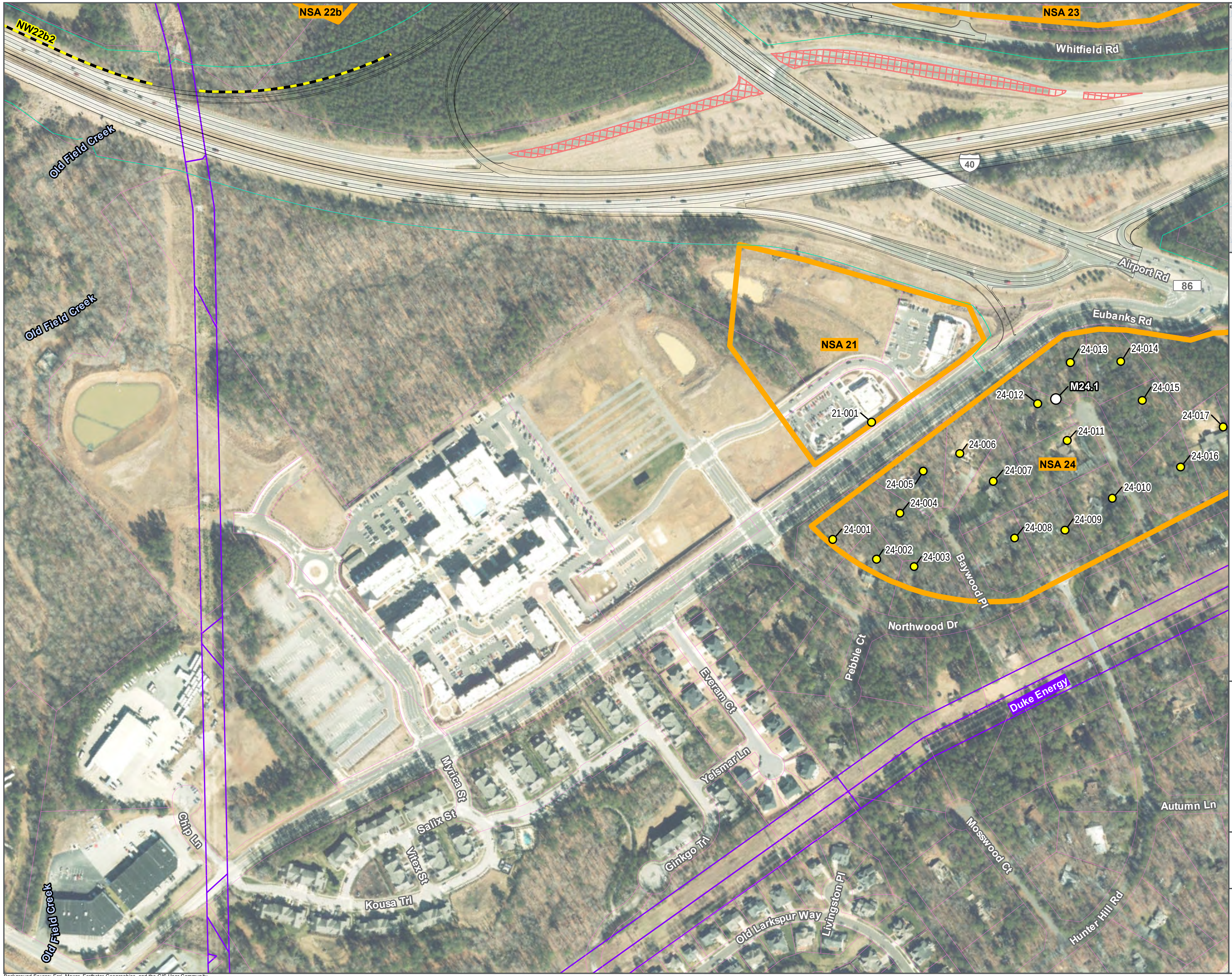
DETAILED STUDY AREA MAP

JUNE 2023

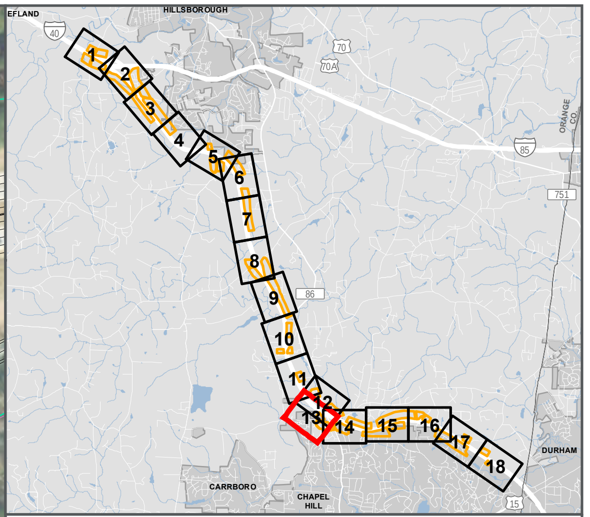
North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

HDR

FIGURE 2-12



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

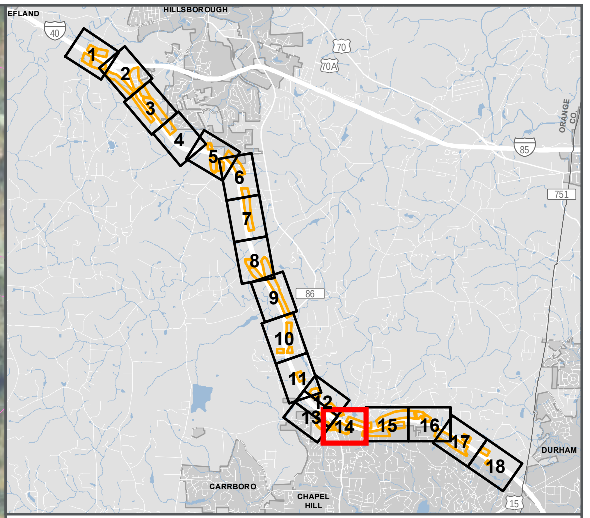
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-13

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
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- Field Noise Monitoring Location
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- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

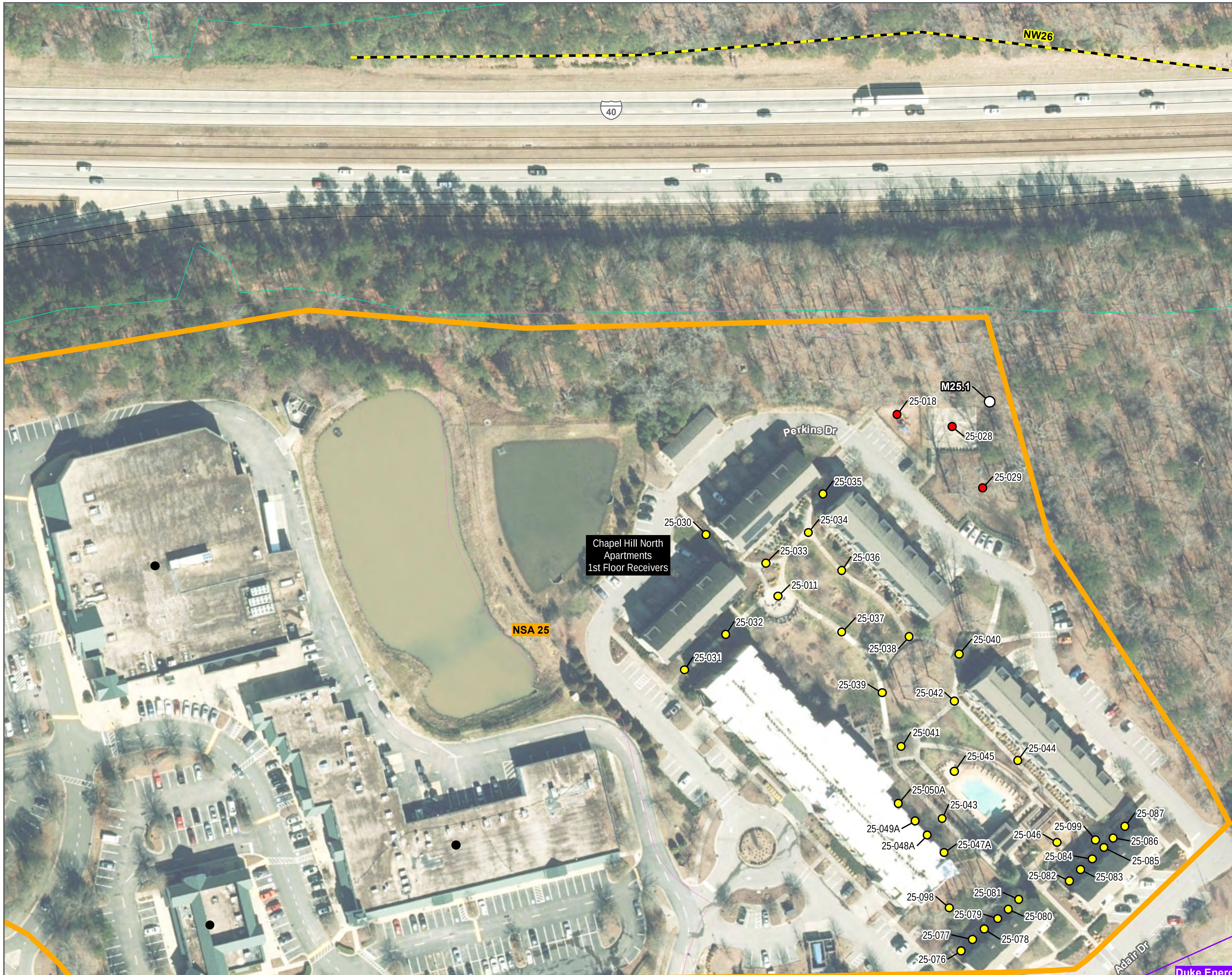
DETAILED STUDY AREA MAP

JUNE 2023

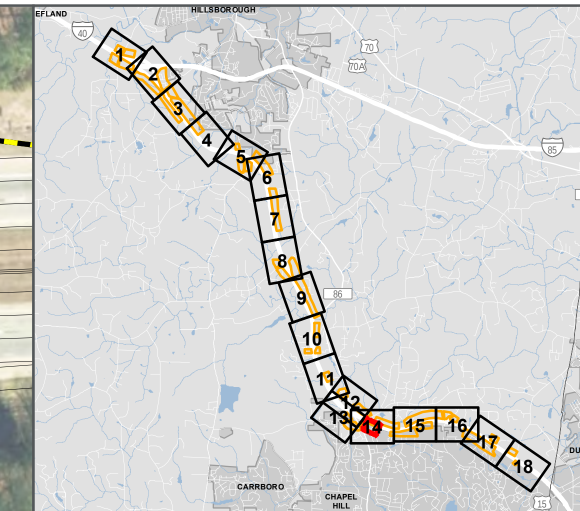
0 300 FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-14



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
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- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Wall
- Noise Wall Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

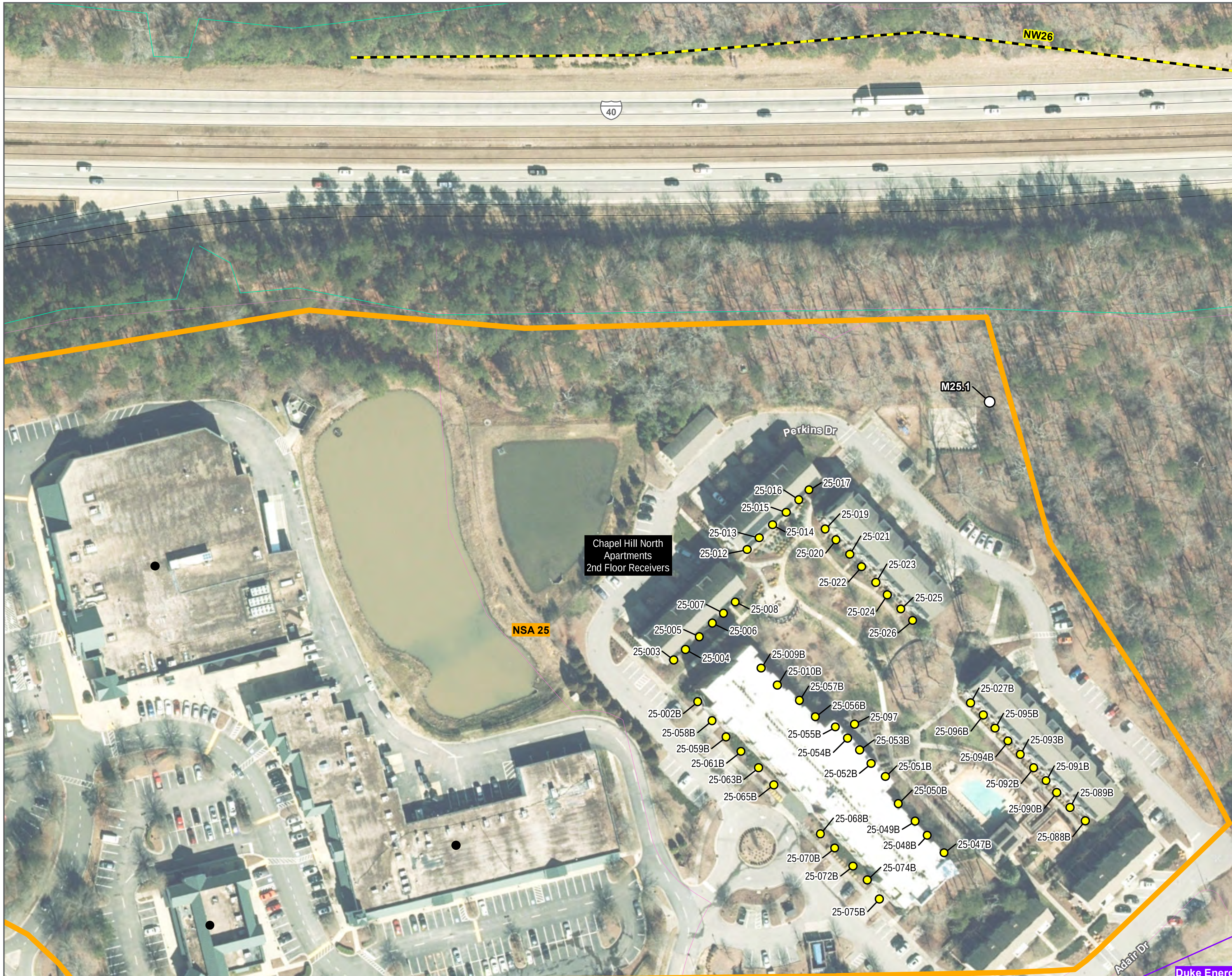
(1st Floor Receivers)

JUNE 2023

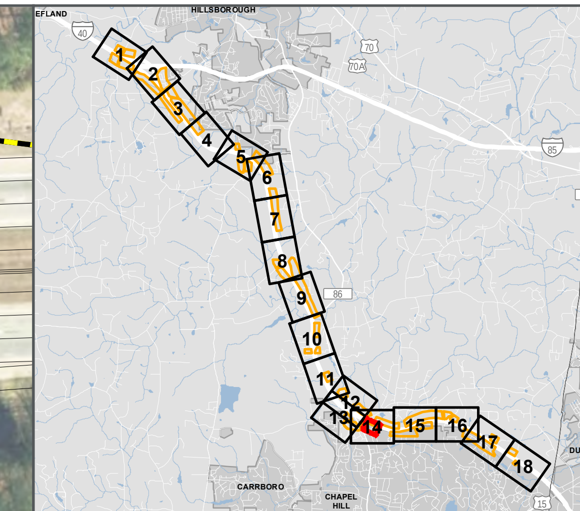
0 100
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-14A-1



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
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- Parcel Boundary
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- Field Noise Monitoring Location
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- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Wall
- Noise Wall Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

(2nd Floor Receivers)

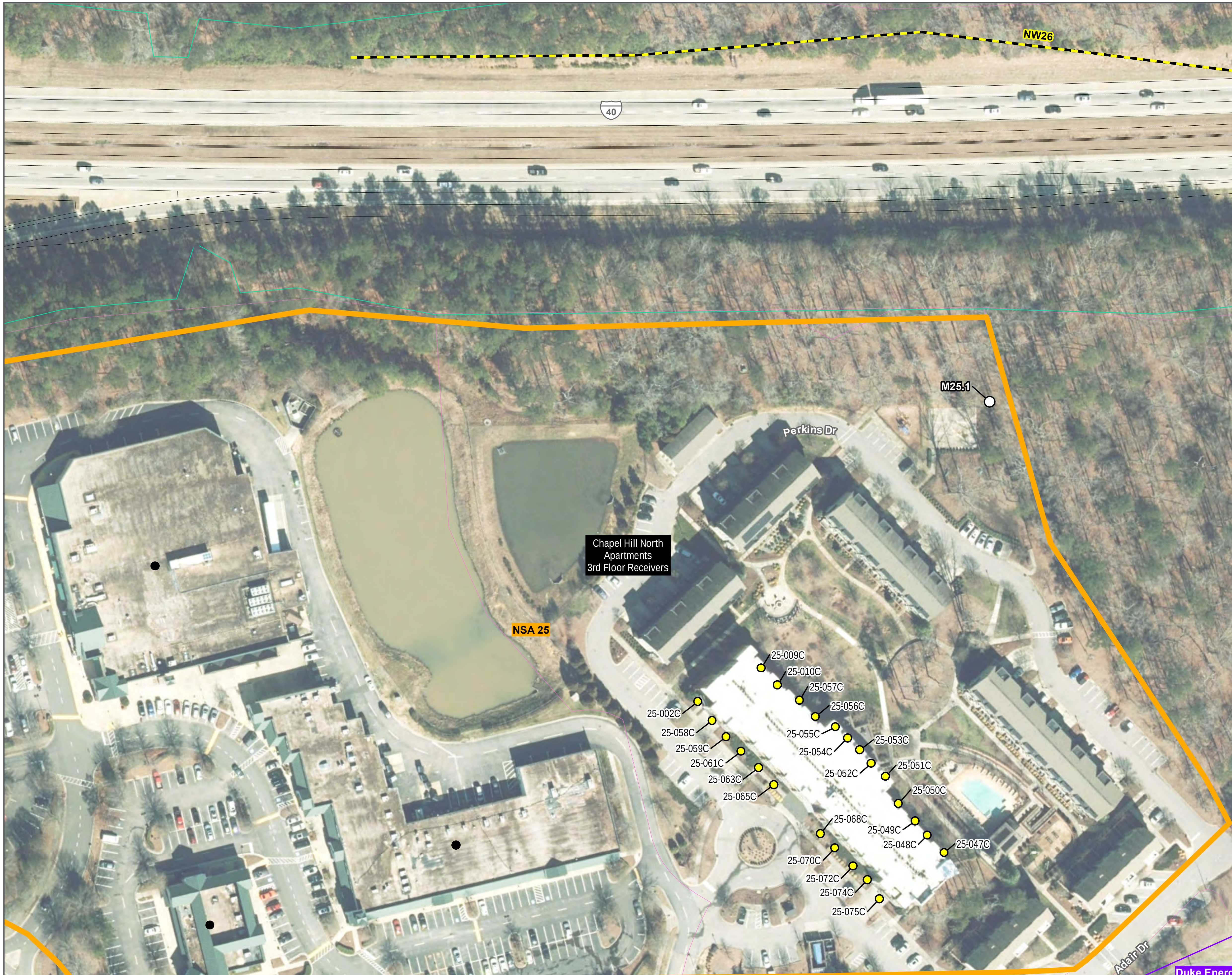
JUNE 2023

0 100
FEET

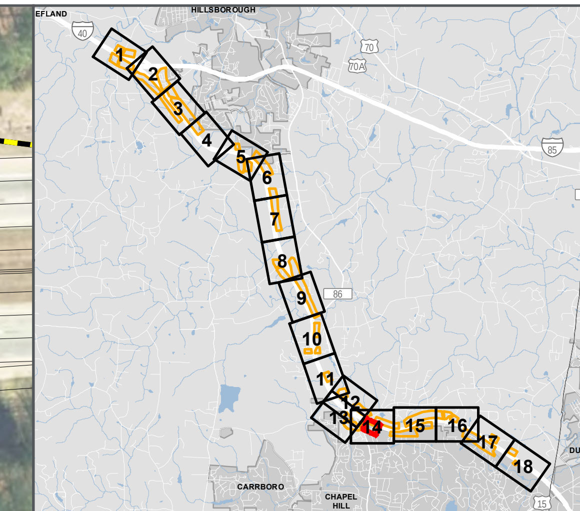
North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

HDR

FIGURE 2-14A-2



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
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- Proposed Right-of-Way
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- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Wall
- Noise Wall Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

(3rd Floor Receivers)

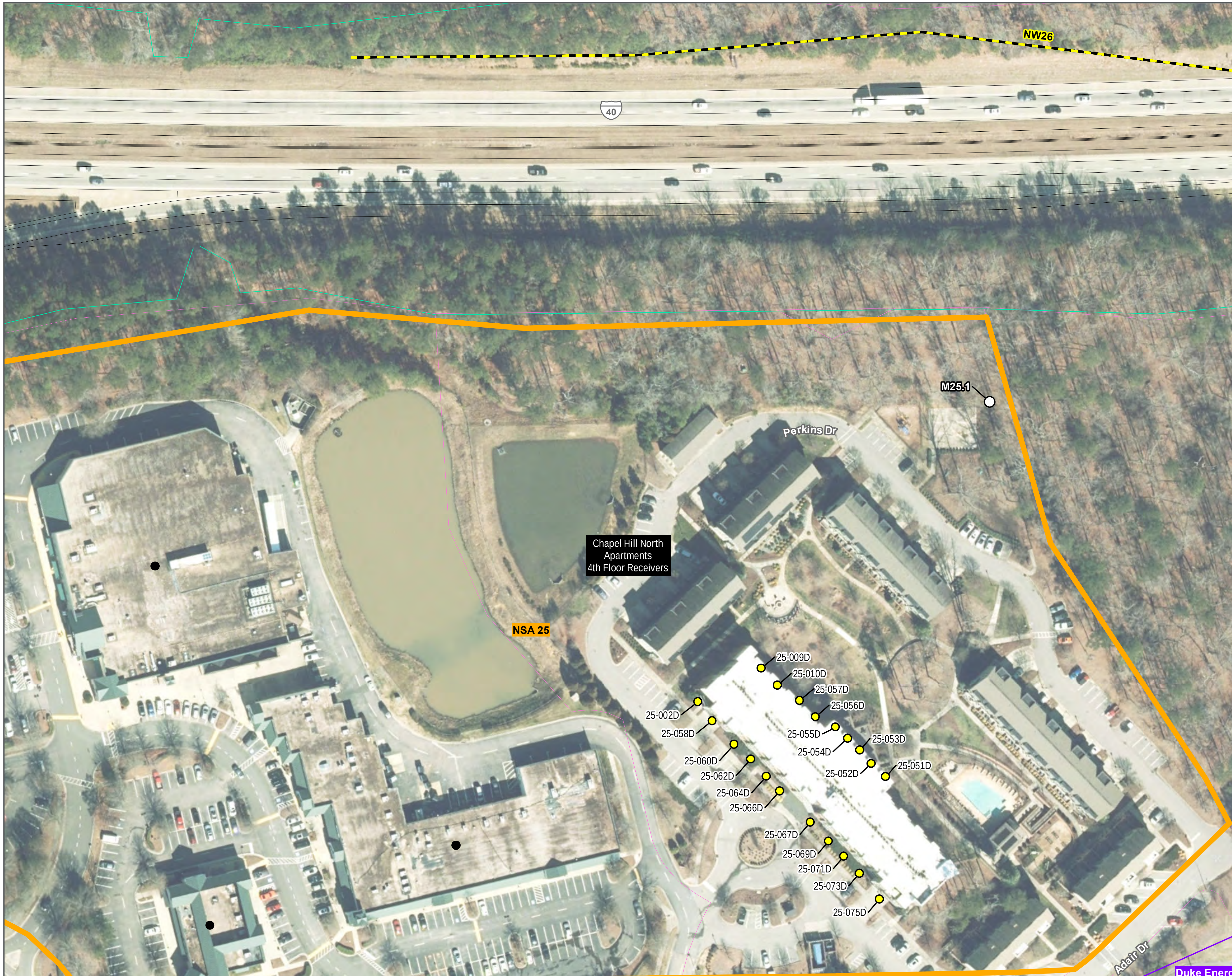
JUNE 2023

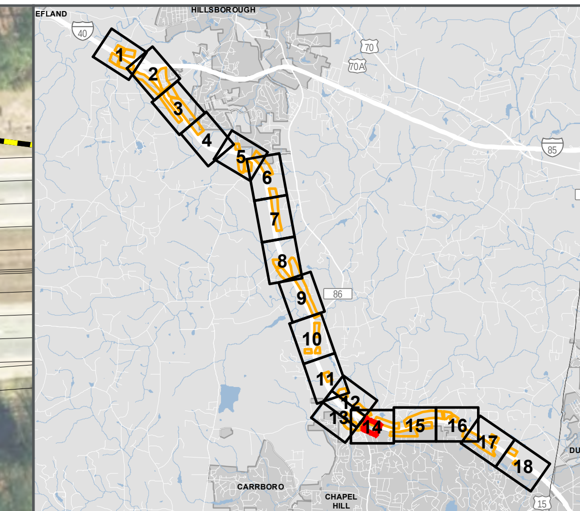
0 100
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

HDR

FIGURE 2-14A-3





Noise Study Area
Proposed Roadway Alignment
Proposed Right-of-Way
Proposed Pavement Removal
Duke Energy Transmission Easement
Parcel Boundary
Proposed Property Acquisition
Field Noise Monitoring Location
Not Impacted and Benefited Receptor
Impacted and Not Benefited Receptor
Impacted and Benefited Receptor
Not Impacted and Not Benefited Receptor
Non-Noise Sensitive Receptor
Recommended Noise Wall
Noise Wall Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

(4th Floor Receivers)

JUNE 2023

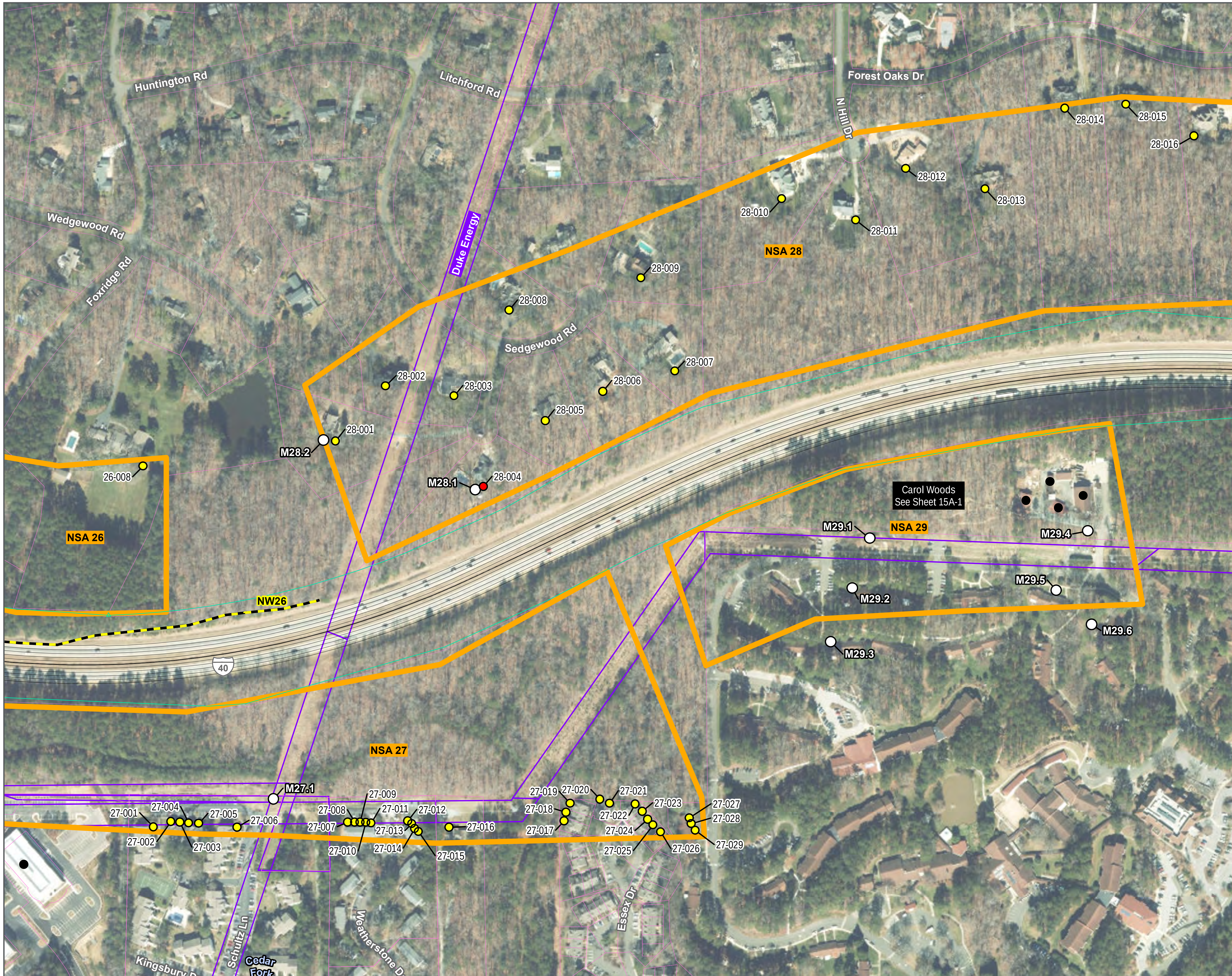
0 100
FEET

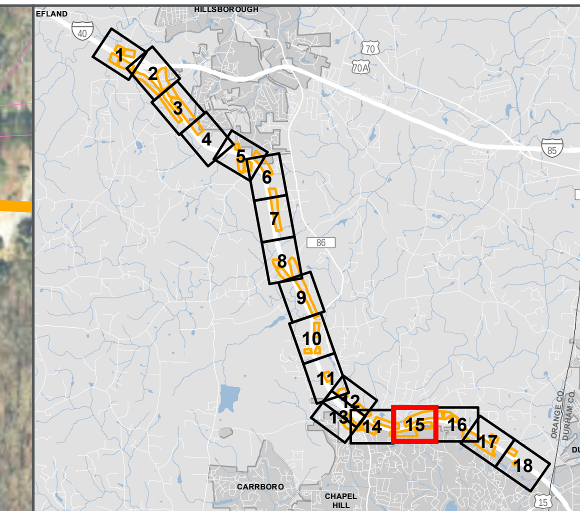
North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

HDR

FIGURE 2-14A-4

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

JUNE 2023

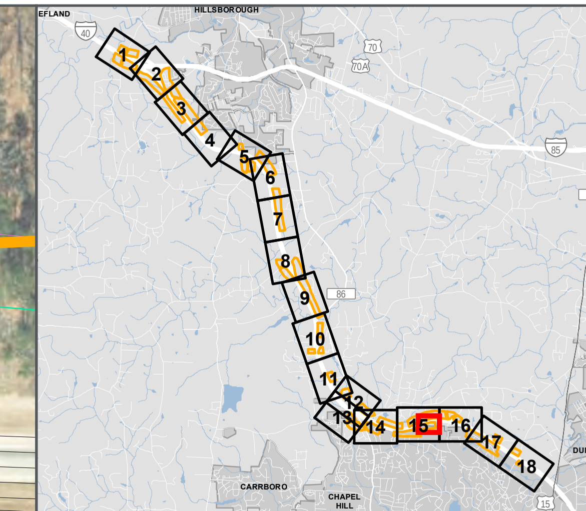
0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-15

Background Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

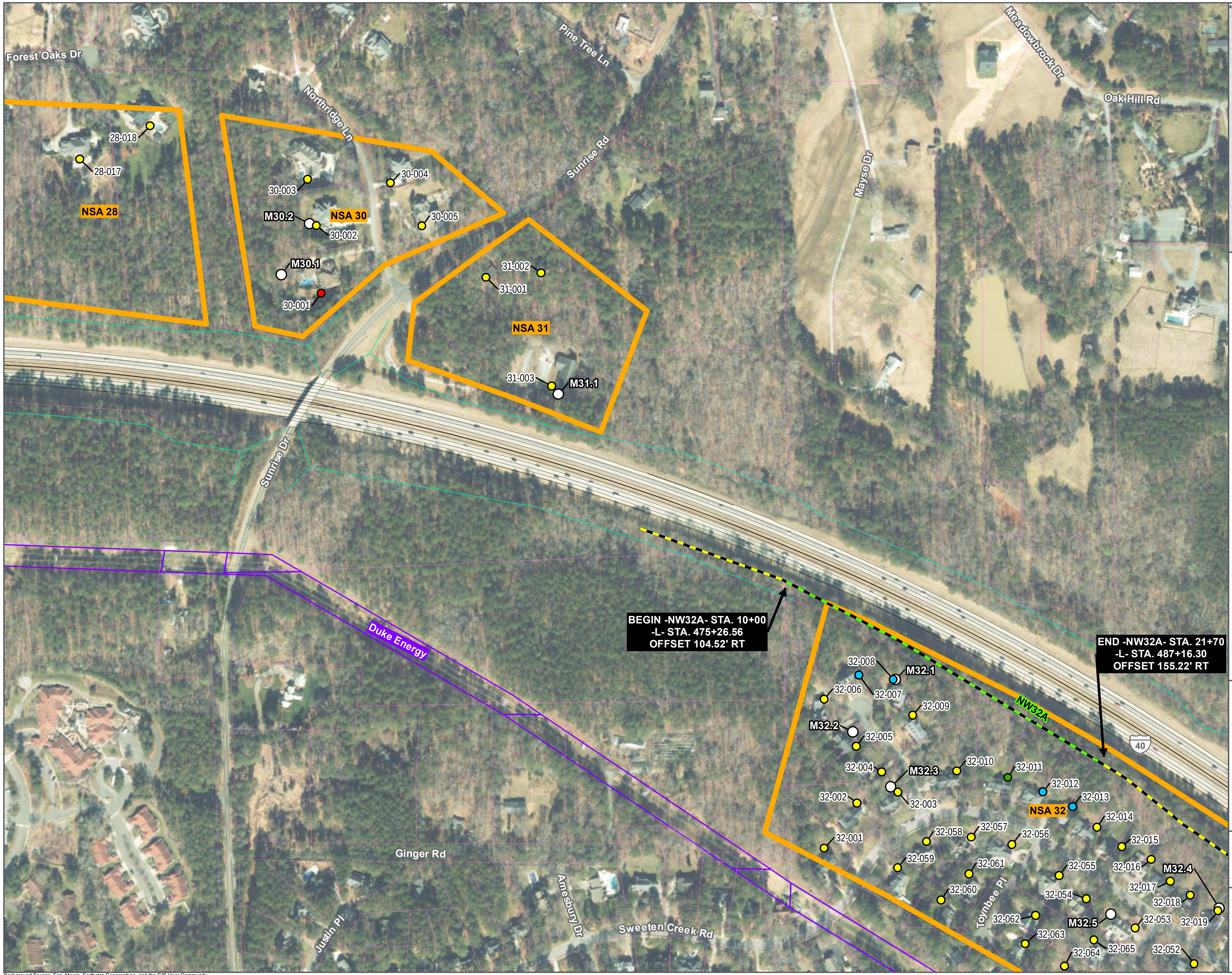
(Carol Woods)

JUNE 2023

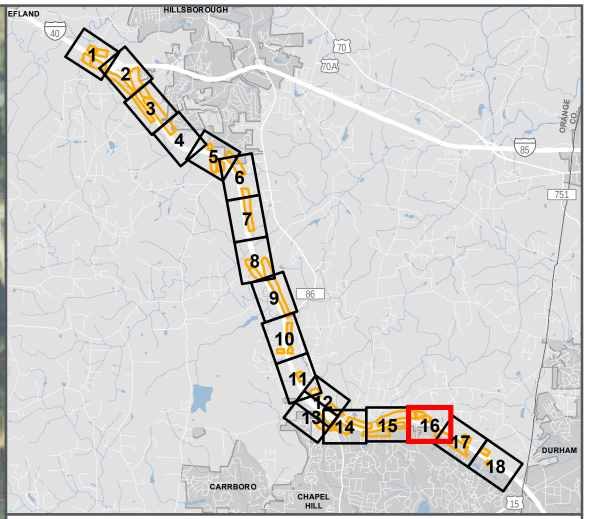
0 150
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-15A-1



Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

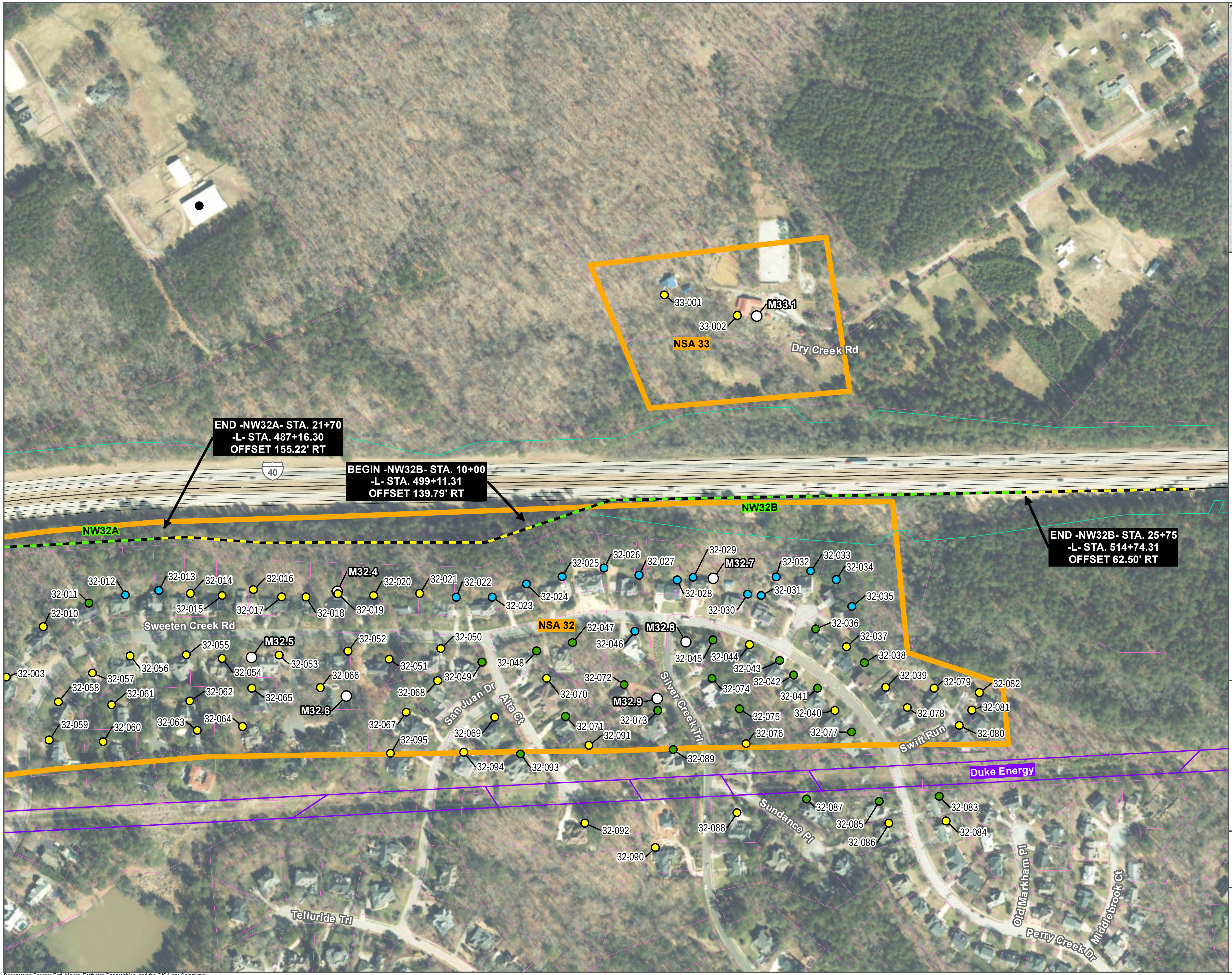
DETAILED STUDY AREA MAP

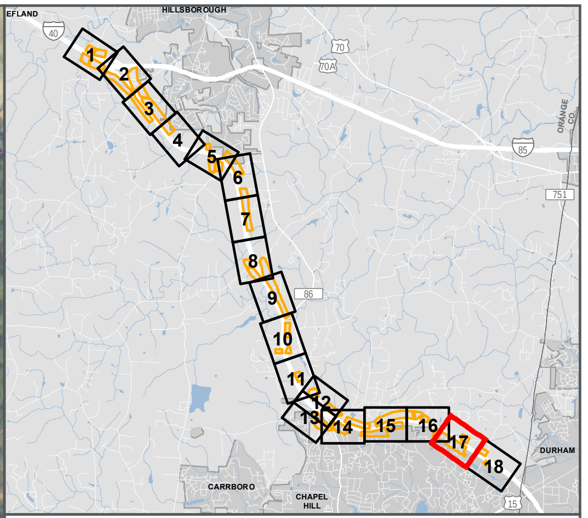
JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-16





- Noise Study Area
- Proposed Roadway Alignment
- Proposed Right-of-Way
- Proposed Pavement Removal
- Duke Energy Transmission Easement
- Parcel Boundary
- Proposed Property Acquisition
- Field Noise Monitoring Location
- Not Impacted and Benefited Receptor
- Impacted and Not Benefited Receptor
- Impacted and Benefited Receptor
- Not Impacted and Not Benefited Receptor
- Non-Noise Sensitive Receptor
- Recommended Noise Barrier
- Noise Barrier Not Recommended

I-3306A – I-40 FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-17

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Background Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

I-3306A – I-40
FROM I-40/I-85 JUNCTION TO US 15/US 501

DETAILED STUDY AREA MAP

JUNE 2023

0 300
FEET

North Carolina Department of Transportation
Environmental Analysis Unit
Traffic Noise & Air Quality Group

FIGURE 2-18

Appendix A. Ambient Noise Level Monitoring and TNM Validation

Memorandum

Date:	Wednesday, April 27, 2022
Project:	STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties
To:	Tracy Roberts NCDOT Traffic Noise & Air Quality Group Leader
From:	Mukul Pal, HDR
Subject:	Traffic Noise Model (TNM) Validation Report

Summary

The purpose of this TNM Validation Report is to document the predictive accuracy of the FHWA Traffic Noise Model (FHWA TNM v2.5) traffic noise models for the I-40 Widening project in Orange and Durham Counties (TIP#: I-3306A).

TNM model validation is the process by which the precision of the modeled relationship between traffic and predicted equivalent noise levels is refined and/or confirmed. The validation process is the basis upon which the traffic noise models for predicting existing year and design year traffic noise levels is founded.

The ambient noise environment varies depending on the proximity to I-40 and the presence of a natural and mechanical sources, and human activity typically present throughout the project vicinity. TNM predicted hourly equivalent traffic noise levels were within ±3 dB(A) for seventy-one (71) of the seventy-three (73) monitoring locations for which traffic was the dominant source. Since TNM can only predict traffic related noise levels, TNM under-predicted hourly equivalent sound levels for one (1) monitoring location (M6.3) for which non-traffic sources were dominant. Additionally, TNM over-predicted hourly equivalent sounds for one (1) monitoring location (M22b.3). The reason for TNM over-prediction is undetermined. Tree zones were initially considered to validate M22b.3 monitoring location, however, was determined to not be a reasonable representation of the existing noise study area features per manual 8.9. Atmospheric influences could be the probable cause for not validating. Refer to Table 1 for a summary of the TNM validation results.

This TNM Validation Report will be included as Appendix A in the I-40 Widening Project Design Noise Report (TIP#: I-3306A DNR).

Ambient Noise Level, Traffic, and Weather Data

Traffic Noise Analysis Work Plan for this project was approved by the North Carolina Department of Transportation (NCDOT) on May 6, 2021. The work plan proposed forty (40) monitoring sessions for measuring existing noise levels. The individual monitoring locations for each monitoring session are shown in Figure 2.

From November 15-18, 2021 and January 18-19, 2022 ambient sound level data was acquired at 73 individual monitoring locations during 40 short-term monitoring sessions.. Where applicable noise level data was acquired in arrays of two or three noise meter locations to evaluate attenuation with increased distances from the dominant roadway noise source. The noise levels presented in Table 1 are the short-term ambient equivalent sound levels obtained in the I-40 Widening projects vicinity (TIP#: I-3306A).

The range of ambient short-term 20-minute equivalent sound levels, Leq20-min obtained at seventy-three (73) individual monitoring locations during forty (40) short-term monitoring sessions representing the thirty-five (35) noise study areas (NSAs) for the project was between 50.2 dB(A) at 103 Landing Drive (M32.6), and 72.1 dB(A) at 7326 Sunrise Road (M31.1).

Classified vehicle traffic counts from existing roadways were acquired concurrently with each of the forty (40) noise monitoring sessions. Traffic data was categorized into five classifications: automobiles, medium trucks, heavy trucks, buses, and motorcycles. Traffic speed for each direction was collected using a handheld radar speed gun . Additionally, weather information was concurrently collected using the hand-held meteorological data collection device HoldPeak HP-866B-WM Anemometer. Refer to individual measurement sheets for this information.

TNM Model Validation

TNM model validation is the process by which the accuracy of the computer-generated existing models is confirmed. In accordance with the NCDOT 2016 Traffic Noise policy, computer models were created using the FHWA TNM v2.5 to predict existing traffic noise levels within the project study area. For each measurement location if the predicted noise level is within ±3 dB(A) of the measured noise level, that measurement site is considered validated.

The ambient noise environment varies depending on the proximity to I-40 and the presence of natural and mechanical sources and human activity typically present throughout the project vicinity. TNM predicted hourly equivalent traffic noise levels were within ±3 dB(A) for seventy-one (71) of the seventy-three (73) monitoring locations for which traffic was the dominant source. Since TNM can only predict traffic related noise levels, TNM under-predicted hourly equivalent sound levels for one (1) monitoring location (M6.3) for which non-traffic sources were dominant. Additionally, TNM over-predicted hourly equivalent sounds for one (1) monitoring location (M22b.3). The reason for TNM over-prediction is undetermined. Tree zones were initially considered to validate M22b.3 monitoring location, however, was determined to not be a reasonable representation of the existing noise study area features per manual 8.9. Atmospheric influences could be the probable cause for not validating.

Refer to Table 1 for a summary of the TNM validation results.

Table 1: TNM Validation Table

Monitoring Session	Monitoring Location	TNM Predicted L_{eq} dB(A)[1]	Measured L_{eq} 20-min dBA(A)	Validation Delta (Pred. – Meas.)
1	M1.1	67.6	66.8	0.8
2	M2.1	64.8	62.2	2.6
3	M3.1	62.5	63.0	-0.5
	M3.2	61.1	58.4	2.7
4	M4.1	61.8	61.6	0.2
5	M5.1	57.4	59.0	-1.6
6-1	M6.1	63.3	61.3	2.0
	M6.2	57.9	57.1	0.8
	M6.3	51.1	54.8	-3.7[2]
6-2	M6.4	66.8	65.1	1.7
	M6.5	63.1	63.4	-0.3
	M6.6	60.6	60.7	-0.1
7	M7.1	57.7	59.9	-2.2
	M7.2	56.3	57.9	-1.6
8	M8.1	57.3	60.2	-2.9
9	M9.1	71.2	69.0	2.2
	M9.2	61.7	64.5	-2.8
10	M10.1	62	61.2	0.8
	M10.2	58.3	59.1	-0.8
11	M11.1	61.5	58.8	2.7
12	M12.1	66.9	66.6	0.3
	M12.2	64.7	65.0	-0.3
13-1	M13.1	64.9	64.1	0.8
	M13.2	61.5	59.7	1.8
	M13.3	56.1	55.7	0.4
13-2	M13.4	62.3	59.7	2.6
	M13.5	58.1	56.4	1.7
	M13.6	56.5	53.6	2.9
14	M14.1	68.9	67.6	1.3
	M14.2	64.4	64.3	0.1
15	M15.1	55.3	53.8	1.5

Monitoring Session	Monitoring Location	TNM Predicted L_{eq} dB(A)[1]	Measured L_{eq} 20-min dBA(A)	Validation Delta (Pred. – Meas.)
16	M16.1	53.1	53.8	-0.7
17	M17.1	66.5	66.6	-0.1
	M17.2	57.0	54.2	2.8
18	M18.1	61.7	62.1	-0.4
19	M19.1	60.6	57.7	2.9
20	M20.1	68.5	68.7	-0.2
	M20.2	65.8	65.9	-0.1
22a	M22a.1	72.7	71.3	1.4
	M22a.2	68.3	67.7	0.6
22b	M22b.1	63.9	63.7	-0.1
	M22b.2	58.6	60.9	-2.4
	M22b.3	62.8	55.4	7.4[3]
23	M23.1	59.8	61.5	-1.7
24	M24.1	57.3	56.8	0.5
	M24.2	62.3	61.0	1.3
25	M25.1	68.2	66.5	1.7
26	M26.1	71	68.8	2.2
	M26.2	65.4	63.3	2.1
27	M27.1	58.3	60.3	-2.0
28	M28.1	65.9	66.8	-0.9
	M28.2	57.3	59.1	-1.8
29-1	M29.1	61.5	61.4	0.1
	M29.2	58.6	59.6	-1.0
	M29.3	55.8	55.3	0.5
29-2	M29.4	56.9	58.9	-2.0
	M29.5	53.1	55.0	-1.9
	M29.6	53.3	53.6	-0.3
29-3	M30.1	65.1	64.9	0.2
	M30.2	59.9	57.0	2.9
31	M31.1	71.3	72.1	-0.8
32-1	M32.1	69	67.7	1.3
	M32.2	60.3	60.7	-0.4

Monitoring Session	Monitoring Location	TNM Predicted L_{eq} dB(A)[1]	Measured L_{eq} 20-min dBA(A)	Validation Delta (Pred. – Meas.)
	M32.3	54.9	56.7	-1.8
32-2	M32.4	61.5	62.5	-1.0
	M32.5	51.5	54.4	-2.9
	M32.6	47.5	50.2	-2.7
32-3	M32.7	65.9	65.8	0.1
	M32.8	62.7	60.4	2.3
	M32.9	60	57.9	2.1
33	M33.1	63.3	62.3	1.0
34	M34.1	62.4	65.2	-2.8
35	M35.1	63.7	63.1	0.6
Measurement Site Validated			Measurement Site Not Validated	

1. Hourly equivalent noise levels, Leq(h), are expressed to the nearest one-tenth decibels to ensure that TNM-predicted noise levels validate to within ± 3.0 dB(A) of measured noise levels without the benefits of rounding.
2. TNM under-predicted due to dominant non-traffic noise sources.
3. TNM over-prediction is undetermined. Tree zones were initially considered to validate M22b.3 monitoring location, however, was determined to not be a reasonable representation of the existing noise study area features per manual 8.9. Atmospheric influences could be the probable cause for not validating.

Attachments:

Field noise measurement datasheets
Noise meter certificates

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M1.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-85, Dimmocks Mill Road Date: 11/17/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M1.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M1.1- 1319 Dimmocks Mill Rd.

SITE SKETCH:

Start Time:
9:30 AM/PM

Duration:
20 minutes

Wind Speed: 4 mph

Wind Direction: SSW

Temperature: 55^0F

Humidity: 70%

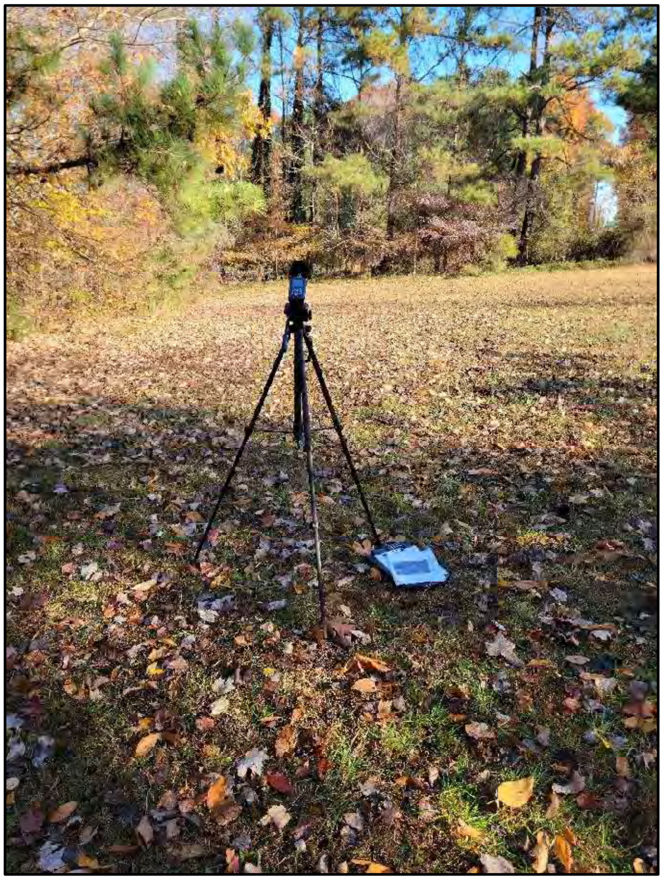
Site M1.1 Leq: 66.8 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-85 NB	341	18	37	1	0	65
I-85 SB / I-40 WB	296	16	59	1	0	65
I-40 EB Ramp	510	28	44	1	0	65
Dimmocks Road NB	8	1	0	0	0	45
Dimmocks Road SB	11	0	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	9:30 AM	68.0	74.1
2	9:31 AM	66.2	69.2
3	9:32 AM	66.5	69.2
4	9:33 AM	66.8	68.2
5	9:34 AM	67.2	69.0
6	9:35 AM	67.0	69.5
7	9:36 AM	66.6	68.9
8	9:37 AM	67.1	69.3
9	9:38 AM	66.6	68.7
10	9:39 AM	66.9	70.4
11	9:40 AM	66.1	69.0
12	9:41 AM	66.5	69.0
13	9:42 AM	67.2	70.4
14	9:43 AM	66.1	69.2
15	9:44 AM	66.1	68.8
16	9:45 AM	66.7	69.4
17	9:46 AM	66.3	69.1
18	9:47 AM	66.8	70.1
19	9:48 AM	66.7	69.7
20	9:49 AM	67.2	70.1

Ambient Noise Monitoring Site M1.1



SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M2.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-85, Dimmocks Rd. Date: 11/17/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M2.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M2.1- 1218 Dimmocks Mill Rd.

SITE SKETCH:

Start Time:
10:04 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: SSW

Temperature: 65^0F

Humidity: 65%

Site M2.1 Leq: 62.2 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-85 NB / I-40 EB	764	30	84	1	0	65
I-85 SB	244	14	21	0	0	65
I-40 WB Ramp	278	18	41	0	0	60
Dimmocks Road NB	7	0	0	0	0	45
Dimmocks Road SB	5	0	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	10:04	62.6	64.6
2	10:05	62.3	63.8
3	10:06	61.2	63.2
4	10:07	62.3	63.9
5	10:08	62.0	63.7
6	10:09	61.4	64.2
7	10:10	62.1	64.3
8	10:11	62.2	65.5
9	10:12	63.0	64.7
10	10:13	62.1	64.3
11	10:14	62.1	65.8
12	10:15	63.1	66.3
13	10:16	61.5	63.0
14	10:17	63.2	68.9
15	10:18	62.0	65.2
16	10:19	62.3	64.5
17	10:20	63.8	67.6
18	10:21	61.0	62.4
19	10:22	61.7	63.6
20	10:23	61.2	63.2

Ambient Noise Monitoring Site M2.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M3.1, M3.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-85, I-40, Dimmocks Road Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M3.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M3.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M3.1- 1229 Dimmocks Mill Rd; M3.2- 1414 Dimmocks Mill Rd.

SITE SKETCH:

Start Time:
2:04 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: NW

Temperature: 53^0F

Humidity: 30%

Site M3.1 Leq: 63.0 dB(A)
Calibration offset: 0.00 dB(A)

Site M3.2 Leq: 58.4 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-85 NB	294	21	72	1	0	65
I-85 SB / I-40 WB	312	18	55	0	0	65
I-40 EB Ramp	436	17	42	0	0	65
Dimmocks Road NB	4	0	0	0	0	45
Dimmocks Road SB	8	0	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq M3.1 (dBA)	Lmax	Measured Leq M3.2 (dBA)	Lmax
1	14:04	63.3	65.3	58.5	60.3
2	14:05	62.5	63.8	57.4	58.6
3	14:06	62.9	63.8	58.0	59.0
4	14:07	62.8	66.7	58.1	59.2
5	14:08	63.6	66.8	58.4	60.1
6	14:09	63.6	65.7	57.8	58.7
7	14:10	63.7	64.4	58.8	59.7
8	14:11	62.3	63.8	58.0	60.1
9	14:12	62.4	64.2	56.3	57.4
10	14:13	62.4	63.3	58.0	59.7
11	14:14	62.2	63.8	58.5	60.9
12	14:15	63.2	64.8	58.5	59.8
13	14:16	63.2	65.5	58.7	59.9
14	14:17	62.3	63.0	58.3	59.7
15	14:18	62.7	64.5	58.9	60.7
16	14:19	62.3	64.2	58.3	60.3
17	14:20	63.6	64.7	59.8	61.7
18	14:21	64.3	65.7	59.2	60.4
19	14:22	63.0	64.7	57.6	58.6
20	14:23	63.6	65.6	59.2	62.3

Ambient Noise Monitoring Site M3.1

Ambient Noise Monitoring Site M3.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M4.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-85, I-40, Dimmocks Rd   Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M4.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one)   **FAST**   **SLOW**

WEIGHTING (circle one)   A   Lin.

Location Description – M4.1- 1225 Dimmocks Mill Rd

SITE SKETCH:

Start Time:
11:54 AM/PM

Duration:
20 minutes

Wind Speed: 9 mph

Wind Direction: NNW

Temperature: 54^0F

Humidity: 34%

Site M4.1 Leq: 61.6 dB(A)
Calibration offset: N/A

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-85 SB	286	19	24	0	0	65
I-40 WB Ramp	328	23	30	0	0	65
I-85NB/I-40 EB	625	28	72	1	0	60
Dimmocks Road NB	2	0	0	0	0	45
Dimmocks Road SB	1	0	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	11:54	62.4	64.5
2	11:55	60.9	62.6
3	11:56	61.2	62.2
4	11:57	61.3	64.2
5	11:58	60.9	62.5
6	11:59	60.1	60.9
7	12:00	61.3	62.6
8	12:01	62.2	63.3
9	12:02	61.7	63.8
10	12:03	61.0	62.3
11	12:04	62.1	64.6
12	12:05	60.0	61.7
13	12:06	61.2	63.1
14	12:07	60.7	62.1
15	12:08	61.8	63.0
16	12:09	62.1	64.2
17	12:10	62.1	63.4
18	12:11	63.1	65.5
19	12:12	61.9	63.2
20	12:13	61.7	64.7

Ambient Noise Monitoring Site M4.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M5.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

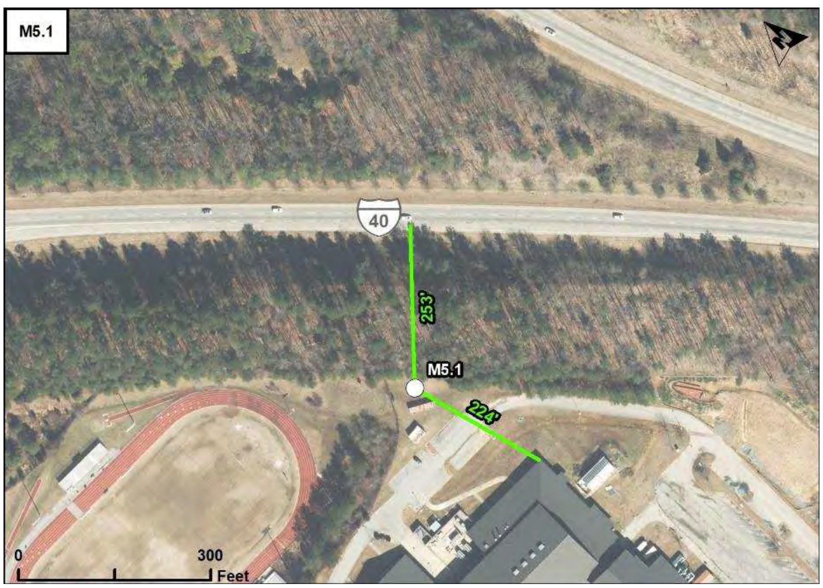
Equipment	Type	Microphone	Serial #
M5.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M5.1- 1125 New Grady Brown School Rd

SITE SKETCH:



Start Time:
8:55 AM/PM

Duration:
20 minutes

Wind Speed: 9 mph

Wind Direction: SW

Temperature: 38^0F

Humidity: 25%

Site M5.1 Leq: 59.0dB(A)
Calibration offset: -0.02 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB (before merge)	493	28	61	1	0	70
I-40 WB (after exit)	390	27	53	0	0	70
I-40 WB Ramp to I-85 NB	4	0	2	0	0	70
I-85 SB Ramp to I-40 EB	5	1	3	0	0	60

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	8:55	58.4	60.9
2	8:56	58.4	60.5
3	8:57	58.1	59.3
4	8:58	57.3	59.5
5	8:59	58.0	59.7
6	9:00	58.1	60.1
7	9:01	57.8	59.8
8	9:02	59.2	61.3
9	9:03	58.5	60.6
10	9:04	65.3	73.8
11	9:05	58.0	62.7
12	9:06	58.1	61.1
13	9:07	57.5	59.4
14	9:08	58.2	59.8
15	9:09	58.8	60.9
16	9:10	57.9	60.1
17	9:11	57.8	59.9
18	9:12	58.4	62.7
19	9:13	58.5	60.0
20	9:14	57.5	60.5

Ambient Noise Monitoring Site M5.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M6.1, M6.2, M6.3

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

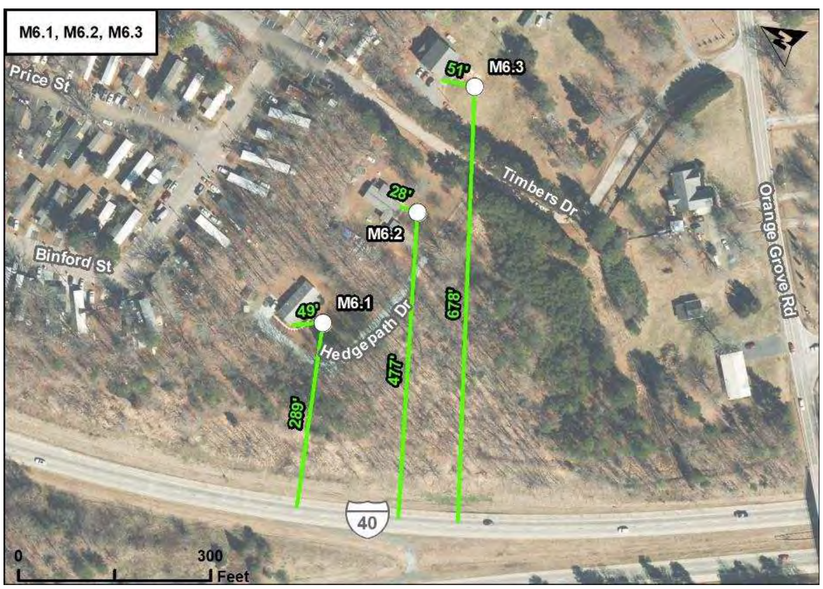
Equipment	Type	Microphone	Serial #
M6.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M6.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M6.3 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M6- 2311 Hedgepath Ln; M6.2- 998 Timbers Dr; M6.3- 999 Timbers Dr

SITE SKETCH:



Start Time:
4:50 AM/PM

Duration:
20 minutes

Wind Speed: 1 mph

Wind Direction: W

Temperature: 44^{0}F

Humidity: 38%

Site M6.1 Leq: 61.3 dB(A)
Calibration offset: -0.01 dB(A)

Site M6.2 Leq: 57.1 dB(A)
Calibration offset: 0.01 dB(A)

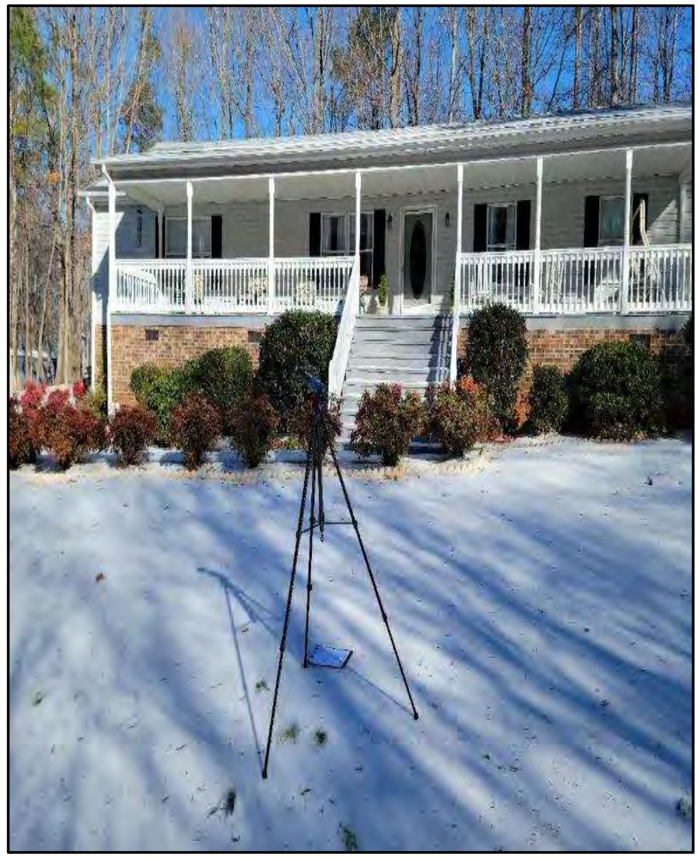
Site M6.3 Leq: 54.8 dB(A)
Calibration offset: 0.02 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	552	13	41	0	0	70
I-40 WB	722	32	82	0	0	70
I-40 WB Ramp to I-85	4	0	0	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq M6.1 (dBA)	Lmax	Measured Leq M6.2 (dBA)	Lmax	Measured Leq M6.3 (dBA)	Lmax
1	16:50	61.7	65.8	57.3	62.0	55.3	59.3
2	16:51	61.4	63.1	56.7	58.9	54.8	56.4
3	16:52	61.2	63.6	56.8	59.0	54.4	56.3
4	16:53	61.0	62.9	56.5	58.6	54.5	56.7
5	16:54	61.2	63.1	57.1	58.6	54.7	56.9
6	16:55	62.1	65.9	57.6	60.8	55.2	57.8
7	16:56	60.8	63.0	56.4	59.9	54.5	55.8
8	16:57	61.3	63.8	56.8	58.4	54.4	55.2
9	16:58	60.3	62.8	56.4	58.1	54.2	55.9
10	16:59	61.8	62.7	57.3	59.3	54.9	56.1
11	17:00	61.3	63.3	57.4	59.5	55.0	56.7
12	17:01	60.3	62.7	56.5	59.0	54.2	56.9
13	17:02	61.3	62.7	56.9	58.3	54.7	56.0
14	17:03	60.7	62.5	56.9	58.6	54.6	56.0
15	17:04	60.1	61.7	56.2	58.0	54.1	55.2
16	17:05	61.1	62.9	57.0	58.4	54.7	56.0
17	17:06	62.3	64.0	58.3	60.7	55.7	57.8
18	17:07	60.7	62.8	56.9	58.9	54.1	56.4
19	17:08	62.9	66.7	58.0	62.1	56.0	60.7
20	17:09	61.8	63.5	58.0	62.6	54.8	58.2

Ambient Noise Monitoring Site M6.1



Ambient Noise Monitoring Site M6.2

Ambient Noise Monitoring Site M6.3

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M6.4, M6.5, M6.6

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-85, I-40 Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

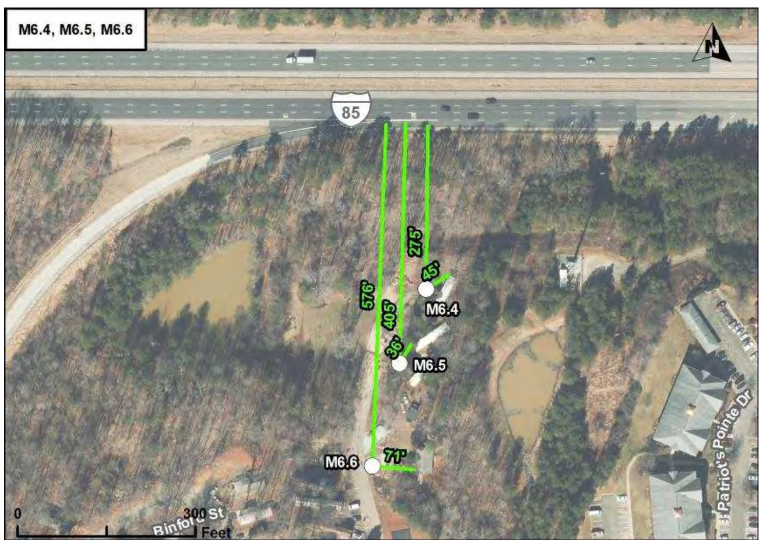
Equipment	Type	Microphone	Serial #
M6.4 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M6.5 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M6.6 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M6.4- 1089 Timber Dr ; M6.5: 1085 Timber Dr ; M6.6: 1080 Timber Dr.

SITE SKETCH:



Start Time:
5:28 AM/PM

Duration:
20 minutes

Wind Speed: 4 mph

Wind Direction: W

Temperature: 47^{0}F

Humidity: 39%

Site M6.4 Leq: 65.1 dB(A)
Calibration offset: -0.01 dB(A)

Site M6.5 Leq: 63.4 dB(A)
Calibration offset: 0.02 dB(A)

Site M6.6 Leq: 60.7 dB(A)
Calibration offset: -0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-85 SB	348	28	24	0	0	70
I-85 NB	304	21	26	0	0	65
I-40 WB	522	26	58	0	0	65
I-40 WB Ramp to I-85	2	0	1	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq M6.4 (dBA)	Lmax	Measured Leq M6.5 (dBA)	Lmax	Measured Leq M6.6 (dBA)	Lmax
1	17:28	65.9	69.4	64.4	68.0	61.8	65.3
2	17:29	65.1	69.8	63.7	69.5	60.5	65.0
3	17:30	65.5	68.9	63.1	64.5	61.3	67.8
4	17:31	65.5	67.5	63.6	66.1	60.3	61.4
5	17:32	64.0	68.3	62.4	64.8	60.8	64.5
6	17:33	64.7	67.3	63.0	65.1	61.0	68.3
7	17:34	64.8	67.2	62.0	63.9	60.4	62.4
8	17:35	64.6	67.6	63.2	65.7	59.5	62.9
9	17:36	64.6	66.7	62.4	64.2	60.2	61.9
10	17:37	64.3	66.3	61.9	64.6	60.0	62.0
11	17:38	64.3	68.0	63.4	66.5	59.4	61.9
12	17:39	65.8	68.8	64.0	66.2	60.8	63.6
13	17:40	67.3	74.1	65.7	70.8	61.1	62.5
14	17:41	65.5	68.1	62.5	65.0	62.7	67.5
15	17:42	64.1	67.3	63.3	65.3	59.2	61.1
16	17:43	65.0	67.9	63.3	65.8	61.1	63.7
17	17:44	64.8	67.7	63.5	65.6	60.5	63.4
18	17:45	63.9	67.3	63.0	64.8	60.6	62.9
19	17:46	65.8	67.4	64.2	66.6	60.8	62.8
20	17:47	64.7	66.4	63.1	65.0	61.3	63.8

Ambient Noise Monitoring Site M6.4

Ambient Noise Monitoring Site M6.5

Ambient Noise Monitoring Site M6.6

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M7.1. M7.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/18/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M7.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M7.2 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M7.1- 2405 Timber Oak Dr ; M7.2- 520 New Grady Brown School Rd

SITE SKETCH:

Start Time:
8:38 AM/PM

Duration:
20 minutes

Wind Speed: 7 mph

Wind Direction: SW

Temperature: 57^{0}F

Humidity: 90%

Site M7.1 Leq: 59.9 dB(A)
Calibration offset: 0.00 dB(A)

Site M7.2 Leq: 57.9 dB(A)
Calibration offset: -0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	689	22	73	1	0	70
I-40 WB	468	28	65	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M7.1 (dBA)	Lmax	Measured Leq M7.2 (dBA)	Lmax
1	8:38	64.2	68.6	58.2	60.1
2	8:39	61.4	63.4	58.8	60.6
3	8:40	58.8	60.9	57.4	61.5
4	8:41	58.8	62.1	57.1	60.3
5	8:42	59.9	61.8	58.7	59.8
6	8:43	58.5	60.2	56.7	58.8
7	8:44	60.6	61.7	58.7	60.3
8	8:45	59.5	61.6	58.5	61.1
9	8:46	58.5	62.9	57.2	59.1
10	8:47	58.2	60.2	56.5	58.5
11	8:48	58.8	60.8	57.1	59.2
12	8:49	58.4	60.3	56.5	59.2
13	8:50	59.4	61.4	57.2	59.5
14	8:51	59.5	61.0	59.0	62.0
15	8:52	60.0	62.2	58.0	59.8
16	8:53	60.1	61.6	59.0	61.4
17	8:54	59.5	61.6	57.7	59.1
18	8:55	59.2	61.5	57.7	60.0
19	8:56	59.2	60.5	57.5	59.5
20	8:57	59.8	61.5	58.1	59.7

Ambient Noise Monitoring Site M7.1

Ambient Noise Monitoring Site M7.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M8.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Orange Grove Rd Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M8.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M8.1- 2210 Chris Dr.
SITE SKETCH:

Start Time:
9:36 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: SW

Temperature: 40^0F

Humidity: 30%

Site M8.1 Leq: 60.2 dB(A)
Calibration offset: 0.02 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	496	42	77	0	0	70
I-40 WB	478	47	62	1	0	70
Orange Grove Road NB	55	3	0	0	0	45
Orange Grove Road SB	45	0	0	0	0	45
Oakdale Dr EB	8	3	0	1	0	40
Oakdale Dr WB	15	5	0	1	0	40

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	9:36	59.3	61.7
2	9:37	59.6	62.9
3	9:38	61.3	67.6
4	9:39	59.9	61.2
5	9:40	60.8	65.0
6	9:41	58.9	61.7
7	9:42	62.6	68.6
8	9:43	62.2	68.1
9	9:44	60.3	61.8
10	9:45	60.7	62.6
11	9:46	59.7	61.3
12	9:47	60.0	61.6
13	9:48	59.8	61.1
14	9:49	58.6	62.0
15	9:50	60.1	63.7
16	9:51	60.4	62.2
17	9:52	60.0	62.1
18	9:53	58.9	61.5
19	9:54	58.6	61.6
20	9:55	59.4	61.6

Ambient Noise Monitoring Site M8.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M9.1, M9.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/18/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M9.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M9.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M9.1- 2335 Blair Dr; M9.2- 2331 Blair Dr

SITE SKETCH:

Start Time:
9:38 AM/PM

Duration:
20 minutes

Wind Speed: 9 mph

Wind Direction: SW

Temperature: 60^0F

Humidity: 88%

Site M9.1 Leq: 69.0 dB(A)
Calibration offset: 0.00 dB(A)

Site M9.2 Leq: 64.5 dB(A)
Calibration offset: 0.01 dB(A)

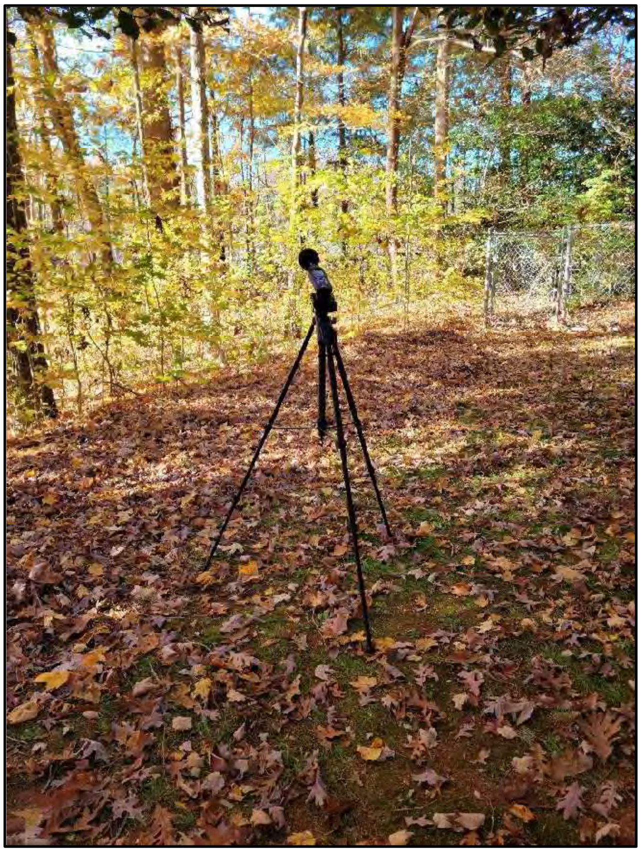
Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	632	37	71	0	0	70
I-40 WB	678	49	78	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M9.1 (dBA)	Lmax	Measured Leq M9.2 (dBA)	Lmax
1	9:38	69.3	72.2	65.1	67.5
2	9:39	68.9	71.9	64.4	67.2
3	9:40	68.8	71.4	64.6	66.9
4	9:41	68.8	72.1	63.2	66.2
5	9:42	67.0	72.4	63.6	67.1
6	9:43	69.6	73.3	64.1	66.5
7	9:44	69.9	72.0	65.9	68.5
8	9:45	69.3	71.3	64.7	66.9
9	9:46	69.3	71.0	65.1	66.8
10	9:47	69.4	73.0	64.9	67.4
11	9:48	67.2	69.3	62.9	64.5
12	9:49	68.8	71.8	64.4	66.8
13	9:50	69.5	71.8	64.5	66.9
14	9:51	68.5	71.4	64.4	66.9
15	9:52	69.1	71.0	64.2	66.0
16	9:53	69.0	71.2	64.7	66.1
17	9:54	68.8	71.6	64.6	66.8
18	9:55	69.8	73.2	65.3	68.0
19	9:56	68.3	70.9	64.1	66.0
20	9:57	68.8	70.4	64.3	65.7

Ambient Noise Monitoring Site M9.1

Ambient Noise Monitoring Site M9.2



SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M10.1, M10.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Old NC-86 Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M10.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M10.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M10.1- 3303 Old NC 86 ; M10.2- 3319 Old NC 86

SITE SKETCH:

Start Time:
5:17 AM/PM

Duration:
20 minutes

Wind Speed: 1 mph

Wind Direction: NW

Temperature: 45^0F

Humidity: 50%

Site M10.1 Leq: 61.2 dB(A)
Calibration offset: 0.02 dB(A)

Site M10.2 Leq: 59.1 dB(A)
Calibration offset: -0.02 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	587	23	32	1	0	70
I-40 WB	818	27	40	1	0	70
I-40 EB Off-Ramp	45	3	0	0	0	50
Old NC86 NB	110	2	0	0	0	45
Old NC86 SB	104	1	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq M10.1 (dBA)	Lmax	Measured Leq M10.2 (dBA)	Lmax
1	17:17	62.4	66.6	62.5	67.9
2	17:18	60.3	65.7	58.3	60.7
3	17:19	60.1	64.0	58.3	61.4
4	17:20	62.1	66.7	60.0	64.0
5	17:21	60.9	63.2	58.8	60.2
6	17:22	61.8	66.1	59.6	63.5
7	17:23	61.1	64.4	58.8	61.0
8	17:24	62.3	66.7	60.5	66.0
9	17:25	61.6	67.1	58.9	61.8
10	17:26	61.3	65.6	58.8	61.1
11	17:27	61.4	64.7	58.3	60.8
12	17:28	62.9	68.6	60.1	64.9
13	17:29	61.2	67.4	58.6	66.1
14	17:30	61.1	64.6	58.7	61.7
15	17:31	60.8	64.8	58.4	61.8
16	17:32	60.2	62.8	57.9	60.9
17	17:33	61.0	65.6	58.3	62.1
18	17:34	59.4	62.8	57.6	59.7
19	17:35	59.7	67.0	56.4	64.4
20	17:36	60.9	64.4	59.0	64.6

Ambient Noise Monitoring Site M10.1

Ambient Noise Monitoring Site M10.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M11.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Old NC-86 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M11.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M11.1- 3013 Rippy Lane

SITE SKETCH:

Start Time:
11:37 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: SW

Temperature: 61^{0}F

Humidity: 35%

Site M11.1 Leq: 58.8 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	401	32	52	0	0	70
I-40 WB	419	24	61	1	0	70
At the intersection of Old NC86 North Ramps						
Old NC86 NB Through	74	2	0	0	0	45
Old NC86 NB Left to On-Ramp	15	0	0	0	0	55
Old NC86 SB Through	56	4	0	0	0	45
Old NC86 SB Right to On-Ramp	23	2	0	0	0	55
I-40 WB Off Ramp Right	12	3	0	0	0	55
I-40 WB Off Ramp Left	21	2	0	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	11:37	59.5	62.1
2	11:38	57.6	60.5
3	11:39	58.1	61.3
4	11:40	58.5	60.7
5	11:41	60.1	62.8
6	11:42	57.0	59.2
7	11:43	59.1	61.3
8	11:44	60.3	63.8
9	11:45	59.2	62.3
10	11:46	59.6	64.2
11	11:47	59.0	63.3
12	11:48	59.0	62.1
13	11:49	57.6	61.1
14	11:50	58.6	61.3
15	11:51	58.7	60.9
16	11:52	58.5	60.9
17	11:53	58.4	62.0
18	11:54	58.3	61.4
19	11:55	58.2	61.1
20	11:56	58.7	62.1

Ambient Noise Monitoring Site M11.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M12.1, M12.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Old NC-86 Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

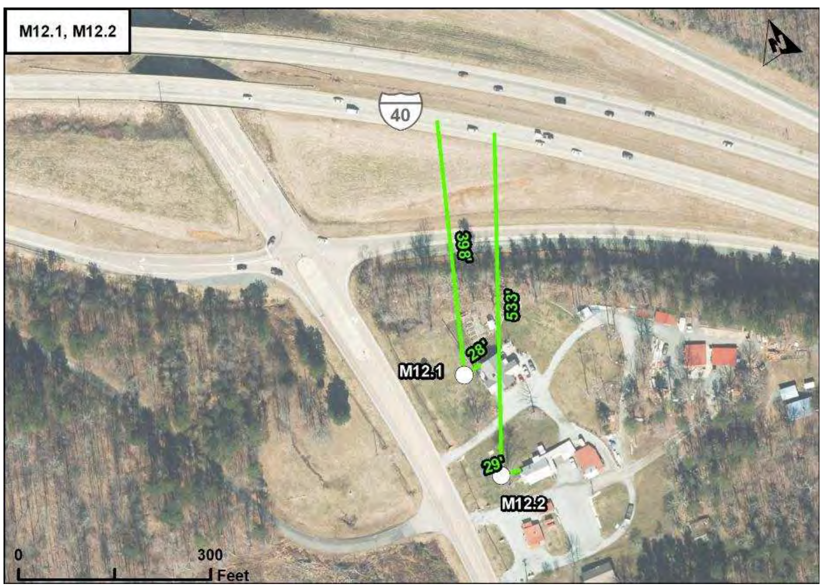
Equipment	Type	Microphone	Serial #
M12.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M12.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M12.1- 3210 Old NC 86 ; M12.2- 3224 Old NC 86 Unit B

SITE SKETCH:



Start Time:
4:37 AM/PM

Duration:
20 minutes

Wind Speed: 1 mph

Wind Direction: NW

Temperature: 50^0F

Humidity: 40%

Site M12.1 Leq: 66.6 dB(A)
Calibration offset: 0.01 dB(A)

Site M12.2 Leq: 65.0 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	537	25	32	1	0	70
I-40 WB	786	19	59	2	0	70
At the intersection of Old NC86 South Ramps						
Old NC86 NB Through	95	2	0	0	0	45
Old NC86 NB Right to On-Ramp	69	2	0	0	0	45
Old NC86 SB Through	76	0	0	0	0	45
Old NC86 SB Left to On-Ramp	34	0	0	0	0	45
I-40 EB Off Ramp Left	8	1	0	0	0	55
I-40 EB Off Ramp Right	9	1	0	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq M12.1 (dBA)	Lmax	Measured Leq M12.2 (dBA)	Lmax
1	16:37	65.3	68.7	63.9	67.4
2	16:38	66.5	68.6	65.1	67.7
3	16:39	66.8	70.1	65.4	69.3
4	16:40	67.7	70.9	65.9	70.1
5	16:41	67.5	69.6	65.8	68.7
6	16:42	66.9	68.8	65.5	67.5
7	16:43	66.1	68.6	64.1	67.3
8	16:44	66.5	68.9	64.8	67.7
9	16:45	65.7	68.1	63.9	66.5
10	16:46	66.5	69.3	64.8	67.5
11	16:47	67.5	70.6	65.9	69.3
12	16:48	65.8	68.2	63.8	66.4
13	16:49	66.8	69.4	65.7	68.2
14	16:50	67.6	70.4	65.6	68.1
15	16:51	66.6	69.8	64.7	68.5
16	16:52	66.6	69.0	64.9	66.9
17	16:53	66.3	68.2	64.8	66.8
18	16:54	65.6	68.1	64.2	66.2
19	16:55	66.9	68.9	65.3	68.1
20	16:56	66.5	69.3	65.1	67.0

Ambient Noise Monitoring Site M12.1

Ambient Noise Monitoring Site M12.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M13.1, M13.2, M13.3

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M13.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M13.2 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M13.3 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M13.1- 642 Alice Loop ; M13.2- 638 Alice Loop ; M13.3- 630 Alice Loop

SITE SKETCH:

Start Time:
9:20 AM/PM

Duration:
20 minutes

Wind Speed: 8 mph

Wind Direction: S

Temperature: 51^0F

Humidity: 45%

Site M13.1 Leq: 64.1 dB(A)
Calibration offsets: 0.00 dB(A)

Site M13.2 Leq: 59.7 dB(A)
Calibration offsets: 0.00 dB(A)

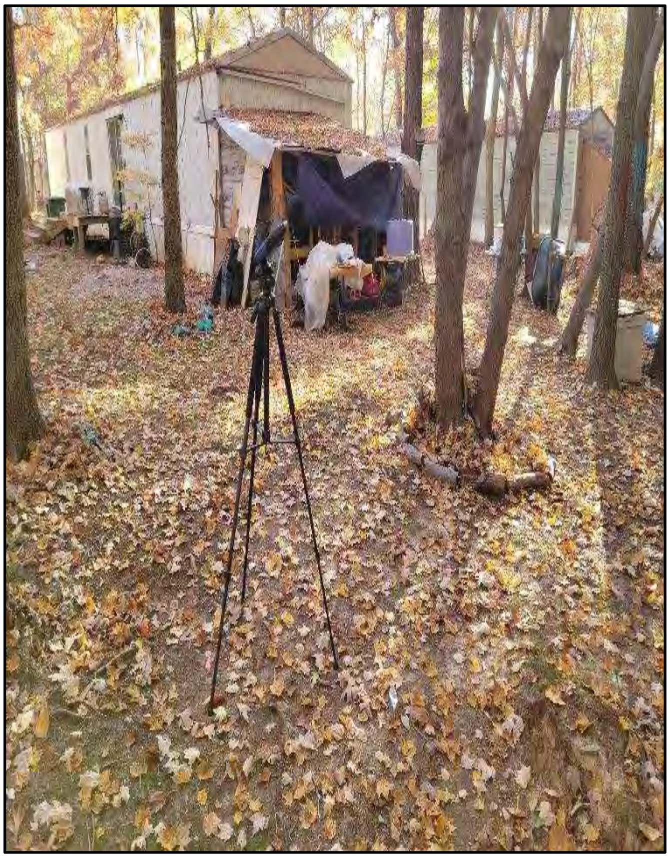
Site M13.3 Leq: 55.7 dB(A)
Calibration offsets: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	421	41	52	1	0	70
I-40 WB	495	40	78	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M13.1 (dBA)	Lmax	Measured Leq M13.2 (dBA)	Lmax	Measured Leq M13.3 (dBA)	Lmax
1	9:20	62.4	65.1	59.5	61.0	56.4	60.3
2	9:21	63.5	66.4	58.9	60.9	55.5	57.5
3	9:22	64.3	68.2	60.7	62.9	56.9	58.4
4	9:23	66.4	73.3	61.2	64.4	57.4	58.9
5	9:24	63.5	66.8	59.7	61.4	56.1	57.9
6	9:25	63.9	66.1	60.2	61.6	56.7	58.5
7	9:26	63.6	66.7	59.5	60.9	56.5	59.0
8	9:27	63.9	65.9	60.0	61.5	56.4	58.2
9	9:28	65.2	70.0	60.5	64.4	56.6	59.5
10	9:29	64.5	67.5	60.0	62.8	55.6	57.4
11	9:30	64.9	67.4	60.3	62.0	56.3	57.2
12	9:31	63.9	66.9	59.3	60.9	55.3	57.1
13	9:32	63.1	66.2	59.1	61.0	55.0	56.2
14	9:33	62.8	65.1	58.6	60.3	54.3	55.8
15	9:34	63.5	65.2	58.7	59.9	54.1	55.3
16	9:35	64.0	67.4	59.2	61.1	54.6	56.4
17	9:36	64.9	67.4	59.8	61.3	54.9	57.3
18	9:37	63.7	66.3	59.3	61.2	54.9	58.6
19	9:38	63.3	65.7	58.8	61.6	53.9	55.6
20	9:39	64.3	66.0	59.7	60.9	55.2	56.5

Ambient Noise Monitoring Site M13.1



Ambient Noise Monitoring Site M13.2

Ambient Noise Monitoring Site M13.3

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M13.4, M13.5, M13.6

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M13.4 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M13.5 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M13.6 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M13.4- 662 Alice Loop ; M13.5- 674 Alice Loop ; M13.6- 675 Alice Loop

SITE SKETCH:

Start Time:
10:50 AM/PM

Duration:
20 minutes

Wind Speed: 8 mph

Wind Direction: S

Temperature: 58^0F

Humidity: 35%

Site M13.4 Leq: 59.7 dB(A)
Calibration offset: N/A

Site M13.5 Leq: 56.4 dB(A)
Calibration offset: 0.00 dB(A)

Site M13.6 Leq: 53.6 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	519	44	59	0	0	70
I-40 WB	484	27	74	1	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M13.4 (dBA)	Lmax	Measured Leq M13.5 (dBA)	Lmax	Measured Leq M13.6 (dBA)	Lmax
1	10:50	60.5	64.4	57.3	60.7	55.1	58.6
2	10:51	58.9	62.4	55.2	58.8	53.5	55.2
3	10:52	60.0	62.3	56.3	59.1	52.6	54.6
4	10:53	59.8	62.0	56.3	58.5	54.0	59.0
5	10:54	59.6	62.0	56.4	58.3	53.4	56.4
6	10:55	59.2	62.5	56.2	60.8	53.9	57.1
7	10:56	60.3	64.0	57.0	61.2	54.7	58.2
8	10:57	60.7	64.7	57.7	61.0	53.8	56.1
9	10:58	61.1	64.0	57.2	60.2	54.2	56.3
10	10:59	59.9	62.6	56.4	58.2	53.7	55.9
11	11:00	59.3	63.8	55.7	60.2	52.7	56.1
12	11:01	59.9	65.9	57.7	63.2	53.9	58.1
13	11:02	61.1	66.6	56.5	60.3	54.0	57.2
14	11:03	59.3	61.3	55.7	57.8	53.1	57.8
15	11:04	59.7	64.5	56.6	61.4	52.5	56.2
16	11:05	60.3	62.8	57.3	59.8	53.3	56.3
17	11:06	58.8	61.3	55.5	58.4	52.8	54.3
18	11:07	57.4	59.8	54.3	56.3	51.9	53.0
19	11:08	57.9	60.5	55.7	58.4	55.0	60.6
20	11:09	58.3	61.6	55.4	57.7	53.2	59.8

Ambient Noise Monitoring Site M13.4

Ambient Noise Monitoring Site M13.5

Ambient Noise Monitoring Site M13.6

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M14.1, M14.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

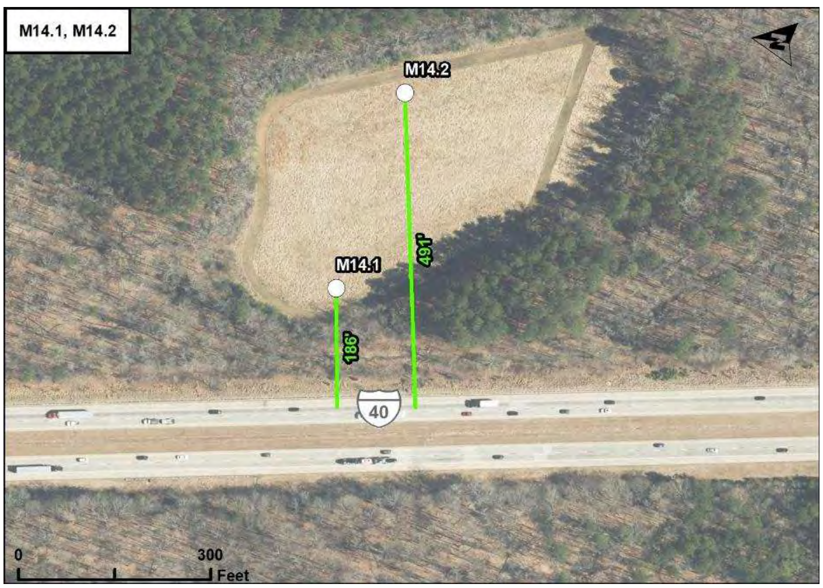
Equipment	Type	Microphone	Serial #
M14.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M14.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description – M14.1- 4215 NC 86 S; M14.2- 4215 NC 86 S

SITE SKETCH:



Start Time:
10:34 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: WSW

Temperature: 44^{0}F

Humidity: 56%

Site M14.1 Leq: 67.6 dB(A)
Calibration offset: 0.01 dB(A)

Site M14.2 Leq: 64.3 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	509	23	76	1	0	70
I-40 WB	494	34	84	1	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M14.1 (dBA)	Lmax	Measured Leq M14.2 (dBA)	Lmax
1	10:34	67.9	70.5	64.9	67.0
2	10:35	67.1	69.3	64.4	65.6
3	10:36	68.8	71.3	65.0	66.2
4	10:37	67.9	70.6	64.8	66.6
5	10:38	65.9	70.6	63.2	66.4
6	10:39	68.2	70.9	64.3	66.3
7	10:40	69.5	72.3	65.8	67.6
8	10:41	66.7	70.7	64.6	67.1
9	10:42	67.7	71.9	64.6	67.7
10	10:43	67.1	69.3	63.6	65.9
11	10:44	68.4	72.3	65.5	68.2
12	10:45	67.7	72.8	63.6	66.8
13	10:46	67.3	71.6	64.7	67.4
14	10:47	67.6	72.6	64.6	68.5
15	10:48	66.8	70.0	63.8	68.6
16	10:49	64.6	67.5	61.7	63.0
17	10:50	67.8	71.4	64.3	66.7
18	10:51	67.8	70.3	63.6	65.1
19	10:52	65.7	67.7	62.3	63.4
20	10:53	68.0	70.7	64.7	67.5

Ambient Noise Monitoring Site M14.1

Ambient Noise Monitoring Site M14.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M15.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, New Hope Church Rd Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M15.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M15.1- 4334 Vallie Hi Ln. Unit B

SITE SKETCH:

Start Time:
2:16 AM/PM

Duration:
20 minutes

Wind Speed: 8 mph

Wind Direction: WNW

Temperature: 53^0F

Humidity: 32%

Site M15.1 Leq: 53.8 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	733	28	43	0	0	70
I-40 WB	734	33	68	0	0	70
At the intersection of New Hope Church Rd South Ramps						
New Hope Church Road NB through	49	2	0	0	0	45
New Hope Church Road NB Right	33	1	0	0	0	45
New Hope Church Road SB through	50	1	0	0	0	45
New Hope Church Road SB Left	10	1	0	0	0	45
I-40 Off-Ramp Right	21	1	0	0	0	55
I-40 Off-Ramp Left	8	0	0	0	0	55
New Hope Church Road NB through	49	2	0	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	14:16	54.0	56.8
2	14:17	56.6	62.1
3	14:18	53.7	55.6
4	14:19	55.9	60.1
5	14:20	54.0	57.3
6	14:21	53.4	55.7
7	14:22	52.8	54.9
8	14:23	52.9	55.5
9	14:24	52.1	54.3
10	14:25	52.0	55.2
11	14:26	53.4	58.9
12	14:27	54.3	58.4
13	14:28	56.4	63.3
14	14:29	52.7	55.6
15	14:30	53.2	55.6
16	14:31	52.3	56.0
17	14:32	52.7	56.4
18	14:33	52.7	56.4
19	14:34	51.4	57.5
20	14:35	54.1	58.7

Ambient Noise Monitoring Site M15.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M16.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, New Hope Church Rd   Date: 11/15/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M16.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one)   **FAST**   **SLOW**

WEIGHTING (circle one)   A   Lin.

Location Description – M16.1- 5111 Homer Ruffin Rd.

SITE SKETCH:

Start Time:
3:50 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: WNW

Temperature: 53^0F

Humidity: 30%

Site M16.1 Leq: 53.8 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	652	19	43	0	0	70
I-40 WB	817	25	62	1	0	70
At the intersection of New Hope Church Rd South Ramps						
New Hope Church Road NB Through	73	3	0	2	0	45
New Hope Church Road NB Right	22	1	0	0	0	45
New Hope Church Road SB Through	52	2	0	0	0	45
New Hope Church Road SB Left	5	0	0	0	0	45
I-40 Off-Ramp Left	8	1	0	0	0	55
I-40 Off-Ramp Right	15	1	0	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	15:50	54.6	61.9
2	15:51	54.0	54.8
3	15:52	54.7	56.2
4	15:53	53.4	54.9
5	15:54	53.0	55.1
6	15:55	52.8	54.8
7	15:56	53.4	54.7
8	15:57	54.1	55.5
9	15:58	53.1	55.8
10	15:59	54.4	55.9
11	16:00	53.9	55.3
12	16:01	53.4	55.1
13	16:02	53.8	55.4
14	16:03	53.4	55.3
15	16:04	54.2	55.3
16	16:05	54.1	55.2
17	16:06	52.3	53.5
18	16:07	54.2	55.4
19	16:08	55.0	60.4
20	16:09	52.9	54.9

Ambient Noise Monitoring Site M16.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M17.1, M17.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M17.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M17.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M17.1- 6027 Meadow Greer Rd; M17.2- 6019 Meadow Greer Rd

SITE SKETCH:

Start Time:
11:29 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: WSW

Temperature: 50^0F

Humidity: 49%

Site M17.1 Leq: 66.6 dB(A)
Calibration offset: 0.01 dB(A)

Site M17.2 Leq: 54.2 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	557	26	68	0	0	70
I-40 WB	480	39	54	1	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M17.1 (dBA)	Lmax	Measured Leq M17.2 (dBA)	Lmax
1	11:29	68.0	70.6	55.7	59.0
2	11:30	65.3	67.3	54.5	57.4
3	11:31	66.2	68.6	54.8	59.1
4	11:32	67.4	69.5	54.7	56.3
5	11:33	66.4	69.8	53.8	55.7
6	11:34	66.1	68.7	53.7	55.1
7	11:35	67.6	69.2	54.8	56.7
8	11:36	65.5	68.0	53.3	54.5
9	11:37	66.2	68.6	53.5	56.5
10	11:38	65.8	68.6	53.5	56.5
11	11:39	66.6	68.8	53.7	55.5
12	11:40	66.6	69.1	53.5	55.2
13	11:41	65.9	67.5	53.2	54.3
14	11:42	66.2	67.8	53.7	54.7
15	11:43	66.8	68.9	53.9	55.0
16	11:44	65.6	68.3	53.4	54.4
17	11:45	66.8	70.2	54.8	56.6
18	11:46	67.4	70.0	55.1	56.4
19	11:47	66.8	69.1	54.6	55.8
20	11:48	67.6	69.2	55.3	56.1

Ambient Noise Monitoring Site M17.1

Ambient Noise Monitoring Site M17.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M18.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Millhouse Rd Date: 11/18/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M18.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M18.1- 5954 Neal Tapps Rd

SITE SKETCH:

Start Time:
4:54 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: SW

Temperature: 63⁰F

Humidity: 85%

Site M18.1 Leq: 62.1 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	620	26	73	2	1	70
I-40 WB	614	32	77	0	1	70
Millhouse Road NB	13	1	0	0	0	30
Millhouse Road SB	14	0	0	0	0	30

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	16:54	60.9	62.4
2	16:55	62.2	63.6
3	16:56	62.1	65.1
4	16:57	62.4	64.8
5	16:58	61.2	62.9
6	16:59	62.0	64.1
7	17:00	62.5	65.7
8	17:01	62.7	66.2
9	17:02	61.5	63.8
10	17:03	60.7	62.1
11	17:04	62.6	65.1
12	17:05	62.2	63.7
13	17:06	62.0	63.4
14	17:07	61.4	62.6
15	17:08	62.5	64.1
16	17:09	62.7	67.4
17	17:10	61.3	62.7
18	17:11	62.4	63.6
19	17:12	63.2	65.1
20	17:13	62.5	63.9

Ambient Noise Monitoring Site M18.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M19.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-30, Millhouse Rd   Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M19.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one)   **FAST**   **SLOW**

WEIGHTING (circle one)   A   Lin.

Location Description – M19.1- 6211 New Jericho Rd

SITE SKETCH:

Start Time:
12:04 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: SW   :

Temperature: 55^0F

Humidity: 34%

Site M19.1 Leq: 57.7 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	510	15	61	1	0	70
I-40 WB	423	19	54	0	0	70
Millhouse Road NB	10	0	0	0	0	30
Millhouse Road SB	15	0	0	0	0	30

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	12:04	57.8	60.6
2	12:05	58.2	60.4
3	12:06	57.4	59.9
4	12:07	57.9	58.9
5	12:08	57.4	59.8
6	12:09	57.7	59.8
7	12:10	56.3	58.6
8	12:11	57.6	59.2
9	12:12	57.4	60.4
10	12:13	58.4	59.8
11	12:14	56.6	58.4
12	12:15	57.2	58.3
13	12:16	57.5	59.2
14	12:17	59.1	60.7
15	12:18	58.9	60.6
16	12:19	56.4	58.0
17	12:20	57.4	59.1
18	12:21	58.0	61.1
19	12:22	57.6	59.8
20	12:23	58.1	59.5

Ambient Noise Monitoring Site M19.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M20.1, M20.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Millhouse Rd Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M20.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11570
M20.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description – M20.1- 1794 Avery Way; M20.2- 1772 Avery Way

SITE SKETCH:

Start Time:
2:24 AM/PM

Duration:
20 minutes

Wind Speed: 8 mph

Wind Direction: W

Temperature: 48^0F

Humidity: 35%

Site M20.1 Leq: 68.7 dB(A)
Calibration offset: -0.01 dB(A)

Site M20.2 Leq: 65.9 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	607	31	65	0	0	70
I-40 WB	587	33	68	0	0	70
Millhouse Road NB	15	0	0	0	0	30
Millhouse Road SB	13	0	0	0	0	30

LOG SHEET

#	1 Minute Period Starting	Measured Leq M20.1 (dBA)	Lmax	Measured Leq M20.2 (dBA)	Lmax
1	14:24	66.4	71.9	62.4	68.6
2	14:25	67.6	72.0	64.7	68.7
3	14:26	67.7	71.3	64.4	67.1
4	14:27	66.4	72.7	62.7	67.2
5	14:28	67.5	72.5	64.7	70.2
6	14:29	68.9	71.2	65.4	67.6
7	14:30	68.5	72.6	65.1	69.1
8	14:31	67.4	70.4	63.8	66.8
9	14:32	65.4	71.0	61.6	65.1
10	14:33	67.1	71.5	63.7	67.9
11	14:34	68.4	73.7	64.9	68.2
12	14:35	67.2	71.9	63.8	68.1
13	14:36	68.3	72.3	64.9	67.9
14	14:37	71.9	82.9	69.8	80.9
15	14:38	69.5	77.4	65.6	75.6
16	14:39	73.5	85.2	72.0	82.9
17	14:40	68.3	73.5	65.2	71.1
18	14:41	67.7	71.1	64.7	68.4
19	14:42	69.2	72.5	65.8	68.9
20	14:43	68.7	71.3	66.1	68.1

Ambient Noise Monitoring Site M20.1

Ambient Noise Monitoring Site M20.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M22a.1, M22a.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

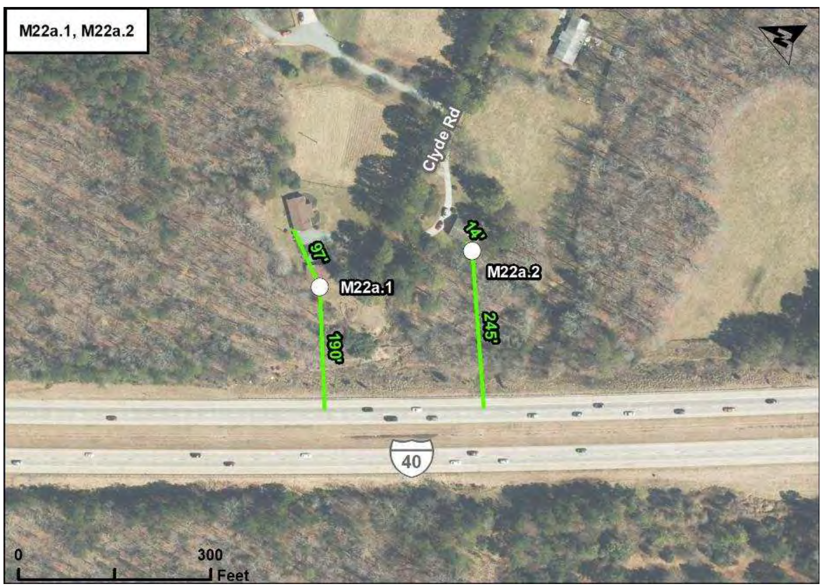
Equipment	Type	Microphone	Serial #
M22a.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M22a.2 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST SLOW

WEIGHTING (circle one) A Lin.

Location Description – M22a.1- 2014 Clyde Rd ; M22a.2- 2015 Clyde Rd

SITE SKETCH:



Start Time:
4:01 AM/PM

Duration:
20 minutes

Wind Speed: 3 mph

Wind Direction: W

Temperature: 47⁰F

Humidity: 35%

Site M22a.1 Leq: 71.3 dB(A)
Calibration offset: -0.02 dB(A)

Site M22a.2 Leq: 67.7 dB(A)
Calibration offset: 0.01 dB(A)

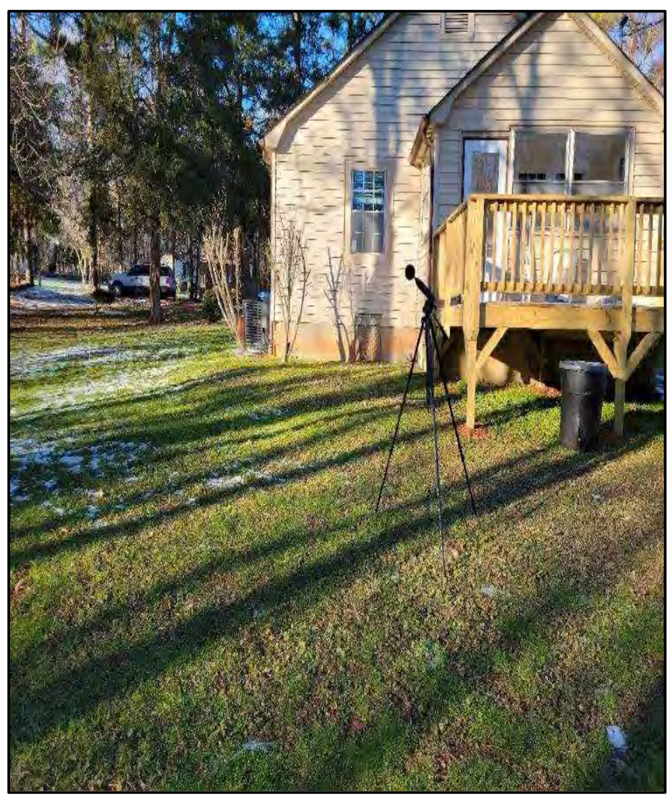
Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	613	19	39	0	0	70
I-40 WB	816	39	75	2	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M22a.1 (dBA)	Lmax	Measured Leq M22a.2 (dBA)	Lmax
1	16:01	71.8	85.3	68.5	70.4
2	16:02	71.8	73.4	68.1	70.7
3	16:03	72.0	75.2	67.4	71.1
4	16:04	68.6	72.6	66.2	69.5
5	16:05	71.7	78.7	68.5	71.0
6	16:06	71.5	74.0	66.3	68.5
7	16:07	69.6	72.4	66.5	72.2
8	16:08	69.9	77.2	65.7	69.4
9	16:09	70.3	73.2	65.8	68.8
10	16:10	69.0	72.3	68.5	72.5
11	16:11	73.4	77.4	69.5	74.5
12	16:12	71.6	79.4	68.5	74.1
13	16:13	71.1	74.9	67.3	70.6
14	16:14	72.5	76.3	69.4	72.0
15	16:15	71.6	74.9	67.1	68.6
16	16:16	70.7	72.7	68.1	70.7
17	16:17	72.1	74.7	67.0	70.7
18	16:18	71.5	76.0	68.7	71.3
19	16:19	71.1	75.3	66.7	70.0
20	16:20	70.7	74.3	66.4	69.0

Ambient Noise Monitoring Site M22a.1

Ambient Noise Monitoring Site M22a.2



SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M22b.1, M22b.2, M22b.3

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, NC-86 Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M22b.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M22b.2 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M22b.3 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M22b.1- 302 Old Moze Trail ; M22b.2- 508 Hurricane Alley ; M22b.3- 528 Hurricane Alley

SITE SKETCH:

Start Time:
3:27 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: W

Temperature: 47^0F

Humidity: 35%

Site M22b.1 Leq: 63.7 dB(A)
Calibration offset: 0.02 dB(A)

Site M22b.2 Leq: 60.9 dB(A)
Calibration offset: 0.00 dB(A)

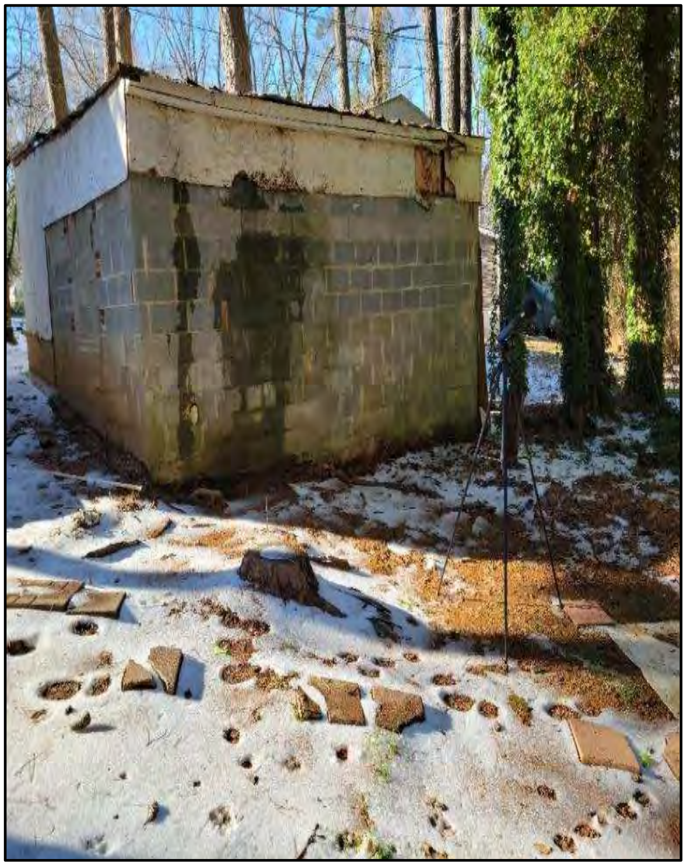
Site M22b.3 Leq: 55.4 dB(A)
Calibration offset: -0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	501	22	29	0	0	70
I-40 WB	436	27	32	0	0	70
I-40 WB On-Ramp	27	2	0	0	0	55
NC 86 NB	55	9	1	0	0	45
NC 86 SB	61	15	0	1	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq M22b.1 (dBA)	Lmax	Measured Leq M22b.2 (dBA)	Lmax	Measured Leq M22b.3 (dBA)	Lmax
1	15:27	63.7	69.6	60.9	63.1	56.0	80.4
2	15:28	64.7	69.7	61.6	64.0	55.4	57.7
3	15:29	59.9	67.8	61.5	64.9	55.8	57.8
4	15:30	66.7	72.6	61.7	64.1	54.9	56.9
5	15:31	60.3	67.1	60.4	62.4	55.1	56.8
6	15:32	62.2	67.6	61.2	63.6	54.1	56.5
7	15:33	63.3	67.5	59.3	62.4	54.1	55.8
8	15:34	62.0	69.2	61.1	63.3	54.9	57.0
9	15:35	59.3	65.4	59.8	61.1	55.4	56.8
10	15:36	64.7	71.9	60.8	63.5	53.7	57.1
11	15:37	66.2	72.2	59.4	62.0	53.6	54.4
12	15:38	62.7	70.2	60.2	64.4	55.9	57.6
13	15:39	63.4	70.0	62.3	64.6	55.8	57.3
14	15:40	62.8	70.0	59.5	60.9	54.7	57.7
15	15:41	68.0	78.0	60.7	62.0	56.7	58.7
16	15:42	64.2	70.6	61.8	64.0	55.3	56.6
17	15:43	63.0	68.9	61.6	64.0	57.1	59.8
18	15:44	62.4	69.7	61.2	63.7	55.8	60.7
19	15:45	62.1	68.4	60.4	61.8	55.8	60.2
20	15:46	60.3	68.7	60.9	63.0	56.4	59.7

Ambient Noise Monitoring Site M22b.1



Ambient Noise Monitoring Site M22b.2

Ambient Noise Monitoring Site M22b.3

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M23.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Whitfield Rd, NC-86 Date: 11/17/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M23.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M23.1- 7106 Dumfries Ln.

SITE SKETCH:

Start Time:
3:33 AM/PM

Duration:
20 minutes

Wind Speed: 9 mph

Wind Direction: SSW

Temperature: 73⁰F

Humidity: 39%

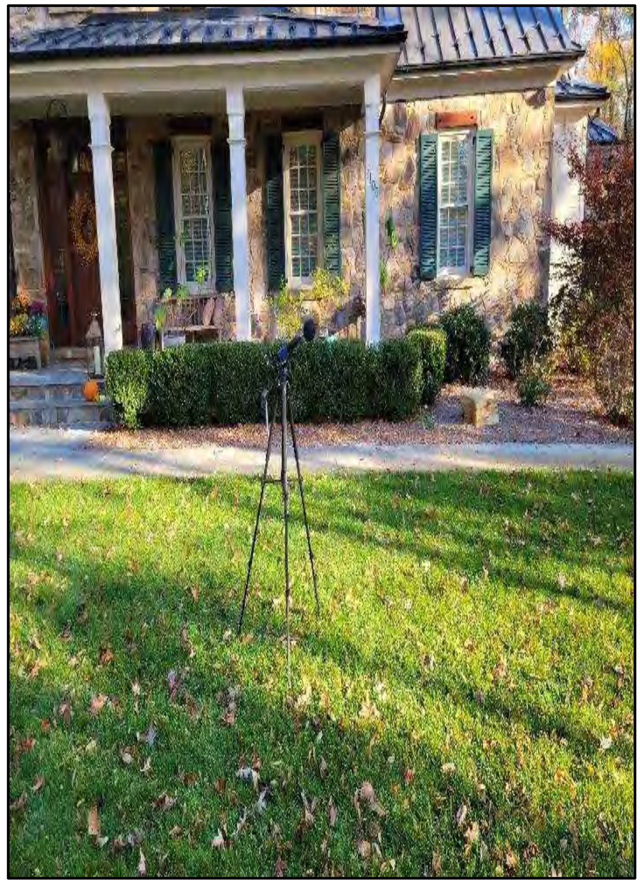
Site M23.1 Leq: 61.5 dB(A)
Calibration offset: 0.02 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	628	22	51	1	0	70
I-40 WB	812	64	28	0	0	70
Whitfield Road EB	49	0	0	0	0	45
Whitfield Road WB	41	0	0	0	0	45
At the intersection of NC 86 North Ramps						
NC 86 SB Through	120	1	0	1	0	45
NC 86 SB Right to On-Ramp	9	0	0	0	0	45
NC 86 NB Through	142	0	1	3	0	45
NC 86 NB Left to On-Ramp	169	3	0	1	0	45
Off Ramp - Right	72	0	3	1	0	55
Off Ramp - Left	24	0	0	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	15:33	62.4	64.2
2	15:34	62.8	65.1
3	15:35	62.4	64.0
4	15:36	62.9	64.6
5	15:37	61.7	63.4
6	15:38	60.9	62.6
7	15:39	61.7	63.3
8	15:40	60.2	62.1
9	15:41	61.1	62.4
10	15:42	60.8	62.9
11	15:43	61.4	63.0
12	15:44	61.1	62.4
13	15:45	60.9	62.5
14	15:46	61.1	62.7
15	15:47	61.2	62.5
16	15:48	61.2	62.4
17	15:49	62.8	66.3
18	15:50	60.5	62.3
19	15:51	60.4	61.7
20	15:52	60.7	62.2

Ambient Noise Monitoring Site M23.1



SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M24.1, M24.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, MLK Blvd. Date: 01/18/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M24.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M24.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M24.1- 104 Groomsbridge Ct. ; M24.2- 7707 NC 86 S

SITE SKETCH:

Start Time:
12:19 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: W

Temperature: 45^0F

Humidity: 40%

Site M24.1 Leq: 56.8 dB(A)
Calibration offset: 0.00 dB(A)

Site M24.2 Leq: 61.0 dB(A)
Calibration offset: -0.01 dB(A)

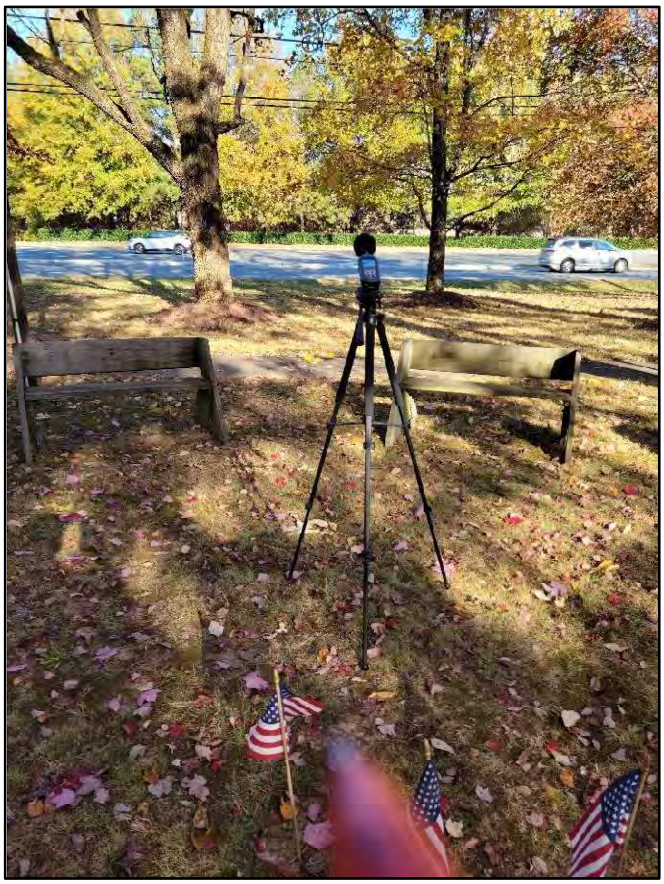
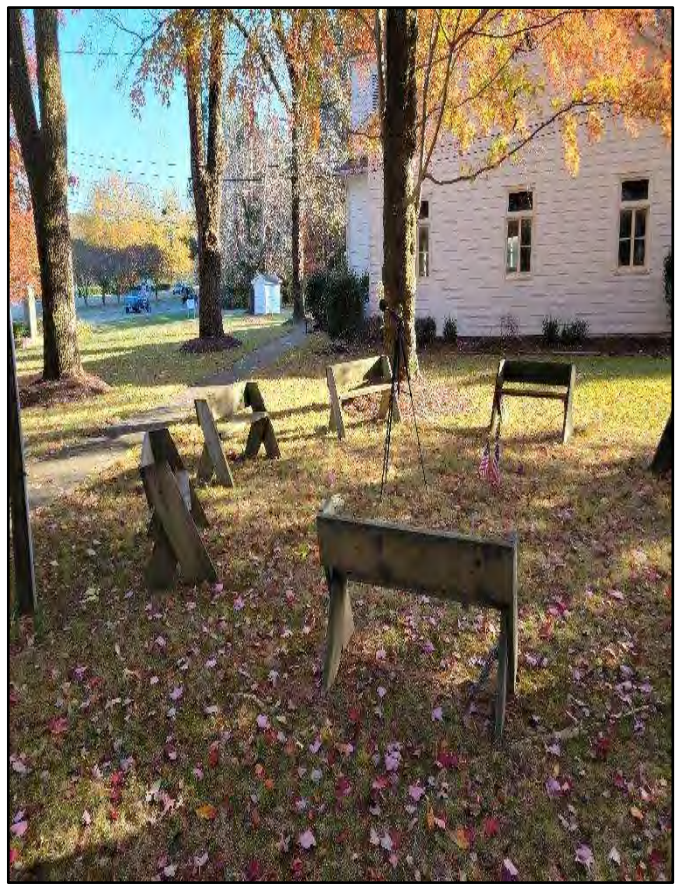
Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	431	22	37	0	0	70
I-40 WB	510	26	28	0	0	70
I-40 EB Exit Ramp Left	17	1	0	0	0	55
I-40 EB Exit Ramp Right	31	0	0	0	0	55
At the intersection of MLK Blvd and Eubanks Road						
MLK Blvd NB Through	109	2	0	0	0	45
MLK Blvd NB Left	84	0	0	1	0	45
MLK Blvd SB Through	208	2	0	1	0	45
MLK Blvd SB Right	52	0	1	0	0	45
Eubanks EB Left	141	5	1	0	0	45
Eubanks EB Right	120	2	1	0	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq M24.1 (dBA)	Lmax	Measured Leq M24.2 (dBA)	Lmax
1	12:19	57.4	59.2	59.7	62.8
2	12:20	57.0	58.7	61.7	66.8
3	12:21	56.9	58.8	57.9	62.2
4	12:22	56.9	59.7	59.8	63.1
5	12:23	57.1	59.0	60.0	62.2
6	12:24	56.6	58.5	60.0	63.0
7	12:25	56.8	58.4	65.8	75.8
8	12:26	55.4	57.3	58.2	62.3
9	12:27	56.7	58.8	62.2	67.8
10	12:28	57.9	59.7	61.3	64.5
11	12:29	58.4	60.5	60.7	63.6
12	12:30	58.2	60.1	60.5	63.4
13	12:31	56.5	58.6	61.6	72.3
14	12:32	55.2	57.3	60.2	66.3
15	12:33	55.7	57.7	60.2	62.6
16	12:34	56.2	58.0	58.4	62.6
17	12:35	56.3	58.2	60.7	65.3
18	12:36	57.0	59.4	62.7	69.7
19	12:37	56.2	59.0	60.1	64.0
20	12:38	55.7	57.6	60.4	63.8

Ambient Noise Monitoring Site M24.1


Ambient Noise Monitoring Site M24.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M25.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/17/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

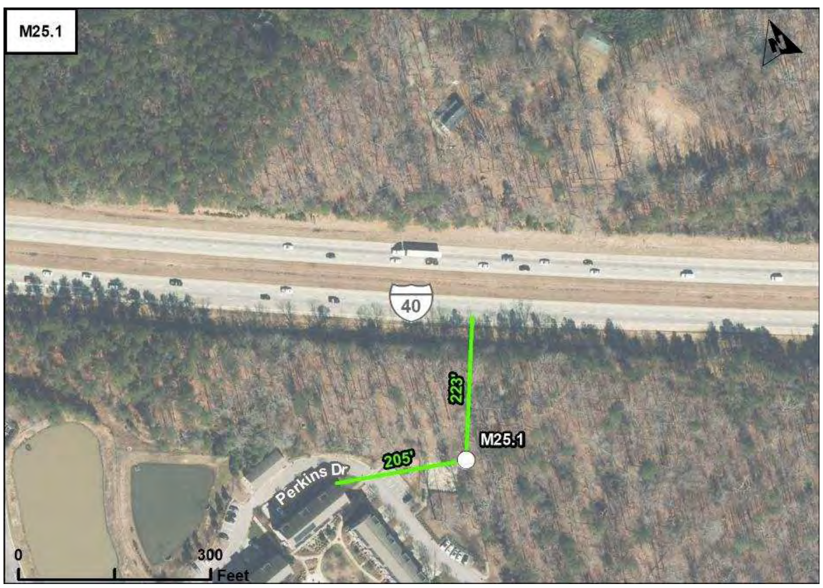
Equipment	Type	Microphone	Serial #
M25.1 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M25.1- 702 Perkins Dr

SITE SKETCH:



Start Time:
11:00 AM/PM

Duration:
20 minutes

Wind Speed: 5 mph

Wind Direction: SSW

Temperature: 65^0F

Humidity: 59%

Site M25.1 Leq: 66.5 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB (Ramp not Included)	639	32	72	2	0	70
I-40 WB	602	42	70	0	0	70
I-40 WB On-Ramp	124	1	3	0	0	55

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	11:00	67.0	68.6
2	11:01	65.1	68.2
3	11:02	66.4	68.9
4	11:03	67.7	71.2
5	11:04	66.6	69.3
6	11:05	67.2	68.7
7	11:06	66.8	68.9
8	11:07	65.9	68.0
9	11:08	67.9	70.4
10	11:09	66.2	68.7
11	11:10	65.8	67.3
12	11:11	66.7	68.3
13	11:12	66.2	68.2
14	11:13	66.0	67.6
15	11:14	66.9	69.1
16	11:15	66.8	68.7
17	11:16	65.7	67.0
18	11:17	67.3	68.9
19	11:18	66.2	68.1
20	11:19	65.1	68.1

Ambient Noise Monitoring Site M25.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M26.1, M26.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M26.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M26.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M26.1- 109 Foxridge Rd; M26.2- 113 Foxridge Rd

SITE SKETCH:

Start Time:
1:13 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: SW

Temperature: 56^0F

Humidity: 39%

Site M26.1 Leq: 68.8 dB(A)
Calibration offset: 0.01 dB(A)

Site M26.2 Leq: 63.3 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	511	19	61	0	0	70
I-40 WB	545	21	53	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M26.1 (dBA)	Lmax	Measured Leq M26.2 (dBA)	Lmax
1	13:13	68.2	72.9	62.7	65.3
2	13:14	69.6	73.1	64.3	65.4
3	13:15	69.9	72.9	64.1	65.5
4	13:16	67.5	71.3	62.0	65.1
5	13:17	69.1	72.5	63.7	65.7
6	13:18	69.0	71.1	63.3	64.7
7	13:19	68.3	71.1	62.8	65.6
8	13:20	69.5	72.0	63.8	65.4
9	13:21	66.9	70.2	62.5	64.1
10	13:22	68.6	71.4	62.7	64.9
11	13:23	68.5	71.7	63.5	65.2
12	13:24	69.3	73.2	63.2	65.4
13	13:25	68.9	73.5	63.3	65.4
14	13:26	68.5	70.5	63.0	64.8
15	13:27	68.9	72.8	63.3	66.4
16	13:28	68.4	71.3	63.0	64.2
17	13:29	69.9	78.2	64.0	68.6
18	13:30	68.9	71.6	63.7	67.0
19	13:31	68.5	71.5	63.4	65.1
20	13:32	68.6	71.5	62.9	65.6

Ambient Noise Monitoring Site M26.1

Ambient Noise Monitoring Site M26.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M27.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M27.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M27.1- 151 Schultz St

SITE SKETCH:

Start Time:
2:32 AM/PM

Duration:
20 minutes

Wind Speed: 13 mph*

Wind Direction: SSW

Temperature: 56^0F

Humidity: 30%

Site M27.1 Leq: 60.3 dB(A)
Calibration offset: 0.00 dB(A)

* The wind speeds at this location was noted from the weatherunderground.com website. The field observed wind speed during the monitoring sessions was calm and no substantial wind noise was prevalent during noise monitoring session at this location.

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	450	21	69	0	0	70
I-40 WB	507	20	63	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	14:32	59.0	61.5
2	14:33	60.8	63.1
3	14:34	65.6	72.2
4	14:35	60.8	63.5
5	14:36	60.2	61.7
6	14:37	58.3	60.6
7	14:38	59.5	61.8
8	14:39	59.2	60.8
9	14:40	58.6	61.3
10	14:41	59.3	61.3
11	14:42	58.9	60.7
12	14:43	60.6	61.8
13	14:44	59.3	61.8
14	14:45	61.0	62.9
15	14:46	59.7	62.4
16	14:47	59.7	62.0
17	14:48	59.8	62.0
18	14:49	60.1	61.4
19	14:50	60.0	61.5
20	14:51	59.4	60.7

Ambient Noise Monitoring Site M27.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M28.1, M28.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M28.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M28.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M28.1- 22 Mafolie Ct; M28.2- 18 Mafolie Ct

SITE SKETCH:

Start Time:
1:54 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: SW

Temperature: 57^0F

Humidity: 40%

Site M28.1 Leq: 66.8 dB(A)
Calibration offset: 0.00 dB(A)

Site M28.2 Leq: 59.1 dB(A)
Calibration offset: 0.00 dB(A)

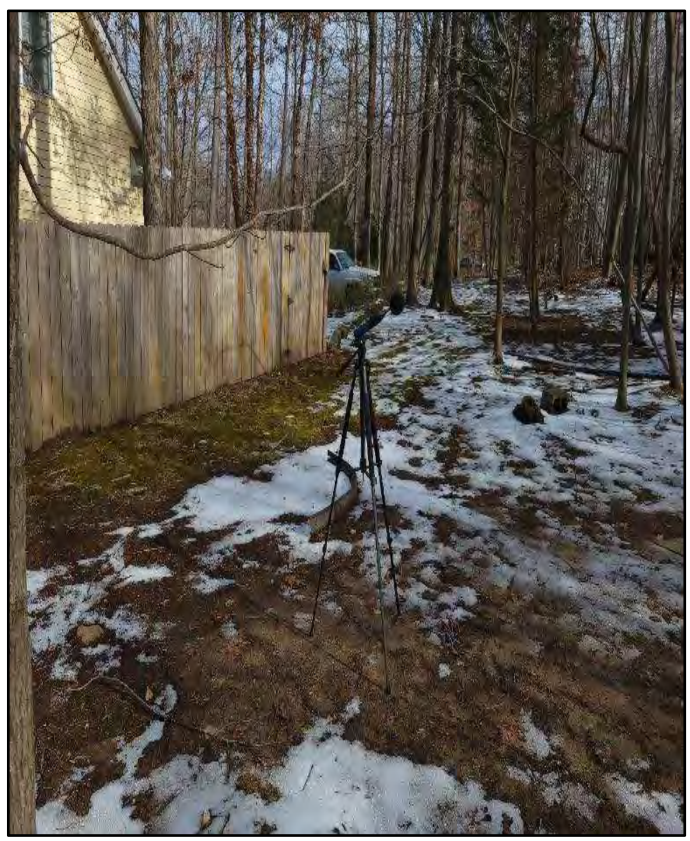
Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	575	20	48	3	0	70
I-40 WB	602	31	50	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M28.1 (dBA)	Lmax	Measured Leq M28.2 (dBA)	Lmax
1	13:54	66.3	69.2	59.4	61.4
2	13:55	66.8	71.9	59.2	62.3
3	13:56	65.3	67.3	57.7	59.6
4	13:57	66.4	71.5	58.6	63.2
5	13:58	66.4	69.5	58.7	61.0
6	13:59	67.3	69.6	59.4	61.6
7	14:00	66.4	67.9	59.1	61.4
8	14:01	67.7	69.2	59.4	61.2
9	14:02	67.4	70.4	59.8	62.3
10	14:03	66.5	68.9	58.5	61.1
11	14:04	66.1	71.6	58.7	62.3
12	14:05	67.1	69.3	59.9	61.8
13	14:06	67.6	69.8	59.6	62.5
14	14:07	66.3	69.2	58.3	63.2
15	14:08	67.4	69.9	59.7	61.7
16	14:09	67.2	69.0	58.7	61.0
17	14:10	66.8	68.2	59.7	61.9
18	14:11	67.5	69.7	59.9	62.2
19	14:12	66.8	68.6	58.6	61.1
20	14:13	66.3	68.8	59.0	62.6

Ambient Noise Monitoring Site M28.1

Ambient Noise Monitoring Site M28.2



SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M29.1, M29.2, M29.3

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M29.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M29.2 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M29.3 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M29.1- 750 Weaver Dairy Rd Unit 172 ; M29.2- 750 Weaver Dairy Rd Unit 171 ; M29.3- 750 Weaver Dairy Rd Unit 146

SITE SKETCH:

Start Time:
1:55 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: S

Temperature: 61⁰F

Humidity: 35%

Site M29.1 Leq: 61.4 dB(A)
Calibration offset: 0.00 dB(A)

Site M29.2 Leq: 59.6 dB(A)
Calibration offset: 0.00 dB(A)

Site M29.3 Leq: 55.3 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	618	20	61	1	0	70
I-40 WB	644	34	89	1	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M29.1 (dBA)	Lmax	Measured Leq M29.2 (dBA)	Lmax	Measured Leq M29.3 (dBA)	Lmax
1	13:55	61.0	63.0	58.9	60.6	54.8	56.8
2	13:56	60.5	62.7	58.9	61.1	54.7	57.1
3	13:57	61.8	63.6	60.2	62.8	56.0	58.7
4	13:58	61.2	63.3	58.8	60.7	55.5	57.3
5	13:59	60.7	62.7	58.9	61.4	54.7	56.7
6	14:00	58.2	60.8	55.8	58.2	52.6	54.9
7	14:01	60.5	62.4	58.9	60.3	54.4	56.3
8	14:02	61.7	63.6	59.7	62.1	55.8	58.3
9	14:03	61.2	62.4	59.1	60.7	55.3	56.9
10	14:04	61.4	62.7	59.7	61.0	55.4	57.1
11	14:05	63.9	67.1	62.4	68.1	56.9	58.8
12	14:06	59.8	61.2	58.2	60.3	54.1	57.2
13	14:07	61.5	62.5	59.4	60.6	55.7	57.7
14	14:08	62.3	65.5	60.7	65.8	55.5	56.7
15	14:09	63.2	66.5	62.0	67.0	55.9	56.6
16	14:10	61.2	62.4	59.7	61.4	55.6	57.4
17	14:11	60.8	62.5	58.7	60.9	55.1	57.3
18	14:12	61.0	62.5	59.1	60.7	55.2	56.7
19	14:13	61.0	63.1	59.3	61.2	55.1	57.1
20	14:14	61.7	63.9	59.7	62.1	56.1	58.4

Ambient Noise Monitoring Site M29.1

Ambient Noise Monitoring Site M29.2

Ambient Noise Monitoring Site M29.3

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M29.4, M29.5, M29.6

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

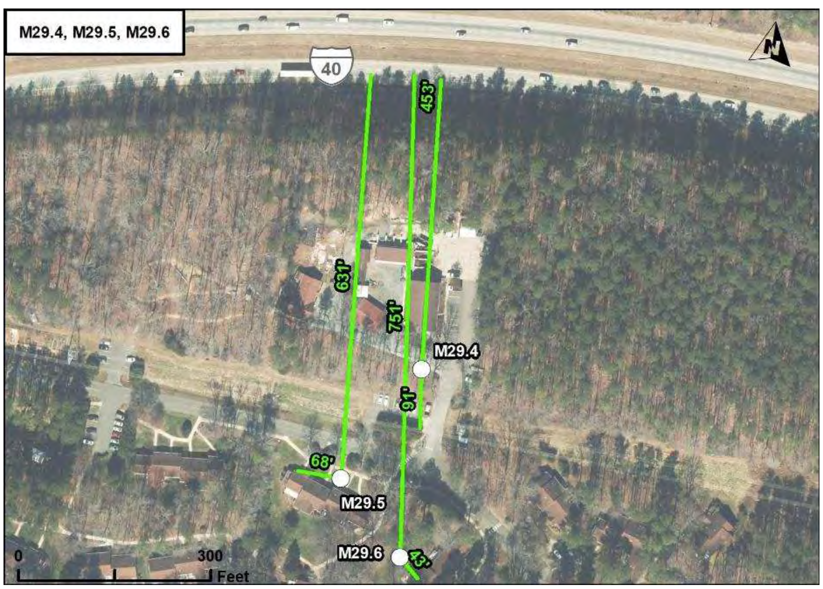
Equipment	Type	Microphone	Serial #
M29.4 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M29.5 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M29.6 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M29.4- 750 Weaver Dairy Rd ; M29.5- 750 Weaver Dairy Rd Unit 182; M29.6- 750 Weaver Dairy Rd Unit 186

SITE SKETCH:



Start Time:
2:45 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: S

Temperature: 63^0F

Humidity: 32%

Site M29.4 Leq: 58.9 dB(A)
Calibration offset: 0.00 dB(A)

Site M29.5 Leq: 55.0 dB(A)
Calibration offset: 0.00 dB(A)

Site M29.6 Leq: 53.6 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	693	22	58	0	0	70
I-40 WB	722	40	81	2	0	70

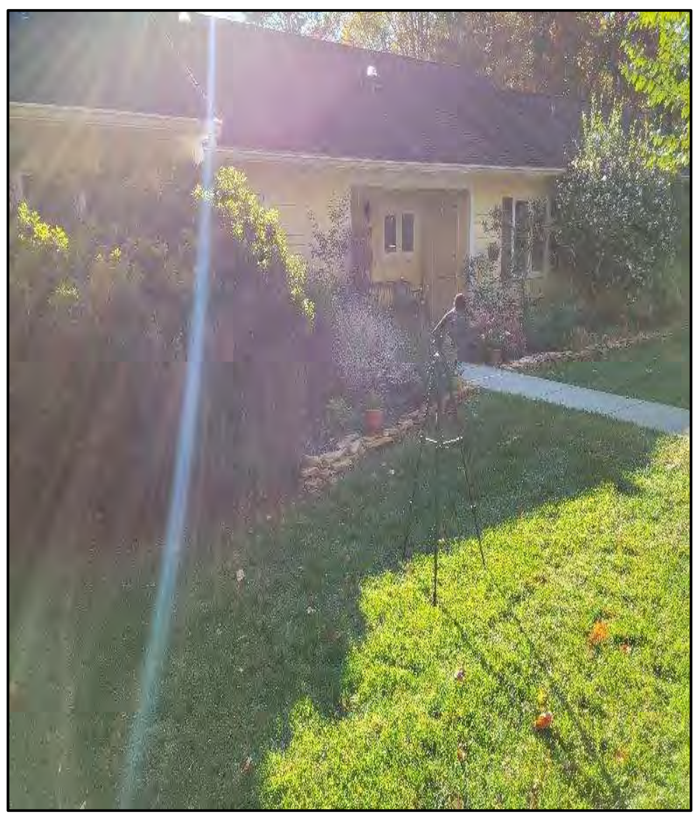
LOG SHEET

#	1 Minute Period Starting	Measured Leq M29.4 (dBA)	Lmax	Measured Leq M29.5 (dBA)	Lmax	Measured Leq M29.6 (dBA)	Lmax
1	14:45	59.4	63.8	54.5	59.7	52.8	54.1
2	14:46	63.9	72.6	62.6*	71.7	56.0	60.4
3	14:47	73.1*	82.2	61.4*	68.5	55.4	58.0
4	14:48	62.3	80.0	53.6	54.6	52.9	55.4
5	14:49	58.1	62.8	59.9	70.2	53.0	54.5
6	14:50	72.5*	85.1	59.0	70.3	55.6	59.5
7	14:51	57.1	58.9	53.4	54.7	52.3	53.5
8	14:52	58.1	59.5	54.2	55.6	53.0	54.6
9	14:53	57.6	58.8	53.5	54.8	53.1	54.2
10	14:54	57.1	58.1	53.1	54.3	52.6	53.7
11	14:55	57.6	60.4	53.8	55.4	52.9	54.2
12	14:56	58.1	59.1	54.2	56.6	53.5	54.4
13	14:57	57.5	58.8	53.5	54.7	52.8	54.1
14	14:58	58.2	60.3	54.3	55.5	53.3	54.7
15	14:59	57.9	58.8	53.9	54.7	53.3	53.8
16	15:00	57.1	57.8	53.6	54.4	52.7	53.3
17	15:01	57.3	58.4	54.0	56.6	53.0	53.8
18	15:02	58.7	61.2	55.1	57.9	54.0	54.9
19	15:03	58.3	59.5	54.5	55.0	53.7	54.2
20	15:04	57.6	60.5	53.9	56.2	53.1	54.3

* Leq1min data point removed from data set due to lawn mower causing a substantial spike.

Ambient Noise Monitoring Site M29.4

Ambient Noise Monitoring Site M29.5



Ambient Noise Monitoring Site M29.6

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M30.1, M30.2

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Sunrise Rd Date: 11/17/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M30.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M30.2 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M30.1- 1023 Northridge Ln. ; M30.2- 1017 Northridge Ln.

SITE SKETCH:

Start Time:
4:31 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: SW

Temperature: 70^0F

Humidity: 42%

Site M30.1 Leq: 64.9 dB(A)
Calibration offset: 0.00 dB(A)

Site M30.2 Leq: 57.0 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	832	22	46	1	0	70
I-40 WB	1,075	53	28	1	0	70
Sunrise Road NB	37	1	0	0	0	45
Sunrise Road SB	48	0	0	1	0	45

LOG SHEET

#	1 Minute Period Starting	Measured Leq M30.1 (dBA)	Lmax	Measured Leq M30.2 (dBA)	Lmax
1	16:31	64.7	66.8	56.9	62.9
2	16:32	64.7	65.7	56.8	57.6
3	16:33	64.2	65.8	56.1	57.4
4	16:34	65.2	66.5	57.4	58.6
5	16:35	65.0	66.3	57.0	58.1
6	16:36	65.2	66.6	57.2	58.0
7	16:37	65.4	67.4	57.4	58.2
8	16:38	65.1	67.4	57.3	58.7
9	16:39	64.6	67.3	56.9	58.7
10	16:40	64.5	66.2	56.6	57.4
11	16:41	64.7	66.0	56.9	57.9
12	16:42	65.1	66.8	57.0	58.2
13	16:43	64.6	66.3	57.2	58.6
14	16:44	66.1	69.8	57.5	58.8
15	16:45	65.1	66.9	57.2	58.5
16	16:46	64.9	66.6	56.9	58.3
17	16:47	65.4	66.4	57.3	57.8
18	16:48	63.8	65.9	56.0	57.0
19	16:49	63.9	65.5	56.1	57.1
20	16:50	65.7	66.9	57.4	58.4

Ambient Noise Monitoring Site M30.1

Ambient Noise Monitoring Site M30.2

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M31.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M31.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M31.1- 7326 Sunrise Rd
SITE SKETCH:

Start Time:
4:14 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: SSW

Temperature: 58^{0}F

Humidity: 35%

Site M31.1 Leq: 72.1 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	724	25	47	0	0	70
I-40 WB	689	31	54	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	16:14	71.2	73.4
2	16:15	72.3	74.8
3	16:16	72.3	74.2
4	16:17	72.3	74.5
5	16:18	71.6	74.1
6	16:19	71.9	73.8
7	16:20	72.1	74.3
8	16:21	71.2	72.9
9	16:22	72.2	73.5
10	16:23	72.1	74.2
11	16:24	73.8	79.5
12	16:25	71.3	73.0
13	16:26	72.0	75.0
14	16:27	71.8	73.7
15	16:28	72.3	74.8
16	16:29	73.1	74.8
17	16:30	71.1	72.9
18	16:31	72.1	74.0
19	16:32	72.1	75.1
20	16:33	71.5	73.4

Ambient Noise Monitoring Site M31.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M32.1, M32.2, M32.3

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M32.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M32.2 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M32.3 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M32.1- 104 Yukon Ln ; M32.2- 105 Yukon Ln; M32.3- 3830 Sweeten Creek Rd

SITE SKETCH:

Start Time:
3:49 AM/PM

Duration:
20 minutes

Wind Speed: 6 mph

Wind Direction: SSW

Temperature: 65⁰F

Humidity: 35%

Site M32.1 Leq: 67.7 dB(A)
Calibration offset: -0.01 dB(A)

Site M32.2 Leq: 60.7 dB(A)
Calibration: 0.00dB(A)

Site M32.3 Leq: 56.7 dB(A)
Calibration: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	890	72	88	1	0	70
I-40 WB	924	79	92	2	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M32.1 (dBA)	Lmax	Measured Leq M32.2 (dBA)	Lmax	Measured Leq M32.3 (dBA)	Lmax
1	15:49	67.7	69.4	60.0	62.1	56.5	57.9
2	15:50	67.1	69.1	59.6	61.9	56.0	57.9
3	15:51	66.6	69.1	59.4	61.1	55.6	57.8
4	15:52	67.4	69.0	60.9	63.1	56.1	57.3
5	15:53	67.9	70.3	60.8	62.2	56.9	58.9
6	15:54	68.1	70.2	60.3	62.8	57.0	60.0
7	15:55	67.0	69.2	60.9	62.7	55.8	57.2
8	15:56	67.5	69.9	60.4	62.8	56.5	58.5
9	15:57	67.9	69.9	60.2	62.0	56.9	58.7
10	15:58	66.6	67.9	60.7	62.2	55.6	56.7
11	15:59	67.9	69.3	61.5	63.4	57.3	58.3
12	16:00	69.1	70.5	61.2	63.6	58.4	62.4
13	16:01	67.3	69.1	60.9	62.4	56.7	58.3
14	16:02	67.5	69.4	60.4	61.9	56.2	57.8
15	16:03	67.4	68.8	61.1	62.9	56.5	57.8
16	16:04	68.2	69.7	60.9	62.6	57.1	58.2
17	16:05	67.5	69.6	60.9	62.3	56.5	58.5
18	16:06	67.9	69.4	60.9	62.8	56.6	57.8
19	16:07	68.4	70.1	61.3	62.4	57.0	58.2
20	16:08	68.0	69.5	61.2	62.5	57.2	59.0

Ambient Noise Monitoring Site M32.1

Ambient Noise Monitoring Site M32.2

Ambient Noise Monitoring Site M32.3

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M32.4, M32.5, M32.6

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M32.4 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M32.5 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
M32.6 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M32.4- 4002 Sweeten Creek Rd ; M32.5- 100 Landing Dr ; M32.6- 103 Landing Dr

SITE SKETCH:

Start Time:
4:30 AM/PM

Duration:
20 minutes

Wind Speed: 5 mph

Wind Direction: SE

Temperature: 60^0F

Humidity: 45%

Site M32.4 Leq: 62.5 dB(A)
Calibration offset: 0.01 dB(A)

Site M32.5 Leq: 54.4 dB(A)
Calibration offset: 0.01 dB(A)

Site M32.6 Leq: 50.2 dB(A)
Calibration offset: 0.01 dB(A

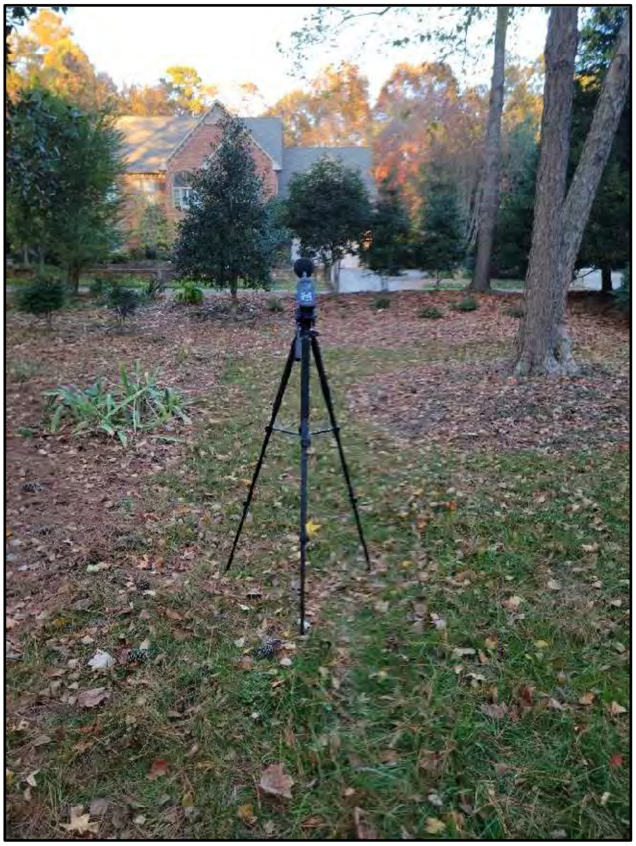
Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	930	95	111	0	4	75
I-40 WB	1,069	89	108	2	0	75

LOG SHEET

#	1 Minute Period Starting	Measured Leq M32.4 (dBA)	Lmax	Measured Leq M32.5 (dBA)	Lmax	Measured Leq M32.6 (dBA)	Lmax
1	16:30	62.4	63.5	54.2	56.0	49.6	50.4
2	16:31	63.0	64.2	54.4	55.5	50.0	50.6
3	16:32	62.2	63.4	53.2	54.4	49.5	50.2
4	16:33	62.6	64.1	53.8	55.2	49.7	50.9
5	16:34	63.3	64.5	54.7	55.9	50.5	51.0
6	16:35	62.3	63.5	53.8	54.8	49.7	50.5
7	16:36	62.7	63.9	54.4	55.9	50.4	51.1
8	16:37	63.0	64.0	54.4	55.1	50.6	53.0
9	16:38	63.5	64.5	55.1	56.4	51.0	51.5
10	16:39	62.8	64.8	54.4	56.4	50.6	51.5
11	16:40	62.9	64.5	54.4	56.0	50.4	51.6
12	16:41	62.6	63.6	54.2	55.1	50.3	51.2
13	16:42	62.8	64.1	54.3	55.2	50.4	51.0
14	16:43	63.2	64.1	55.4	57.3	51.1	51.7
15	16:44	62.7	64.2	55.2	56.8	50.6	52.2
16	16:45	62.5	64.8	55.0	56.3	50.8	51.8
17	16:46	62.2	63.3	54.5	55.6	50.3	51.3
18	16:47	60.8	62.4	54.1	56.8	49.6	51.0
19	16:48	61.2	62.7	53.9	54.6	49.5	50.5
20	16:49	61.4	63.5	53.7	54.7	49.5	50.7

Ambient Noise Monitoring Site M32.4

Ambient Noise Monitoring Site M32.5



Ambient Noise Monitoring Site M32.6

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET Reading: M32.7, M32.8, M32.9

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 11/16/2021

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M32.7 - Sound Level Meter	Larson Davis Model 831C	SN330809	11571
M32.8 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
M32.9 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) FAST **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M32.7- 604 Perry Creek Dr ; M32.8- 406 Silver Creek Trail ; M32.9- 403 Silver Creek Trail

SITE SKETCH:

Start Time:
5:24 AM/PM

Duration:
20 minutes

Wind Speed: 1 mph

Wind Direction: SSE

Temperature: 53^{0}F

Humidity: 56%

Site M32.7 Leq: 65.8 dB(A)
Calibration offset: 0.00 dB(A)

Site M32.8 Leq: 59.8 dB(A)
Calibration offset: 0.01 dB(A)

Site M32.9 Leq: 57.3 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	872	21	28	0	0	70
I-40 WB	998	19	34	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq M32.7 (dBA)	Lmax	Measured Leq M32.8 (dBA)	Lmax	Measured Leq M32.9 (dBA)	Lmax
1	17:24	65.2	67.6	59.3	62.6	56.9	60.4
2	17:25	65.9	69.0	59.7	61.7	57.4	59.8
3	17:26	65.2	67.3	59.7	61.0	57.0	58.4
4	17:27	65.5	68.5	59.4	62.9	56.7	58.4
5	17:28	66.0	67.7	60.7	62.9	57.8	59.1
6	17:29	65.3	68.7	59.0	60.9	56.7	58.9
7	17:30	66.4	68.3	60.3	62.3	57.5	58.6
8	17:31	66.7	70.5	60.2	62.6	57.6	58.9
9	17:32	63.6	67.8	58.9	62.6	56.4	58.6
10	17:33	66.3	68.1	59.7	61.0	56.8	58.2
11	17:34	65.5	67.6	59.6	61.1	57.1	58.2
12	17:35	65.2	68.0	59.7	61.0	57.1	58.2
13	17:36	64.9	68.4	58.9	61.0	56.2	57.6
14	17:37	66.4	67.9	60.0	61.4	57.4	59.2
15	17:38	65.7	68.3	60.2	61.7	57.6	58.6
16	17:39	75.2*	85.2*	66.0	74.9	63.3	71.5
17	17:40	66.7	69.0	60.1	61.7	57.3	58.8
18	17:41	66.2	68.6	60.1	62.1	58.3	60.0
19	17:42	66.2	68.6	59.7	60.7	57.4	58.2
20	17:43	65.4	67.4	59.9	61.5	57.9	58.7

* Leq1min data point removed from data set due to leaf blower causing a substantial spike.

Ambient Noise Monitoring Site M32.7

Ambient Noise Monitoring Site M32.8

Ambient Noise Monitoring Site M32.9

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M33.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40 Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

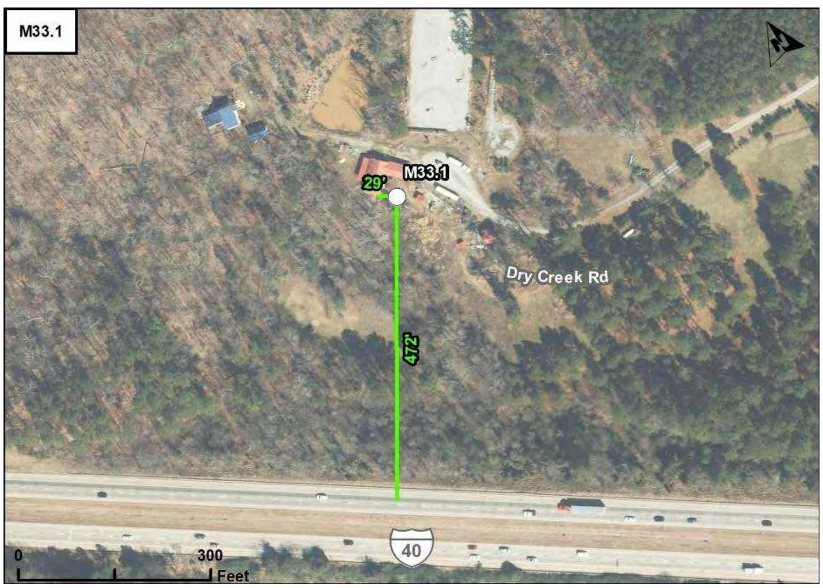
Equipment	Type	Microphone	Serial #
M33.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M33.1- 4500 Dry Creek Rd

SITE SKETCH:



Start Time:
4:14 AM/PM

Duration:
20 minutes

Wind Speed: 10 mph

Wind Direction: SSW

Temperature: 58^0F

Humidity: 35%

Site M33.1 Leq: 62.3 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	724	25	47	0	0	70
I-40 WB	689	31	54	0	0	70

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	16:14	61.5	65.7
2	16:15	62.0	63.7
3	16:16	62.3	64.1
4	16:17	61.1	63.3
5	16:18	62.5	64.4
6	16:19	60.7	61.8
7	16:20	61.3	63.0
8	16:21	61.6	62.6
9	16:22	61.9	64.5
10	16:23	67.9	76.7
11	16:24	60.7	63.0
12	16:25	60.6	63.7
13	16:26	61.9	67.3
14	16:27	60.9	63.1
15	16:28	62.8	65.5
16	16:29	61.8	64.5
17	16:30	62.2	64.1
18	16:31	62.0	65.1
19	16:32	61.2	63.2
20	16:33	62.3	64.5

Ambient Noise Monitoring Site M33.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M34.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Erwin Rd   Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M34.1 - Sound Level Meter	Larson Davis Model 831C	SN330808	11570
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one)   **FAST**   **SLOW**

WEIGHTING (circle one)   A   Lin.

Location Description – M34.1- 411 Erwin Rd

SITE SKETCH:

Start Time:
3:19 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: SW

Temperature: 58^0F

Humidity: 35%

Site M34.1 Leq: 65.2 dB(A)
Calibration offset: 0.01 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	720	34	59	2	0	70
I-40 WB	810	38	48	0	0	70
Erwin Road NB	101	8	0	0	0	50
Erwin Road SB	141	11	2	0	0	50

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	15:19	65.2	67.3
2	15:20	65.2	68.2
3	15:21	65.0	66.6
4	15:22	64.5	66.1
5	15:23	64.8	67.7
6	15:24	64.4	66.2
7	15:25	65.5	67.7
8	15:26	65.0	66.2
9	15:27	65.5	67.6
10	15:28	66.1	68.9
11	15:29	64.6	67.5
12	15:30	64.5	69.6
13	15:31	64.6	66.0
14	15:32	66.0	67.8
15	15:33	66.4	70.1
16	15:34	65.2	67.0
17	15:35	64.8	67.1
18	15:36	64.8	66.1
19	15:37	65.6	68.9
20	15:38	66.5	68.7

Ambient Noise Monitoring Site M34.1

SHORT-TERM TRAFFIC NOISE MONITORING LOG SHEET

Reading: M35.1

Project Description: STIP Project No. I-3306A – I-40 Widening, Orange and Durham Counties

Noise Source: I-40, Erwin Rd Date: 01/19/2022

Personnel: Mukul Pal, Jackson Garvey, Kraemer Scott, Fiona Cardova, Jarvis Turner

Equipment	Type	Microphone	Serial #
M35.1 - Sound Level Meter	Larson Davis Model 831C	SN330807	11569
Calibrator	Larson Davis Cal200		4467

SLM SETTINGS (circle one) **FAST** **SLOW**

WEIGHTING (circle one) A Lin.

Location Description – M35.1- 390 Erwin Rd

SITE SKETCH:

Start Time:
3:19 AM/PM

Duration:
20 minutes

Wind Speed: 11 mph

Wind Direction: SW

Temperature: 58^0F

Humidity: 35%

Site M35.1 Leq: 63.1 dB(A)
Calibration offset: 0.00 dB(A)

Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Recorded Speed
I-40 EB	720	34	59	2	0	70
I-40 WB	810	38	48	0	0	70
Erwin Road NB	101	8	0	0	0	50
Erwin Road SB	141	11	2	0	0	50

LOG SHEET

#	1 Minute Period Starting	Measured Leq (dBA)	Lmax
1	15:19	63.9	68.3
2	15:20	63.1	66.4
3	15:21	62.5	65.8
4	15:22	62.6	66.9
5	15:23	63.0	65.6
6	15:24	63.4	66.2
7	15:25	62.9	66.2
8	15:26	62.2	64.8
9	15:27	64.1	66.5
10	15:28	63.5	67.0
11	15:29	60.1	64.6
12	15:30	63.5	68.2
13	15:31	62.6	65.8
14	15:32	63.1	65.3
15	15:33	64.9	70.8
16	15:34	63.4	65.5
17	15:35	62.6	65.4
18	15:36	63.0	66.4
19	15:37	63.4	66.0
20	15:38	61.9	64.7

Ambient Noise Monitoring Site M35.1

Calibration Certificate

Certificate Number 2021006850
Customer:
HDR Engineering Inc
1601 Utica Avenue South
St. Louis Park, MN 55416, United States

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	071151	***Technician***	Ashley Anderson		
Test Results	**Pass**	***Calibration Date***	9 Jun 2021		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Temperature***	23.72	°C	± 0.01 °C
		Humidity	51.6	%RH	± 0.5 %RH
		Static Pressure	86.07	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 μPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/05/2021	03/05/2022	003003
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Agilent 34401A DMM	07/07/2020	07/07/2021	007165
SRS DS360 Ultra Low Distortion Generator	08/19/2020	08/19/2021	007167

Calibration Certificate

Certificate Number 2021006857
Customer:
HDR Engineering Inc
1601 Utica Avenue South
St. Louis Park, MN 55416, United States

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	071152	***Technician***	Ashley Anderson		
Test Results	**Pass**	***Calibration Date***	9 Jun 2021		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Temperature***	23.74	°C	± 0.01 °C
		Humidity	52.8	%RH	± 0.5 %RH
		Static Pressure	85.99	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/05/2021	03/05/2022	003003
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Agilent 34401A DMM	07/07/2020	07/07/2021	007165
SRS DS360 Ultra Low Distortion Generator	08/19/2020	08/19/2021	007167

Calibration Certificate

Certificate Number 2021006859
Customer:
HDR Engineering Inc
1601 Utica Avenue South
St. Louis Park, MN 55416, United States

Model Number	PRM831	**Procedure Number**	D0001.8383		
Serial Number	071153	**Technician**	Ashley Anderson		
Test Results	**Pass**	**Calibration Date**	9 Jun 2021		
Initial Condition	As Manufactured	**Calibration Due**			
		Temperature	23.73	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	**Humidity**	51.6	%RH	± 0.5 %RH
		Static Pressure	85.97	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 μPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/05/2021	03/05/2022	003003
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Agilent 34401A DMM	07/07/2020	07/07/2021	007165
SRS DS360 Ultra Low Distortion Generator	08/19/2020	08/19/2021	007167

Calibration Certificate

Certificate Number 2021010034

Customer:

HDR Engineering Inc
1601 Utica Avenue South
St. Louis Park, MN 55416, United States

Model Number	CAL200	***Procedure Number***	D0001.8386			
Serial Number	4467	***Technician***	Scott Montgomery			
Test Results	**Pass**	***Calibration Date***	17 Aug 2021			
Initial Condition	Adjusted	***Calibration Due***	17 Aug 2022			
		Temperature	24	°C	± 0.3 °C	
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	33	%RH	± 3 %RH	
		Static Pressure	101.1	kPa	± 1 kPa	

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 μPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	04/01/2021	04/01/2022	001051
Agilent 34401A DMM	03/02/2021	03/02/2022	002588
Microphone Calibration System	02/24/2021	02/24/2022	005446
1/2" Preamplifier	08/27/2020	08/27/2021	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/09/2021	08/09/2022	006507
1/2 inch Microphone - RI - 200V	09/24/2020	09/24/2021	006511
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Pressure Transducer	06/28/2021	06/28/2022	007310

Initial Assessment

Certificate Number 2021010033

Customer:
HDR Engineering Inc
1601 Utica Avenue South
St. Louis Park, MN 55416, United States

Model Number	CAL200	***Procedure Number***	D0001.8386			
Serial Number	4467	***Technician***	Scott Montgomery			
Test Results	**Pass**	***Calibration Date***	17 Aug 2021			
Initial Condition	As Received	***Calibration Due***				
		Temperature	24	°C	± 0.3 °C	
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	33	%RH	± 3 %RH	
		Static Pressure	101.3	kPa	± 1 kPa	

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 μPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	04/01/2021	04/01/2022	001051
Agilent 34401A DMM	03/02/2021	03/02/2022	002588
Microphone Calibration System	02/24/2021	02/24/2022	005446
1/2" Preamplifier	08/27/2020	08/27/2021	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/09/2021	08/09/2022	006507
1/2 inch Microphone - RI - 200V	09/24/2020	09/24/2021	006511
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Pressure Transducer	06/28/2021	06/28/2022	007310

LARSON DAVIS - A PCB PIEZOTRONICS DIV.
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ilac-MRA ACCREDITED Cert. #3622.01

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A PCB PIEZOTRONICS DIV.

Appendix B. Hourly Equivalent Traffic Noise Levels and Equivalent Receptor Calculations

Table B-1. Hourly Equivalent Traffic Noise Levels

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
01-001: 1319 Dimmocks Mill Rd	Residential	B	1	1319 Dimmocks Mill Rd	74	76	2
02-001: 1218 Dimmocks Mill Rd	Residential	B	1	1218 Dimmocks Mill Rd	68	70	2
02-002: 1218 Dimmocks Mill Rd	Residential	B	1	1218 Dimmocks Mill Rd	69	70	1
03-001: 1229 Dimmocks Mill Rd	Residential	B	1	1229 Dimmocks Mill Rd	66	69	3
03-002: 1414 Dimmocks Mill Rd	Residential	B	1	1414 Dimmocks Mill Rd	71	73	2
04-001: 1225 Dimmocks Mill Rd	Residential	B	1	1225 Dimmocks Mill Rd	66	68	2
04-002: 1231 Dimmocks Mill Rd	Residential	B	1	1231 Dimmocks Mill Rd	60	62	2
05-001: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-002: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-003: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	63	3
05-004: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-005: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	65	3
05-006: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	64	3
05-007: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	63	2
05-008: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	65	3
05-009: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	63	3
05-010: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	63	3
05-011: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	63	65	2
05-012: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	63	2
05-013: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	63	2
05-014: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	63	65	2
05-015: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	63	2
05-016: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	61	64	3
05-017: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	63	65	2
05-018: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	64	66	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
05-019: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	65	**67**	2
05-020: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	63	**66**	3
05-021: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-022: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	62	2
05-023: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-024: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	64	**67**	3
05-025: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	66	**69**	3
05-026: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	68	**70**	2
05-027: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	65	**68**	3
05-028: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	62	64	2
05-029: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	62	2
05-030: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	62	2
05-031: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59	61	2
05-032: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	60	1
05-033: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59	61	2
05-034: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	63	3
05-035: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59	61	2
05-036: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	60	1
05-037: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59	0
05-038: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59	0
05-039: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59[7]	0
05-040: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59[7]	0
05-041: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59	0
05-042: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59	61	2
05-043: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	60	62	2
05-044: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59[7]	0
05-045: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59[7]	0

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
05-046: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59[7]	0
05-047: Cedar Ridge High School - Athletic Fields	Athletic Field	C	0.02	1125 New Grady Brown School Rd	59[7]	59	0
05-048: 1125 New Grady Brown School Rd	School	D	1	1125 New Grady Brown School Rd	35	38	3
06-001: 1089 Timbers Dr	Residential	B	1	1089 Timbers Dr	71	73	2
06-002: 1087 Timbers Dr	Residential	B	1	1087 Timbers Dr	69	71	2
06-003: 1085 Timbers Dr	Residential	B	1	1085 Timbers Dr	67	70	3
06-004: 1083 Timbers Dr	Residential	B	1	1083 Timbers Dr	66	68	2
06-005: 1067 Timbers Dr	Residential	B	1	1067 Timbers Dr	59	62	3
06-006: 1065 Timbers Dr	Residential	B	1	1065 Timbers Dr	58	61	3
06-007: 1063 Timbers Dr	Residential	B	1	1063 Timbers Dr	57	60	3
06-008: 1061 Timbers Dr	Residential	B	1	1061 Timbers Dr	55	57	2
06-009: 1059 Timbers Dr	Residential	B	1	1059 Timbers Dr	57	59	2
06-010: 1057 Timbers Dr	Residential	B	1	1057 Timbers Dr	57	59	2
06-011: 1055 Timbers Dr	Residential	B	1	1055 Timbers Dr	58	60	2
06-012: 1053 Timbers Dr	Residential	B	1	1053 Timbers Dr	56	59	3
06-013: 1047 Timbers Dr	Residential	B	1	1047 Timbers Dr	57	59	2
06-014: 1045 Timbers Dr	Residential	B	1	1045 Timbers Dr	56	59	3
06-015: 1060 Timbers Dr	Residential	B	1	1060 Timbers Dr	55[8]	57	2
06-016: 1064 Timbers Dr	Residential	B	1	1064 Timbers Dr	55[8]	57	2
06-017: 1066 Timbers Dr	Residential	B	1	1066 Timbers Dr	61	64	3
06-018: 1068 Timbers Dr	Residential	B	1	1068 Timbers Dr	60	63	3
06-019: 1070 Timbers Dr	Residential	B	1	1070 Timbers Dr	60	62	2
06-020: 1072 Timbers Dr	Residential	B	1	1072 Timbers Dr	62	65	3
06-021: 1074 Timbers Dr	Residential	B	1	1074 Timbers Dr	63	65	2
06-022: 1076 Timbers Dr	Residential	B	1	1076 Timbers Dr	64	66	2
06-023: 1078 Timbers Dr	Residential	B	1	1078 Timbers Dr	65	68	3
06-024: 1080 Timbers Dr	Residential	B	1	1080 Timbers Dr	66	68	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
06-025: 201 Binford St	Residential	B	1	201 Binford St	66	68	2
06-026: 203 Binford St	Residential	B	1	203 Binford St	65	67	2
06-027: 205 Binford St	Residential	B	1	205 Binford St	63	65	2
06-028: 207 Binford St	Residential	B	1	207 Binford St	63	65	2
06-029: 211 Binford St	Residential	B	1	211 Binford St	63	65	2
06-030: 213 Binford St	Residential	B	1	213 Binford St	62	64	2
06-031: 215 Binford St	Residential	B	1	215 Binford St	61	63	2
06-032: 217 Binford St	Residential	B	1	217 Binford St	60	62	2
06-033: 221 Binford St	Residential	B	1	221 Binford St	59	61	2
06-034: 223 Binford St	Residential	B	1	223 Binford St	58	60	2
06-035: 225 Binford St	Residential	B	1	225 Binford St	58	60	2
06-036: 227 Binford St	Residential	B	1	227 Binford St	57	59	2
06-037: 104 Binford St	Residential	B	1	104 Binford St	56	58	2
06-038: 112 Binford St	Residential	B	1	112 Binford St	55	57	2
06-039: 226 Binford St	Residential	B	1	226 Binford St	55	57	2
06-040: 224 Binford St	Residential	B	1	224 Binford St	56	58	2
06-041: 222 Binford St	Residential	B	1	222 Binford St	57	59	2
06-042: 220 Binford St	Residential	B	1	220 Binford St	56	58	2
06-043: 218 Binford St	Residential	B	1	218 Binford St	60	62	2
06-044: 216 Binford St	Residential	B	1	216 Binford St	61	63	2
06-045: 214 Binford St	Residential	B	1	214 Binford St	62	64	2
06-046: 210 Binford St	Residential	B	1	210 Binford St	62	64	2
06-047: 208 Binford St	Residential	B	1	208 Binford St	62	64	2
06-048: 206 Binford St	Residential	B	1	206 Binford St	62	64	2
06-049: 202 Binford St	Residential	B	1	202 Binford St	62	64	2
06-050: 150 Binford St	Residential	B	1	150 Binford St	64	67	3
06-051: 148 Binford St	Residential	B	1	148 Binford St	63	65	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
06-052: 144 Binford St	Residential	B	1	144 Binford St	62	64	2
06-053: 142 Binford St	Residential	B	1	142 Binford St	61	64	3
06-054: 140 Binford St	Residential	B	1	140 Binford St	61	64	3
06-055: 138 Binford St	Residential	B	1	138 Binford St	61	64	3
06-056: 136 Binford St	Residential	B	1	136 Binford St	62	64	2
06-057: 134 Binford St	Residential	B	1	134 Binford St	61	64	3
06-058: 132 Binford St	Residential	B	1	132 Binford St	61	63	2
06-059: 126 Binford St	Residential	B	1	126 Binford St	61	63	2
06-060: 118 Binford St	Residential	B	1	118 Binford St	60	63	3
06-061: 149 Binford St	Residential	B	1	149 Binford St	70	72	2
06-062: 147 Binford St	Residential	B	1	147 Binford St	70	73	3
06-063: 145 Binford St	Residential	B	1	145 Binford St	69	72	3
06-064: 143 Binford St	Residential	B	1	143 Binford St	69	72	3
06-065: 141 Binford St	Residential	B	1	141 Binford St	70	72	2
06-066: 139 Binford St	Residential	B	1	139 Binford St	70	72	2
06-067: 137 Binford St	Residential	B	1	137 Binford St	70	73	3
06-068: 135 Binford St	Residential	B	1	135 Binford St	72	74	2
06-069: 133 Binford St	Residential	B	1	133 Binford St	73	75	2
06-070: 131 Binford St	Residential	B	1	131 Binford St	73	75	2
06-071: 129 Binford St	Residential	B	1	129 Binford St	73	75	2
06-072: 127 Binford St	Residential	B	1	127 Binford St	72	74	2
06-073: 123 Binford St	Residential	B	1	123 Binford St	73	75	2
06-074: 121 Binford St	Residential	B	1	121 Binford St	67	70	3
06-075: 119 Binford St	Residential	B	1	119 Binford St	66	69	3
06-076: 117 Binford St	Residential	B	1	117 Binford St	60	65	5
06-077: 115 Binford St	Residential	B	1	115 Binford St	59	62	3
06-078: 113 Binford St	Residential	B	1	113 Binford St	57	59	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
06-079: 111 Binford St	Residential	B	1	111 Binford St	56	59	3
06-080: 109 Binford St	Residential	B	1	109 Binford St	57	60	3
06-081: 107 Binford St	Residential	B	1	107 Binford St	57	60	3
06-082: 105 Binford St	Residential	B	1	105 Binford St	55	57	2
06-083: 103 Binford St	Residential	B	1	103 Binford St	55[8]	55	0
06-084: 101 Binford St	Residential	B	1	101 Binford St	55	57	2
06-085: 2311 Hedgepath Dr	Residential	B	1	2311 Hedgepath Dr	65	68	3
06-086: 998 Timbers Dr	Residential	B	1	998 Timbers Dr	61	64	3
06-087: 999 Timbers Dr	Residential	B	1	999 Timbers Dr	55	56	1
06-088: 223 Romero Grove Ln	Residential	B	1	223 Romero Grove Ln	55[8]	55[8]	0
06-089: 216 Romero Grove Ln	Residential	B	1	216 Romero Grove Ln	55	56	1
06-090: 2317 Orange Grove Rd	Residential	B	1	2317 Orange Grove Rd	60	61	1
06-091: 2323 Orange Grove Rd	Residential	B	1	2323 Orange Grove Rd	71	72	1
07-001: 2326 Orange Grove Rd	Residential	B	1	2326 Orange Grove Rd	67	69	2
07-002: 2330 Orange Grove Rd	Residential	B	1	2330 Orange Grove Rd	63	65	2
07-003: 904 New Grady Brown School Rd	Residential	B	1	904 New Grady Brown School Rd	59	61	2
07-004: 818 Grady Brown School Rd	Residential	B	1	818 Grady Brown School Rd	57	59	2
07-005: 2405 Timber Oak Dr	Residential	B	1	2405 Timber Oak Dr	55	57	2
07-006: 2410 Timber Oak Dr	Residential	B	1	2410 Timber Oak Dr	54	56	2
07-007: 614 New Grady Brown School Rd	Residential	B	1	614 New Grady Brown School Rd	55	57	2
07-008: 2420 Timber Oak Dr	Residential	B	1	2420 Timber Oak Dr	51	53	2
07-009: 520 New Grady Brown School Rd	Residential	B	1	520 New Grady Brown School Rd	56	58	2
07-010: 504 New Grady Brown School Rd	Residential	B	1	504 New Grady Brown School Rd	55	58	3
07-011: 508 New Grady Brown School Rd	Residential	B	1	508 New Grady Brown School Rd	61	63	2
07-012: 502 New Grady Brown School Rd	Residential	B	1	502 New Grady Brown School Rd	64	66	2
08-001: 2302 Orange Grove Rd	Residential	B	1	2302 Orange Grove Rd	56	58	2
08-002: 2310 Orange Grove Rd	Residential	B	1	2310 Orange Grove Rd	56	58	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
08-003: 2316 Orange Grove Rd	Residential	B	1	2316 Orange Grove Rd	57	59	2
08-004: 2322 Orange Grove Rd	Residential	B	1	2322 Orange Grove Rd	60	62	2
08-005: 923 Oakdale Dr	Residential	B	1	923 Oakdale Dr	59	61	2
08-006: 909 Oakdale Dr - Unit 28	Residential	B	1	909 Oakdale Dr - Unit 28	58	60	2
08-007: 909 Oakdale Dr - Unit 29	Residential	B	1	909 Oakdale Dr - Unit 29	55	57	2
08-008: 909 Oakdale Dr - Unit 30	Residential	B	1	909 Oakdale Dr - Unit 30	55	57	2
08-009: 909 Oakdale Dr - Unit 31	Residential	B	1	909 Oakdale Dr - Unit 31	55	57	2
08-010: 909 Oakdale Dr - Unit 32	Residential	B	1	909 Oakdale Dr - Unit 32	54	56	2
08-011: 909 Oakdale Dr - Unit 33	Residential	B	1	909 Oakdale Dr - Unit 33	53	55	2
08-012: 909 Oakdale Dr - Unit 34	Residential	B	1	909 Oakdale Dr - Unit 34	53	55	2
08-013: 909 Oakdale Dr - Unit 35	Residential	B	1	909 Oakdale Dr - Unit 35	51	53	2
08-014: 909 Oakdale Dr - Unit 36	Residential	B	1	909 Oakdale Dr - Unit 36	52	54	2
08-015: 909 Oakdale Dr - Unit 13	Residential	B	1	909 Oakdale Dr - Unit 13	52	54	2
08-016: 909 Oakdale Dr - Unit 12	Residential	B	1	909 Oakdale Dr - Unit 12	50	52	2
08-017: 909 Oakdale Dr - Unit 11	Residential	B	1	909 Oakdale Dr - Unit 11	51	53	2
08-018: 909 Oakdale Dr - Unit 10	Residential	B	1	909 Oakdale Dr - Unit 10	51	53	2
08-019: 909 Oakdale Dr - Unit 9	Residential	B	1	909 Oakdale Dr - Unit 9	51	53	2
08-020: 909 Oakdale Dr - Unit 8	Residential	B	1	909 Oakdale Dr - Unit 8	51	53	2
08-021: 909 Oakdale Dr - Unit 7	Residential	B	1	909 Oakdale Dr - Unit 7	52	54	2
08-022: 909 Oakdale Dr - Unit 6	Residential	B	1	909 Oakdale Dr - Unit 6	52	54	2
08-023: 909 Oakdale Dr - Unit 5	Residential	B	1	909 Oakdale Dr - Unit 5	53	55	2
08-024: 909 Oakdale Dr - Unit 4	Residential	B	1	909 Oakdale Dr - Unit 4	54	56	2
08-025: 909 Oakdale Dr - Unit 3	Residential	B	1	909 Oakdale Dr - Unit 3	56	58	2
08-026: 909 Oakdale Dr	Residential	B	1	909 Oakdale Dr	60	62	2
08-027: 909 Oakdale Dr - Unit 2	Residential	B	1	909 Oakdale Dr - Unit 2	54	56	2
08-028: 909 Oakdale Dr - Unit 1	Residential	B	1	909 Oakdale Dr - Unit 1	59	61	2
08-029: 909 Oakdale Dr - Unit 27	Residential	B	1	909 Oakdale Dr - Unit 27	57	59	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
08-030: 909 Oakdale Dr - Unit 26	Residential	B	1	909 Oakdale Dr - Unit 26	52	54	2
08-031: 909 Oakdale Dr - Unit 25	Residential	B	1	909 Oakdale Dr - Unit 25	52	54	2
08-032: 909 Oakdale Dr - Unit 24	Residential	B	1	909 Oakdale Dr - Unit 24	51	53	2
08-033: 909 Oakdale Dr - Unit 23	Residential	B	1	909 Oakdale Dr - Unit 23	51	53	2
08-034: 909 Oakdale Dr - Unit 22	Residential	B	1	909 Oakdale Dr - Unit 22	51	53	2
08-035: 909 Oakdale Dr - Unit 21	Residential	B	1	909 Oakdale Dr - Unit 21	51	53	2
08-036: 909 Oakdale Dr - Unit 20	Residential	B	1	909 Oakdale Dr - Unit 20	50	53	3
08-037: 909 Oakdale Dr - Unit 19	Residential	B	1	909 Oakdale Dr - Unit 19	51	53	2
08-038: 909 Oakdale Dr - Unit 18	Residential	B	1	909 Oakdale Dr - Unit 18	50	53	3
08-039: 909 Oakdale Dr - Unit 17	Residential	B	1	909 Oakdale Dr - Unit 17	49	52	3
08-040: 909 Oakdale Dr - Unit 16	Residential	B	1	909 Oakdale Dr - Unit 16	49	51	2
08-041: 909 Oakdale Dr - Unit 15	Residential	B	1	909 Oakdale Dr - Unit 15	49	51	2
08-042: 909 Oakdale Dr - Unit 14	Residential	B	1	909 Oakdale Dr - Unit 14	49	51	2
08-043: 817 Oakdale Dr	Residential	B	1	817 Oakdale Dr	48	50	2
09-001: 814 Oakdale Dr	Residential	B	1	814 Oakdale Dr	59	60	1
09-002: 826 Oakdale Dr	Residential	B	1	826 Oakdale Dr	65	**67**	2
09-003: 836 Oakdale Dr	Residential	B	1	836 Oakdale Dr	72	**73**	1
09-004: 832 Oakdale Dr	Residential	B	1	832 Oakdale Dr	60	62	2
09-005: 820 Oakdale Dr	Residential	B	1	820 Oakdale Dr	54	56	2
09-006: 810 Oakdale Dr	Residential	B	1	810 Oakdale Dr	53	55	2
09-007: 804 Oakdale Dr	Residential	B	1	804 Oakdale Dr	50	52	2
09-008: 800 Oakdale Dr	Residential	B	1	800 Oakdale Dr	50	52	2
09-009: 2311 Blair Dr	Residential	B	1	2311 Blair Dr	51	53	2
09-010: 2315 Blair Dr	Residential	B	1	2315 Blair Dr	52	54	2
09-011: 2321 Blair Dr	Residential	B	1	2321 Blair Dr	53	55	2
09-012: 2327 Blair Dr	Residential	B	1	2327 Blair Dr	57	58	1
09-013: 2331 Blair Dr	Residential	B	1	2331 Blair Dr	62	64	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
09-014: 2335 Blair Dr	Residential	B	1	2335 Blair Dr	69	71	2
09-015: 2338 Blair Dr	Residential	B	1	2338 Blair Dr	60	61	1
09-016: 2334 Blair Dr	Residential	B	1	2334 Blair Dr	55	56	1
09-017: 2318 Blair Dr	Residential	B	1	2318 Blair Dr	49	51	2
09-018: 2312 Blair Dr	Residential	B	1	2312 Blair Dr	49	51	2
09-019: 2306 Blair Dr	Residential	B	1	2306 Blair Dr	50	52	2
09-020: 2517 Myrtle Ln	Residential	B	1	2517 Myrtle Ln	51	53	2
09-021: 2703 Brick Hearth Dr	Residential	B	1	2703 Brick Hearth Dr	59	60	1
09-022: 2705 Brick Hearth Dr	Residential	B	1	2705 Brick Hearth Dr	59	60	1
09-023: 2707 Brick Hearth Dr	Residential	B	1	2707 Brick Hearth Dr	59	60	1
09-024: 2709 Brick Hearth Dr	Residential	B	1	2709 Brick Hearth Dr	58	60	2
09-025: 2711 Brick Hearth Dr	Residential	B	1	2711 Brick Hearth Dr	57	58	1
09-026: 2710 Brick Hearth Dr	Residential	B	1	2710 Brick Hearth Dr	52	53	1
10-001: 3209 Old NC 86	Residential	B	1	3209 Old NC 86	68	70	2
10-002: 3303 Old NC 86	Residential	B	1	3303 Old NC 86	64	66	2
10-003: 3315 Old NC 86	Residential	B	1	3315 Old NC 86	64	66	2
10-004: 3319 Old NC 86	Residential	B	1	3319 Old NC 86	60	61	1
10-005: 3401 Old NC 86	Residential	B	1	3401 Old NC 86	60	62	2
11-001: 3013 Rippy Ln	Residential	B	1	3013 Rippy Ln	63	65	2
12-001: 3210 Old NC 86	Residential	B	1	3210 Old NC 86	69	71	2
12-002: 3220 Old NC 86	Residential	B	1	3220 Old NC 86	65	66	1
12-003: 3224 Old NC 86	Residential	B	1	3224 Old NC 86	62	67	5
12-004: 3300 Old NC 86	Residential	B	1	3300 Old NC 86	61	62	1
12-005: 3312 Old NC 86	Residential	B	1	3312 Old NC 86	65	66	1
12-006: 3400 Old NC 86	Residential	B	1	3400 Old NC 86	63	65	2
13-001: 430 Waterstone Dr	Medical Center	D	1	430 Waterstone Dr	38	40	2
13-002: 622 Alice Loop	Residential	B	1	622 Alice Loop	57	59	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
13-003: 624 Alice Loop	Residential	B	1	624 Alice Loop	59	60	1
13-004: 626 Alice Loop	Residential	B	1	626 Alice Loop	60	61	1
13-005: 628 Alice Loop	Residential	B	1	628 Alice Loop	59	61	2
13-006: 630 Alice Loop	Residential	B	1	630 Alice Loop	60	61	1
13-007: 632 Alice Loop	Residential	B	1	632 Alice Loop	60	61	1
13-008: 634 Alice Loop	Residential	B	1	634 Alice Loop	59	60	1
13-009: 636 Alice Loop	Residential	B	1	636 Alice Loop	60	61	1
13-010: 638 Alice Loop	Residential	B	1	638 Alice Loop	63	64	1
13-011: 640 Alice Loop	Residential	B	1	640 Alice Loop	65	**66**	1
13-012: 642 Alice Loop	Residential	B	1	642 Alice Loop	65	**66**	1
13-013: 644 Alice Loop	Residential	B	1	644 Alice Loop	65	**67**	2
13-014: 646 Alice Loop	Residential	B	1	646 Alice Loop	65	**67**	2
13-015: 648 Alice Loop	Residential	B	1	648 Alice Loop	66	**67**	1
13-016: 650 Alice Loop	Residential	B	1	650 Alice Loop	65	**67**	2
13-017: 652 Alice Loop	Residential	B	1	652 Alice Loop	64	**66**	2
13-018: 654 Alice Loop	Residential	B	1	654 Alice Loop	64	**66**	2
13-019: 656 Alice Loop	Residential	B	1	656 Alice Loop	65	**66**	1
13-020: 658 Alice Loop	Residential	B	1	658 Alice Loop	64	**66**	2
13-022: 662 Alice Loop	Residential	B	1	662 Alice Loop	63	65	2
13-023: 664 Alice Loop	Residential	B	1	664 Alice Loop	62	64	2
13-024: 668 Alice Loop	Residential	B	1	668 Alice Loop	62	64	2
13-025: 670 Alice Loop	Residential	B	1	670 Alice Loop	61	63	2
13-027: 672 Alice Loop	Residential	B	1	672 Alice Loop	60	62	2
13-028: 674 Alice Loop	Residential	B	1	674 Alice Loop	59	61	2
13-029: 676 Alice Loop	Residential	B	1	676 Alice Loop	59	61	2
13-030: 678 Alice Loop	Residential	B	1	678 Alice Loop	58	60	2
13-031: 680 Alice Loop	Residential	B	1	680 Alice Loop	57	59	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
13-032: 677 Alice Loop	Residential	B	1	677 Alice Loop	58	60	2
13-033: 675 Alice Loop	Residential	B	1	675 Alice Loop	58	60	2
13-034: 673 Alice Loop	Residential	B	1	673 Alice Loop	57	59	2
13-035: 671 Alice Loop	Residential	B	1	671 Alice Loop	57	59	2
13-036: 669 Alice Loop	Residential	B	1	669 Alice Loop	58	60	2
13-037: 665 Alice Loop	Residential	B	1	665 Alice Loop	58	61	3
13-038: 659 Alice Loop	Residential	B	1	659 Alice Loop	59	61	2
13-039: 657 Alice Loop	Residential	B	1	657 Alice Loop	60	62	2
13-040: 655 Alice Loop	Residential	B	1	655 Alice Loop	61	63	2
13-041: 651 Alice Loop	Residential	B	1	651 Alice Loop	61	63	2
13-042: 649 Alice Loop	Residential	B	1	649 Alice Loop	61	63	2
13-043: 647 Alice Loop	Residential	B	1	647 Alice Loop	61	63	2
13-044: 625 Alice Loop	Residential	B	1	625 Alice Loop	58	59	1
13-045: 623 Alice Loop	Residential	B	1	623 Alice Loop	60	61	1
13-046: 621 Alice Loop	Residential	B	1	621 Alice Loop	57	59	2
13-047: 619 Alice Loop	Residential	B	1	619 Alice Loop	57	59	2
13-048: 617 Alice Loop	Residential	B	1	617 Alice Loop	56	58	2
13-049: 615 Alice Loop	Residential	B	1	615 Alice Loop	56	58	2
13-050: 613 Alice Loop	Residential	B	1	613 Alice Loop	54	56	2
13-121: 660 Alice Loop	Residential	B	1	660 Alice Loop	64	65	1
14-001: 1608 Scarlett Mountain Rd	Residential	B	1	1608 Scarlett Mountain Rd	64	66	2
14-002: 1600 Scarlett Mountain Rd	Residential	B	1	1600 Scarlett Mountain Rd	63	65	2
14-003: 1600 Cheyenne Dr	Residential	B	1	1600 Cheyenne Dr	66	68	2
14-004: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	66	67	1
14-005: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	66	68	2
14-006: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	67	69	2
14-007: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	68	69	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
14-008: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	68	**69**	1
14-009: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	67	**69**	2
14-010: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	70	**71**	1
14-011: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	70	**72**	2
14-012: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	70	**71**	1
14-013: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	68	**70**	2
14-014: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	66	**68**	2
14-015: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	65	**66**	1
14-016: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	64	**66**	2
14-017: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	63	65	2
14-018: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	63	64	1
14-019: Blackwood Farm Park Trail	Trail	C	0.01	Blackwood Farm Park Trail	62	64	2
15-001: 4318 Vallie Hi Ln	Residential	B	1	4318 Vallie Hi Ln	59	60	1
15-002: 4334 Vallie Hi Ln	Residential	B	1	4334 Vallie Hi Ln	56	58	2
16-001: 1201 New Hope Church Rd	Residential	B	1	1201 New Hope Church Rd	59	61	2
16-002: 5111 Homer Ruffin Rd	Residential	B	1	5111 Homer Ruffin Rd	56	57	1
16-003: 5208 Homer Ruffin Rd	Residential	B	1	5208 Homer Ruffin Rd	68	**70**	2
17-001: Sunrise Church - Playground	Playground	C	1	1315 New Hope Trace	58	59	1
17-002: 1315 New Hope Trace	Place of Worship	D	1	1315 New Hope Trace	35	35	0
17-003: Sunrise Church - Picnic Area	Picnic Area	C	1	1315 New Hope Trace	58	60	2
17-004: 6109 Meadowsweet Ln	Residential	B	1	6109 Meadowsweet Ln	58	60	2
17-005: 6114 Meadowsweet Ln	Residential	B	1	6114 Meadowsweet Ln	63	65	2
17-006: 5317 Hideaway Dr	Residential	B	1	5317 Hideaway Dr	65	**66**	1
17-007: 5321 Hideaway Dr	Residential	B	1	5321 Hideaway Dr	65	**67**	2
17-008: 5325 Hideaway Dr	Residential	B	1	5325 Hideaway Dr	65	**67**	2
17-009: 5401 Hideaway Dr	Residential	B	1	5401 Hideaway Dr	64	**66**	2
17-010: 6025 Meadow Greer Rd	Residential	B	1	6025 Meadow Greer Rd	66	**68**	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
17-011: 6027 Meadow Greer Rd	Residential	B	1	6027 Meadow Greer Rd	69	71	2
17-012: 6019 Meadow Greer Rd	Residential	B	1	6019 Meadow Greer Rd	59	61	2
17-013: 6015 Meadow Greer Rd	Residential	B	1	6015 Meadow Greer Rd	54[9]	54[9]	0
17-014: 6022 Meadow Greer Rd	Residential	B	1	6022 Meadow Greer Rd	65	67	2
17-015: 6018 Meadow Greer Rd	Residential	B	1	6018 Meadow Greer Rd	61	63	2
17-016: 6014 Meadow Greer Rd	Residential	B	1	6014 Meadow Greer Rd	61	62	1
17-017: 5623 Hideaway Dr	Residential	B	1	5623 Hideaway Dr	56	57	1
17-018: 5629 Hideaway Dr	Residential	B	1	5629 Hideaway Dr	55	56	1
17-019: 5635 Hideaway Dr	Residential	B	1	5635 Hideaway Dr	56	58	2
17-020: 5635 Hideaway Dr	Residential	B	1	5635 Hideaway Dr	58	60	2
17-021: 5705 Hideaway Dr	Residential	B	1	5705 Hideaway Dr	58	60	2
17-022: 5715 Hideaway Dr	Residential	B	1	5715 Hideaway Dr	60	62	2
17-023: 5721 Hideaway Dr	Residential	B	1	5721 Hideaway Dr	61	63	2
17-024: 5803 Hideaway Dr	Residential	B	1	5803 Hideaway Dr	64	66	2
17-025: 5809 Hideaway Dr	Residential	B	1	5809 Hideaway Dr	66	67	1
17-026: 5901 Hideaway Dr	Residential	B	1	5901 Hideaway Dr	66	67	1
17-027: 5904 Hideaway Dr	Residential	B	1	5904 Hideaway Dr	60	61	1
17-028: 5912 Hideaway Dr	Residential	B	1	5912 Hideaway Dr	59	61	2
17-029: 5911 Hideaway Dr	Residential	B	1	5911 Hideaway Dr	65	66	1
18-001: 6023 NC 86	Residential	B	1	6023 NC 86	59	60	1
18-002: 5940 Neal Tapps Rd	Residential	B	1	5940 Neal Tapps Rd	58	60	2
18-003: 5944 Neal Tapps Rd	Residential	B	1	5944 Neal Tapps Rd	60	61	1
18-004: 5948 Neal Tapps Rd	Residential	B	1	5948 Neal Tapps Rd	61	63	2
18-005: 5952 Neal Tapps Rd	Residential	B	1	5952 Neal Tapps Rd	60	62	2
18-006: 5954 Neal Tapps Rd	Residential	B	1	5954 Neal Tapps Rd	62	64	2
19-001: Emerson Waldorf School - Playground	Playground	C	1	6211 New Jericho Rd	63	65	2
20-002: 6008 Millhouse Rd	Residential	B	1	6008 Millhouse Rd	67	69	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
20-003: 1732 Avery Way	Residential	B	1	1732 Avery Way	66	**67**	1
20-004: 1732 Avery Way	Residential	B	1	1732 Avery Way	64	65	1
20-005: 1732 Avery Way	Residential	B	1	1732 Avery Way	64	**66**	2
20-006: 1732 Avery Way	Residential	B	1	1732 Avery Way	66	**68**	2
20-007: 1732 Avery Way	Residential	B	1	1732 Avery Way	69	**70**	1
21-001: 2114 Eubanks Rd	Residential	B	1	2114 Eubanks Rd	59	61	2
22a-001: 2014 Clyde Rd	Residential	B	1	2014 Clyde Rd	71	**72**	1
22a-002: 2015 Clyde Rd	Residential	B	1	2015 Clyde Rd	69	**70**	1
22a-003: 2107 Clyde Rd	Residential	B	1	2107 Clyde Rd	64	65	1
22b-001: 298 Old Moze Trail	Residential	B	1	298 Old Moze Trail	63	**66**	3
22b-002: 300 Old Moze Trail	Residential	B	1	300 Old Moze Trail	65	**66**	1
22b-003: 302 Old Moze Trail	Residential	B	1	302 Old Moze Trail	65	**66**	1
22b-004: 304 Old Moze Trail	Residential	B	1	304 Old Moze Trail	64	**66**	2
22b-005: 306 Old Moze Trail	Residential	B	1	306 Old Moze Trail	60	62	2
22b-006: 307 Old Moze Trail	Residential	B	1	307 Old Moze Trail	59	60	1
22b-007: 506 Hurricane Alley	Residential	B	1	506 Hurricane Alley	59	61	2
22b-008: 508 Hurricane Alley	Residential	B	1	508 Hurricane Alley	60	62	2
22b-009: 510 Hurricane Alley	Residential	B	1	510 Hurricane Alley	60	62	2
22b-010: 512 Hurricane Alley	Residential	B	1	512 Hurricane Alley	61	63	2
22b-011: 514 Hurricane Alley	Residential	B	1	514 Hurricane Alley	61	63	2
22b-012: 516 Hurricane Alley	Residential	B	1	516 Hurricane Alley	62	63	1
22b-013: 518 Hurricane Alley	Residential	B	1	518 Hurricane Alley	62	64	2
22b-014: 520 Hurricane Alley	Residential	B	1	520 Hurricane Alley	63	64	1
22b-015: 522 Hurricane Alley	Residential	B	1	522 Hurricane Alley	63	65	2
22b-016: 524 Hurricane Alley	Residential	B	1	524 Hurricane Alley	64	**66**	2
22b-017: 526 Hurricane Alley	Residential	B	1	526 Hurricane Alley	65	**67**	2
22b-018: 527 Hurricane Alley	Residential	B	1	527 Hurricane Alley	65	**67**	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
22b-019: 133 Mary Kathryn Ln	Residential	B	1	133 Mary Kathryn Ln	64	65	1
22b-020: 131 Mary Kathryn Ln	Residential	B	1	131 Mary Kathryn Ln	64	65	1
22b-021: 129 Mary Kathryn Ln	Residential	B	1	129 Mary Kathryn Ln	63	65	2
22b-022: 127 Mary Kathryn Ln	Residential	B	1	127 Mary Kathryn Ln	63	65	2
22b-023: 125 Mary Kathryn Ln	Residential	B	1	125 Mary Kathryn Ln	63	65	2
22b-024: 123 Mary Kathryn Ln	Residential	B	1	123 Mary Kathryn Ln	63	65	2
22b-025: 121 Mary Kathryn Ln	Residential	B	1	121 Mary Kathryn Ln	63	65	2
22b-026: 119 Mary Kathryn Ln	Residential	B	1	119 Mary Kathryn Ln	63	65	2
22b-027: 117 Mary Kathryn Ln	Residential	B	1	117 Mary Kathryn Ln	61	63	2
22b-028: 115 Mary Kathryn Ln	Residential	B	1	115 Mary Kathryn Ln	60	62	2
22b-029: 113 Mary Kathryn Ln	Residential	B	1	113 Mary Kathryn Ln	60	63	3
22b-030: 111 Mary Kathryn Ln	Residential	B	1	111 Mary Kathryn Ln	60	63	3
22b-031: 109 Mary Kathryn Ln	Residential	B	1	109 Mary Kathryn Ln	60	63	3
22b-032: 107 Mary Kathryn Ln	Residential	B	1	107 Mary Kathryn Ln	61	64	3
22b-033: 105 Mary Kathryn Ln	Residential	B	1	105 Mary Kathryn Ln	67	ROW	
23-001: 2312 Whitfield Rd	Residential	B	1	2312 Whitfield Rd	62	62	0
23-002: 7120 Dumfries Ln	Residential	B	1	7120 Dumfries Ln	54	55	1
23-003: 7116 Dumfries Ln	Residential	B	1	7116 Dumfries Ln	55	56	1
23-004: 7112 Dumfries Ln	Residential	B	1	7112 Dumfries Ln	57	58	1
23-005: 7106 Dumfries Ln	Residential	B	1	7106 Dumfries Ln	62	63	1
23-006: 7115 Lochwood Ct	Residential	B	1	7115 Lochwood Ct	63	65	2
24-001: 210 Northwood Dr	Residential	B	1	210 Northwood Dr	57	59	2
24-002: 208 Northwood Dr	Residential	B	1	208 Northwood Dr	58	60	2
24-003: 206 Northwood Dr	Residential	B	1	206 Northwood Dr	58	60	2
24-004: 104 Baywood Pl	Residential	B	1	104 Baywood Pl	59	61	2
24-005: 103 Baywood Pl	Residential	B	1	103 Baywood Pl	57	58	1
24-006: 106 Baywood Pl	Residential	B	1	106 Baywood Pl	55	57	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	**Use**	**NAC**	**ERs**	**Address**	**Existing 2019**	**Build 2045**	**Change[2]**
24-007: 101 Baywood Pl	Residential	B	1	101 Baywood Pl	55	56	1
24-008: 100 Baywood Pl	Residential	B	1	100 Baywood Pl	56	57	1
24-009: 202 Northwood Dr	Residential	B	1	202 Northwood Dr	52	53	1
24-010: 106 Groomsbridge Ct	Residential	B	1	106 Groomsbridge Ct	57	58	1
24-011: 105 Groomsbridge Ct	Residential	B	1	105 Groomsbridge Ct	54	55	1
24-012: 104 Groomsbridge Ct	Residential	B	1	104 Groomsbridge Ct	56	57	1
24-013: 103 Groomsbridge Ct	Residential	B	1	103 Groomsbridge Ct	57	59	2
24-014: 102 Groomsbridge Ct	Residential	B	1	102 Groomsbridge Ct	58	59	1
24-015: 101 Groomsbridge Ct	Residential	B	1	101 Groomsbridge Ct	57	59	2
24-016: 116 Northwood Dr	Residential	B	1	116 Northwood Dr	57	58	1
24-017: 114 Northwood Dr	Residential	B	1	114 Northwood Dr	59	60	1
24-018: 112 Northwood Dr	Residential	B	1	112 Northwood Dr	59	60	1
24-020: North Chapel Hill Baptist Church - Outdoor Worship Area	Place of Worship	C	1	7707 NC 86	66	67	1
24-021: 7707 NC 86	Place of Worship	D	1	7707 NC 86	42	43	1
25-001: 1802 Martin Luther King Jr Blvd	Restaurant	E	1	1802 Martin Luther King Jr Blvd	56	57	1
25-002B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	60	1
25-002C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-002D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	64	65	1
25-003: 510 Perkins Dr	Residential	B	1	510 Perkins Dr	53	52	-1
25-004: 512 Perkins Dr	Residential	B	1	512 Perkins Dr	53	53	0
25-005: 514 Perkins Dr	Residential	B	1	514 Perkins Dr	53	53	0
25-006: 516 Perkins Dr	Residential	B	1	516 Perkins Dr	53	53	0
25-007: 518 Perkins Dr	Residential	B	1	518 Perkins Dr	53	54	1
25-008: 520 Perkins Dr	Residential	B	1	520 Perkins Dr	54	55	1
25-009B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	53	53	0
25-009C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	55	-1
25-009D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	64	65	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
25-010B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	53	53	0
25-010C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	55	55	0
25-010D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	63	64	1
25-011: Chapel Hill North Apartments - Picnic Area	Picnic Area	C	1	200 Perkins Dr	58	60	2
25-012: 610 Perkins Dr	Residential	B	1	610 Perkins Dr	56	56	0
25-013: 612 Perkins Dr	Residential	B	1	612 Perkins Dr	57	57	0
25-014: 614 Perkins Dr	Residential	B	1	614 Perkins Dr	58	59	1
25-015: 616 Perkins Dr	Residential	B	1	616 Perkins Dr	60	61	1
25-016: 618 Perkins Dr	Residential	B	1	618 Perkins Dr	61	62	1
25-017: 620 Perkins Dr	Residential	B	1	620 Perkins Dr	61	63	2
25-018: Chapel Hill North Apartments - Playground	Playground	C	0.3	200 Perkins Dr	67	69	2
25-019: 710 Perkins Dr	Residential	B	1	710 Perkins Dr	52	50	-2
25-020: 712 Perkins Dr	Residential	B	1	712 Perkins Dr	51	49	-2
25-021: 714 Perkins Dr	Residential	B	1	714 Perkins Dr	52	50	-2
25-022: 716 Perkins Dr	Residential	B	1	716 Perkins Dr	52	50	-2
25-023: 718 Perkins Dr	Residential	B	1	718 Perkins Dr	52	51	-1
25-024: 720 Perkins Dr	Residential	B	1	720 Perkins Dr	53	52	-1
25-025: 722 Perkins Dr	Residential	B	1	722 Perkins Dr	54	54	0
25-026: 724 Perkins Dr	Residential	B	1	724 Perkins Dr	55	55	0
25-027B: 812 Perkins Dr	Residential	B	1	812 Perkins Dr	55	55	0
25-028: Chapel Hill North Apartments - Basketball	Basketball Court	C	0.3	200 Perkins Dr	68	69	1
25-029: Chapel Hill North Apartments - Dog park	Dog Park	C	0.3	200 Perkins Dr	66	68	2
25-030: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	63	65	2
25-031: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	51	51	0
25-032: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	51	50	-1
25-033: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	54	53	-1
25-034: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	56	57	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
25-035: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	61	62	1
25-036: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	51	49	-2
25-037: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	56	57	1
25-038: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	57	59	2
25-039: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	57	58	1
25-040: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	60	62	2
25-041: Chapel Hill North Apartments - Picnic Area	Picnic Area	C	1	200 Perkins Dr	53	54	1
25-042: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	57	58	1
25-043: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	48	49	1
25-044: Chapel Hill North Apartments - Trail	Trail	C	0.07	200 Perkins Dr	51	52	1
25-045: Chapel Hill North Apartments - Pool	Pool	C	1	200 Perkins Dr	51	53	2
25-046: Chapel Hill North Apartments - Garden	Community Garden	C	1	200 Perkins Dr	51	52	1
25-047A: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	47	47	0
25-047B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	49	50	1
25-047C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	51	52	1
25-048A: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	47	48	1
25-048B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	50	51	1
25-048C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	52	54	2
25-049A: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	48	49	1
25-049B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	51	52	1
25-049C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	53	55	2
25-050A: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	49	49	0
25-050B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	52	53	1
25-050C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	57	1
25-051B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	54	56	2
25-051C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	60	2
25-051D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
25-052B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	55	57	2
25-052C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	61	2
25-052D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-053B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	58	2
25-053C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-053D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	62	63	1
25-054B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	57	59	2
25-054C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-054D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	62	64	2
25-055B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	60	2
25-055C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-055D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	63	64	1
25-056B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-056C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-056D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	63	64	1
25-057B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	57	58	1
25-057C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	60	1
25-057D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	63	64	1
25-058B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	60	2
25-058C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-058D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	62	63	1
25-059B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-059C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-060D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-061B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-061C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-062D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
25-063B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	57	59	2
25-063C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	61	2
25-064D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	61	62	1
25-065B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	57	59	2
25-065C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	60	1
25-066D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-067D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-068B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	57	58	1
25-068C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	60	2
25-069D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	60	61	1
25-070B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	58	2
25-070C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-071D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	61	2
25-072B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	58	2
25-072C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-073D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	60	1
25-074B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	57	1
25-074C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-075B: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	56	57	1
25-075C: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	58	59	1
25-075D: 200 Perkins Dr	Residential	B	1	200 Perkins Dr	59	60	1
25-076: 211 Adair Dr	Residential	B	1	211 Adair Dr	52	53	1
25-077: 209 Adair Dr	Residential	B	1	209 Adair Dr	51	53	2
25-078: 207 Adair Dr	Residential	B	1	207 Adair Dr	51	53	2
25-079: 205 Adair Dr	Residential	B	1	205 Adair Dr	51	53	2
25-080: 203 Adair Dr	Residential	B	1	203 Adair Dr	51	52	1
25-081: 201 Adair Dr	Residential	B	1	201 Adair Dr	51	52	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
25-082: 111 Adair Dr	Residential	B	1	111 Adair Dr	52	53	1
25-083: 109 Adair Dr	Residential	B	1	109 Adair Dr	52	53	1
25-084: 107 Adair Dr	Residential	B	1	107 Adair Dr	53	54	1
25-085: 105 Adair Dr	Residential	B	1	105 Adair Dr	53	55	2
25-086: 103 Adair Dr	Residential	B	1	103 Adair Dr	54	55	1
25-087: 101 Adair Dr	Residential	B	1	101 Adair Dr	56	57	1
25-088B: 830 Perkins Dr	Residential	B	1	830 Perkins Dr	53	54	1
25-089B: 828 Perkins Dr	Residential	B	1	828 Perkins Dr	53	54	1
25-090B: 826 Perkins Dr	Residential	B	1	826 Perkins Dr	53	54	1
25-091B: 824 Perkins Dr	Residential	B	1	824 Perkins Dr	53	54	1
25-092B: 822 Perkins Dr	Residential	B	1	822 Perkins Dr	53	54	1
25-093B: 820 Perkins Dr	Residential	B	1	820 Perkins Dr	53	54	1
25-094B: 818 Perkins Dr	Residential	B	1	818 Perkins Dr	53	54	1
25-095B: 816 Perkins Dr	Residential	B	1	816 Perkins Dr	54	54	0
25-096B: 814 Perkins Dr	Residential	B	1	814 Perkins Dr	54	54	0
25-097: Chapel Hill North Apartments - Patio	Patio	C	1	200 Perkins Dr	59	61	2
25-098: Chapel Hill North Apartments - Trail	Trail	C	0.5	200 Perkins Dr	51	53	2
25-099: Chapel Hill North Apartments - Trail	Trail	C	0.5	200 Perkins Dr	53	54	1
26-001: 2623 Whitfield Rd	Residential	B	1	2623 Whitfield Rd	62	63	1
26-002: 2715 Whitfield Rd	Residential	B	1	2715 Whitfield Rd	68	70	2
26-003: 2719 Whitfield Rd	Residential	B	1	2719 Whitfield Rd	66	66	0
26-004: 2719 Whitfield Rd	Residential	B	1	2719 Whitfield Rd	62	63	1
26-005: 113 Foxridge Rd	Residential	B	1	113 Foxridge Rd	65	66	1
26-006: 112 Foxridge Rd	Residential	B	1	112 Foxridge Rd	65	66	1
26-007: 111 Foxridge Rd	Residential	B	1	111 Foxridge Rd	72	73	1
26-008: 101 Foxridge Rd	Residential	B	1	101 Foxridge Rd	61	62	1
27-001: 227 Schultz St	Residential	B	1	227 Schultz St	58	61	3

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
27-002: 219 Schultz St	Residential	B	1	219 Schultz St	59	61	2
27-003: 213 Schultz St	Residential	B	1	213 Schultz St	59	61	2
27-004: 207 Schultz St	Residential	B	1	207 Schultz St	59	61	2
27-005: 201 Schultz St	Residential	B	1	201 Schultz St	59	61	2
27-006: 151 Schultz St	Residential	B	1	151 Schultz St	58	60	2
27-007: 113 Weatherstone Dr - Unit A	Residential	B	1	113 Weatherstone Dr - Unit A	57	60	3
27-008: 113 Weatherstone Dr - Unit B	Residential	B	1	113 Weatherstone Dr - Unit B	58	60	2
27-009: 113 Weatherstone Dr - Unit C	Residential	B	1	113 Weatherstone Dr - Unit C	57	60	3
27-010: 113 Weatherstone Dr - Unit D	Residential	B	1	113 Weatherstone Dr - Unit D	57	60	3
27-011: 113 Weatherstone Dr - Unit E	Residential	B	1	113 Weatherstone Dr - Unit E	57	60	3
27-012: 110 Weatherstone Dr - Unit D	Residential	B	1	110 Weatherstone Dr - Unit D	57	60	3
27-013: 110 Weatherstone Dr - Unit C	Residential	B	1	110 Weatherstone Dr - Unit C	57	59	2
27-014: 110 Weatherstone Dr - Unit B	Residential	B	1	110 Weatherstone Dr - Unit B	56	58	2
27-015: 110 Weatherstone Dr - Unit A	Residential	B	1	110 Weatherstone Dr - Unit A	56	58	2
27-016: 870 Weaver Dairy Rd	Place of Worship	D	1	870 Weaver Dairy Rd	35	35	0
27-017: 137 Essex Dr	Residential	B	1	137 Essex Dr	55	57	2
27-018: 139 Essex Dr	Residential	B	1	139 Essex Dr	55	57	2
27-019: 141 Essex Dr	Residential	B	1	141 Essex Dr	55	57	2
27-020: 142 Essex Dr	Residential	B	1	142 Essex Dr	55	57	2
27-021: 140 Essex Dr	Residential	B	1	140 Essex Dr	54	56	2
27-022: 138 Essex Dr	Residential	B	1	138 Essex Dr	54	56	2
27-023: 136 Essex Dr	Residential	B	1	136 Essex Dr	53	55	2
27-024: 134 Essex Dr	Residential	B	1	134 Essex Dr	52	54	2
27-025: 132 Essex Dr	Residential	B	1	132 Essex Dr	52	54	2
27-026: 130 Essex Dr	Residential	B	1	130 Essex Dr	51	53	2
27-027: 750 Weaver Dairy Rd - Unit 121	Residential	B	1	750 Weaver Dairy Rd - Unit 121	53	55	2
27-028: 750 Weaver Dairy Rd - Unit 120	Residential	B	1	750 Weaver Dairy Rd - Unit 120	52	54	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
27-029: 750 Weaver Dairy Rd - Unit 119	Residential	B	1	750 Weaver Dairy Rd - Unit 119	51	53	2
28-001: 18 Mafolie Ct	Residential	B	1	18 Mafolie Ct	59	60	1
28-002: 14 Sedgewood Rd	Residential	B	1	14 Sedgewood Rd	56	57	1
28-003: 16 Mafolie Ct	Residential	B	1	16 Mafolie Ct	56	57	1
28-004: 22 Mafolie Ct	Residential	B	1	22 Mafolie Ct	67	68	1
28-005: 24 Sedgewood Rd	Residential	B	1	24 Sedgewood Rd	63	65	2
28-006: 26 Sedgewood Rd	Residential	B	1	26 Sedgewood Rd	63	65	2
28-007: 28 Sedgewood Rd	Residential	B	1	28 Sedgewood Rd	62	65	3
28-008: 34 Sedgewood Rd	Residential	B	1	34 Sedgewood Rd	52	54	2
28-009: 30 Sedgewood Rd	Residential	B	1	30 Sedgewood Rd	50	52	2
28-010: 7207 North Hill Dr	Residential	B	1	7207 North Hill Dr	51	54	3
28-011: 7213 North Hill Dr	Residential	B	1	7213 North Hill Dr	53	56	3
28-012: 7208 North Hill Dr	Residential	B	1	7208 North Hill Dr	51	53	2
28-013: 3415 Forest Oaks Dr	Residential	B	1	3415 Forest Oaks Dr	52	54	2
28-014: 3429 Forest Oaks Dr	Residential	B	1	3429 Forest Oaks Dr	49	51	2
28-015: 3501 Forest Oaks Dr	Residential	B	1	3501 Forest Oaks Dr	49	51	2
28-016: 3513 Forest Oaks Dr	Residential	B	1	3513 Forest Oaks Dr	50	52	2
28-017: 3521 Forest Oaks Dr	Residential	B	1	3521 Forest Oaks Dr	51	53	2
28-018: 3525 Forest Oaks Dr	Residential	B	1	3525 Forest Oaks Dr	49	51	2
29-001: 750 Weaver Dairy Rd - Unit 139	Residential	B	1	750 Weaver Dairy Rd - Unit 139	61	63	2
29-002: 750 Weaver Dairy Rd - Unit 140	Residential	B	1	750 Weaver Dairy Rd - Unit 140	60	62	2
29-003: 750 Weaver Dairy Rd - Unit 141	Residential	B	1	750 Weaver Dairy Rd - Unit 141	59	61	2
29-004: 750 Weaver Dairy Rd - Unit 142	Residential	B	1	750 Weaver Dairy Rd - Unit 142	58	60	2
29-005: 750 Weaver Dairy Rd - Unit 169	Residential	B	1	750 Weaver Dairy Rd - Unit 169	62	65	3
29-006: 750 Weaver Dairy Rd - Unit 168	Residential	B	1	750 Weaver Dairy Rd - Unit 168	61	63	2
29-007: 750 Weaver Dairy Rd - Unit 167	Residential	B	1	750 Weaver Dairy Rd - Unit 167	60	61	1
29-008: 750 Weaver Dairy Rd - Unit 167	Residential	B	1	750 Weaver Dairy Rd - Unit 167	59	60	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
29-009: 750 Weaver Dairy Rd - Unit 166	Residential	B	1	750 Weaver Dairy Rd - Unit 166	58	59	1
29-010: 750 Weaver Dairy Rd - Unit 170	Residential	B	1	750 Weaver Dairy Rd - Unit 170	59	61	2
29-011: 750 Weaver Dairy Rd - Unit 171	Residential	B	1	750 Weaver Dairy Rd - Unit 171	58	60	2
29-012: 750 Weaver Dairy Rd - Unit 172	Residential	B	1	750 Weaver Dairy Rd - Unit 172	58	60	2
29-013: 750 Weaver Dairy Rd - Unit 172	Residential	B	1	750 Weaver Dairy Rd - Unit 172	58	60	2
29-014: 750 Weaver Dairy Rd - Unit 173	Residential	B	1	750 Weaver Dairy Rd - Unit 173	57	59	2
29-015: 750 Weaver Dairy Rd - Unit 175	Residential	B	1	750 Weaver Dairy Rd - Unit 175	57	59	2
29-016: 750 Weaver Dairy Rd - Unit 174	Residential	B	1	750 Weaver Dairy Rd - Unit 174	56	58	2
29-017: 750 Weaver Dairy Rd - Unit 174	Residential	B	1	750 Weaver Dairy Rd - Unit 174	56	58	2
29-018: 750 Weaver Dairy Rd - Unit 176	Residential	B	1	750 Weaver Dairy Rd - Unit 176	56	58	2
29-019: 750 Weaver Dairy Rd - Unit 177	Residential	B	1	750 Weaver Dairy Rd - Unit 177	55	57	2
29-020: 750 Weaver Dairy Rd - Unit 178	Residential	B	1	750 Weaver Dairy Rd - Unit 178	55	57	2
29-021: 750 Weaver Dairy Rd - Unit 179	Residential	B	1	750 Weaver Dairy Rd - Unit 179	54	56	2
29-022: 750 Weaver Dairy Rd - Unit 180	Residential	B	1	750 Weaver Dairy Rd - Unit 180	54	56	2
29-023: 750 Weaver Dairy Rd - Unit 181	Residential	B	1	750 Weaver Dairy Rd - Unit 181	52	54	2
29-024: 750 Weaver Dairy Rd - Unit 182	Residential	B	1	750 Weaver Dairy Rd - Unit 182	52	54	2
29-025: 750 Weaver Dairy Rd - Unit 183	Residential	B	1	750 Weaver Dairy Rd - Unit 183	52	53	1
29-026: Carol Woods - Farmers Garden (Garden 1)	Community Garden	C	0.5	750 Weaver Dairy Rd	62	63	1
29-027: Carol Woods - Farmers Garden (Garden 1)	Community Garden	C	0.5	750 Weaver Dairy Rd	59	61	2
29-028: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	60	62	2
29-029: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	62	63	1
29-030: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	62	64	2
29-031: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	59	61	2
29-032: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	59	61	2
29-033: Carol Woods - Dog Park	Dog Park	C	0.17	750 Weaver Dairy Rd	58	60	2
29-034: Carol Woods - Rotation Garden (Garden 2)	Community Garden	C	1	750 Weaver Dairy Rd	62	64	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
29-035: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	59	61	2
29-036: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	59	62	3
29-037: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	60	62	2
29-038: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	61	63	2
29-039: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	62	64	2
29-040: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	62	64	2
29-041: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	61	64	3
29-042: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	62	64	2
29-043: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	61	63	2
29-044: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	59	61	2
29-045: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	57	60	3
29-046: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	56	59	3
29-047: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	58	60	2
29-048: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	57	59	2
29-049: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	55	57	2
29-050: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	55	56	1
29-051: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	54	56	2
29-052: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	54	56	2
29-053: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	54	56	2
29-054: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	56	57	1
29-055: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	56	57	1
29-056: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	56	58	2
29-057: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	55	57	2
29-058: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	55	57	2
29-059: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	55	57	2
29-060: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	52	53	1
29-061: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	59	61	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
29-062: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	56	58	2
29-063: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	57	60	3
29-064: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	60	62	2
29-065: Harkness Circle Trail	Trail	C	0.03	750 Weaver Dairy Rd	61	63	2
30-001: 1023 Northridge Ln	Residential	B	1	1023 Northridge Ln	65	67	2
30-002: 1017 Northridge Ln	Residential	B	1	1017 Northridge Ln	61	64	3
30-003: 1011 Northridge Ln	Residential	B	1	1011 Northridge Ln	51	53	2
30-004: 1014 Northridge Ln	Residential	B	1	1014 Northridge Ln	52	54	2
30-005: 1024 Northridge Ln	Residential	B	1	1024 Northridge Ln	61	63	2
31-001: 7304 Sunrise Rd	Residential	B	1	7304 Sunrise Rd	61	63	2
31-002: 7220 Sunrise Rd	Residential	B	1	7220 Sunrise Rd	62	64	2
31-003: 7326 Sunrise Rd	Place of Worship	D	1	7326 Sunrise Rd	46	48	2
32-001: 3824 Sweeten Creek Rd	Residential	B	1	3824 Sweeten Creek Rd	51	52	1
32-002: 3828 Sweeten Creek Rd	Residential	B	1	3828 Sweeten Creek Rd	50[10]	51	1
32-003: 3830 Sweeten Creek Rd	Residential	B	1	3830 Sweeten Creek Rd	53	55	2
32-004: 103 Yukon Ln	Residential	B	1	103 Yukon Ln	53	55	2
32-005: 105 Yukon Ln	Residential	B	1	105 Yukon Ln	55	57	2
32-006: 107 Yukon Ln	Residential	B	1	107 Yukon Ln	61	63	2
32-007: 106 Yukon Ln	Residential	B	1	106 Yukon Ln	66	68	2
32-008: 104 Yukon Ln	Residential	B	1	104 Yukon Ln	67	69	2
32-009: 102 Yukon Ln	Residential	B	1	102 Yukon Ln	58	60	2
32-010: 100 Yukon Ln	Residential	B	1	100 Yukon Ln	58	60	2
32-011: 3902 Sweeten Creek Rd	Residential	B	1	3902 Sweeten Creek Rd	62	64	2
32-012: 3904 Sweeten Creek Rd	Residential	B	1	3904 Sweeten Creek Rd	64	66	2
32-013: 3906 Sweeten Creek Rd	Residential	B	1	3906 Sweeten Creek Rd	65	67	2
32-014: 3908 Sweeten Creek Rd	Residential	B	1	3908 Sweeten Creek Rd	63	65	2
32-015: 3910 Sweeten Creek Rd	Residential	B	1	3910 Sweeten Creek Rd	60	62	2

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
32-016: 3912 Sweeten Creek Rd	Residential	B	1	3912 Sweeten Creek Rd	61	63	2
32-017: 3914 Sweeten Creek Rd	Residential	B	1	3914 Sweeten Creek Rd	59	61	2
32-018: 4000 Sweeten Creek Rd	Residential	B	1	4000 Sweeten Creek Rd	58	61	3
32-019: 4002 Sweeten Creek Rd	Residential	B	1	4002 Sweeten Creek Rd	59	61	2
32-020: 4004 Sweeten Creek Rd	Residential	B	1	4004 Sweeten Creek Rd	56	58	2
32-021: 4006 Sweeten Creek Rd	Residential	B	1	4006 Sweeten Creek Rd	61	64	3
32-022: 4008 Sweeten Creek Rd	Residential	B	1	4008 Sweeten Creek Rd	63	**66**	3
32-023: 4010 Sweeten Creek Rd	Residential	B	1	4010 Sweeten Creek Rd	65	**67**	2
32-024: 4100 Sweeten Creek Rd	Residential	B	1	4100 Sweeten Creek Rd	67	**69**	2
32-025: 4102 Sweeten Creek Rd	Residential	B	1	4102 Sweeten Creek Rd	69	**71**	2
32-026: 4104 Sweeten Creek Rd	Residential	B	1	4104 Sweeten Creek Rd	70	**72**	2
32-027: 4106 Sweeten Creek Rd	Residential	B	1	4106 Sweeten Creek Rd	70	**72**	2
32-028: 4108 Sweeten Creek Rd	Residential	B	1	4108 Sweeten Creek Rd	69	**70**	1
32-029: 604 Perry Creek Dr	Residential	B	1	604 Perry Creek Dr	68	**69**	1
32-030: 602 Perry Creek Dr	Residential	B	1	602 Perry Creek Dr	66	**67**	1
32-031: 600 Perry Creek Dr	Residential	B	1	600 Perry Creek Dr	65	**67**	2
32-032: 103 Hawksbill Pl	Residential	B	1	103 Hawksbill Pl	67	**68**	1
32-033: 105 Hawksbill Pl	Residential	B	1	105 Hawksbill Pl	66	**67**	1
32-034: 104 Hawksbill Pl	Residential	B	1	104 Hawksbill Pl	66	**67**	1
32-035: 102 Hawksbill Pl	Residential	B	1	102 Hawksbill Pl	64	**66**	2
32-036: 508 Perry Creek Dr	Residential	B	1	508 Perry Creek Dr	62	63	1
32-037: 506 Perry Creek Dr	Residential	B	1	506 Perry Creek Dr	62	63	1
32-038: 504 Perry Creek Dr	Residential	B	1	504 Perry Creek Dr	62	64	2
32-039: 502 Perry Creek Dr	Residential	B	1	502 Perry Creek Dr	62	63	1
32-040: 503 Perry Creek Dr	Residential	B	1	503 Perry Creek Dr	57	58	1
32-041: 505 Perry Creek Dr	Residential	B	1	505 Perry Creek Dr	57	58	1
32-042: 507 Perry Creek Dr	Residential	B	1	507 Perry Creek Dr	59	60	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
32-043: 509 Perry Creek Dr	Residential	B	1	509 Perry Creek Dr	60	62	2
32-044: 601 Perry Creek Dr	Residential	B	1	601 Perry Creek Dr	61	62	1
32-045: 406 Silver Creek Trl	Residential	B	1	406 Silver Creek Trl	61	63	2
32-046: 5007 Sweeten Creek Rd	Residential	B	1	5007 Sweeten Creek Rd	65	66	1
32-047: 4103 Sweeten Creek Rd	Residential	B	1	4103 Sweeten Creek Rd	63	64	1
32-048: 101 Alta Ct	Residential	B	1	101 Alta Ct	62	63	1
32-049: 4007 Sweeten Creek Rd	Residential	B	1	4007 Sweeten Creek Rd	59	61	2
32-050: 4005 Sweeten Creek Rd	Residential	B	1	4005 Sweeten Creek Rd	55	57	2
32-051: 4003 Sweeten Creek Rd	Residential	B	1	4003 Sweeten Creek Rd	53	54	1
32-052: 4001 Sweeten Creek Rd	Residential	B	1	4001 Sweeten Creek Rd	50[10]	50	0
32-053: 3905 Sweeten Creek Rd	Residential	B	1	3905 Sweeten Creek Rd	50[10]	50	0
32-054: 3903 Sweeten Creek Rd	Residential	B	1	3903 Sweeten Creek Rd	50[10]	50	0
32-055: 101 Toynbee Pl	Residential	B	1	101 Toynbee Pl	50[10]	51	1
32-056: 3839 Sweeten Creek Rd	Residential	B	1	3839 Sweeten Creek Rd	52	54	2
32-057: 3837 Sweeten Creek Rd	Residential	B	1	3837 Sweeten Creek Rd	51	53	2
32-058: 3835 Sweeten Creek Rd	Residential	B	1	3835 Sweeten Creek Rd	50	52	2
32-059: 3833 Sweeten Creek Rd	Residential	B	1	3833 Sweeten Creek Rd	50[10]	50[10]	0
32-060: 104 Toynbee Pl	Residential	B	1	104 Toynbee Pl	50[10]	50[10]	0
32-061: 102 Toynbee Pl	Residential	B	1	102 Toynbee Pl	50[10]	50[10]	0
32-062: 103 Toynbee Pl	Residential	B	1	103 Toynbee Pl	50[10]	50[10]	0
32-063: 105 Toynbee Pl	Residential	B	1	105 Toynbee Pl	50[10]	50[10]	0
32-064: 104 Landing Dr	Residential	B	1	104 Landing Dr	50[10]	50[10]	0
32-065: 102 Landing Dr	Residential	B	1	102 Landing Dr	50[10]	50[10]	0
32-066: 103 Landing Dr	Residential	B	1	103 Landing Dr	50[10]	50[10]	0
32-067: 111 San Juan Dr	Residential	B	1	111 San Juan Dr	50[10]	50[10]	0
32-068: 113 San Juan Dr	Residential	B	1	113 San Juan Dr	50[10]	50[10]	0
32-069: 110 San Juan Dr	Residential	B	1	110 San Juan Dr	50	51	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
32-070: 201 Alta Ct	Residential	B	1	201 Alta Ct	56	57	1
32-071: 203 Alta Ct	Residential	B	1	203 Alta Ct	61	63	2
32-072: 405 Silver Creek Trl	Residential	B	1	405 Silver Creek Trl	62	63	1
32-073: 403 Silver Creek Trl	Residential	B	1	403 Silver Creek Trl	60	62	2
32-074: 404 Silver Creek Trl	Residential	B	1	404 Silver Creek Trl	59	60	1
32-075: 400 Silver Creek Trl	Residential	B	1	400 Silver Creek Trl	59	61	2
32-076: 101 Sundance Pl	Residential	B	1	101 Sundance Pl	60	61	1
32-077: 501 Perry Creek Dr	Residential	B	1	501 Perry Creek Dr	60	62	2
32-078: 500 Perry Creek Dr	Residential	B	1	500 Perry Creek Dr	62	64	2
32-079: 103 Swift Run	Residential	B	1	103 Swift Run	62	64	2
32-080: 100 Swift Run	Residential	B	1	100 Swift Run	62	64	2
32-081: 102 Swift Run	Residential	B	1	102 Swift Run	62	64	2
32-082: 104 Swift Run	Residential	B	1	104 Swift Run	63	64	1
32-083: 408 Perry Creek Dr	Residential	B	1	408 Perry Creek Dr	61	62	1
32-084: 406 Perry Creek Dr	Residential	B	1	406 Perry Creek Dr	59	60	1
32-085: 415 Perry Creek Dr	Residential	B	1	415 Perry Creek Dr	62	64	2
32-086: 413 Perry Creek Dr	Residential	B	1	413 Perry Creek Dr	60	62	2
32-087: 103 Sundance Pl	Residential	B	1	103 Sundance Pl	62	63	1
32-088: 100 Sundance Pl	Residential	B	1	100 Sundance Pl	59	61	2
32-089: 401 Silver Creek Trl	Residential	B	1	401 Silver Creek Trl	59	60	1
32-090: 321 Silver Creek Trl	Residential	B	1	321 Silver Creek Trl	59	61	2
32-091: 205 Alta Ct	Residential	B	1	205 Alta Ct	59	60	1
32-092: 206 Alta Ct	Residential	B	1	206 Alta Ct	59	61	2
32-093: 202 Alta Ct	Residential	B	1	202 Alta Ct	56	57	1
32-094: 108 San Juan Dr	Residential	B	1	108 San Juan Dr	50[10]	50	0
32-095: 109 San Juan Dr	Residential	B	1	109 San Juan Dr	50[10]	50[10]	0
33-001: 4500 Dry Creek Rd	Residential	B	1	4500 Dry Creek Rd	63	64	1

Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))		
Receptor Number[1]	Use	NAC	ERs	Address	Existing 2019	Build 2045	Change[2]
33-002: 4500 Dry Creek Rd	Residential	B	1	4500 Dry Creek Rd	64	65	1
34-001: 441 Erwin Rd	Residential	B	1	441 Erwin Rd	60	62	2
34-002: 415 Erwin Rd	Residential	B	1	415 Erwin Rd	58	60	2
35-001: 390 Erwin Rd	Residential	B	1	390 Erwin Rd	63	65	2
Predicted NSA Design Year 2045 Traffic Noise Impacts[3]						113[4]	0

Noise Level Impact[5] | Substantial Increase Impact[6] | Right-of-Way-Acquisition

[1] Receptor number format is XX-YYY, where XX represents the NSA.

[2] Several noise receptors are predicted to experience a noise level reduction relative to the existing conditions. This is due to changes in future traffic patterns and/or changes in the horizontal and vertical roadway alignment.

[3] The number of predicted impacts is not duplicated if receptors are predicted to be impacted by more than one criterion (e.g., if a receptor is impacted by NAC criteria and also by Substantial Increase criteria, it is counted as only one impact)

[4] Total number of predicted traffic noise impacts under the Build Alternative = 109 residences and four non-residential ERs represented by 24 discrete modeled receptors. The number of impacted ERs in each NSA are rounded up to the next whole number to equal 4, for a total of 113 impacts.

[5] Predicted traffic noise impact due to approaching or exceeding NAC (refer to Table 3)

[6] Predicted substantial increase noise impact (refer to Section 10 for definition). No substantial increase noise impacts are predicted for this project.

[7] The lowest attainable NSA 05 equivalent sound level = 59 dB(A) per ambient sound level data acquired at monitoring location M5.1 (Refer to Table 5).

[8] The lowest attainable NSA 06 equivalent sound level = 55 dB(A) per ambient sound level data acquired at monitoring location M6.3 (Refer to Table 5).

[9] The lowest attainable NSA 17 equivalent sound level = 54 dB(A) per ambient sound level data acquired at monitoring location M17.2 (Refer to Table 5).

[10] The lowest attainable NSA 32 equivalent sound level = 50 dB(A) per ambient sound level data acquired at monitoring location M32.6 (Refer to Table 5).

CALCULATION OF EQUIVALENT RECEPTOR VALUE

Apartment Exterior Use Areas (Activity Category C)
25-018, 028, 029

CASE: The Chapel Hill North Apartments has three non-residential areas of frequent human use for which the apartment buildings provide no shielding from I-40 traffic noise: a small one-station playground, a one-goal half-court basketball court with no artificial lighting, and a dog park with one bench. Apartment management (Alexis and Maria) was contacted by phone on June 23rd, 2023 to confirm usage assumptions, but reported that usage data is not collected. Accounting for weather (hot, cold, inclement) and typical child schedules (daycare, elementary school), the playground is assumed to be used by an average of four people (three children and one supervising adult) for 50% of average daily daylight, or six hours per day. With only one goal, no artificial lighting, and less than half regulation size, the basketball court is assumed to be used by an average of four people (two-on-two) for the same six hours per day. Since there is only one bench, the dog park is assumed to be used by an average of not more than two persons at any one time. Apartment/condominium dog owners must walk their dogs every day regardless of weather; therefore, the dog park is assumed to be used every day for all 12 daylight hours plus one hour of twilight every morning and one hour of twilight every evening for a total of 14 hours per day.

Line	For an Average Single Family Residential Unit in North Carolina	
A	People per Residence	3
B	Hours Available for Use per Year	8,760
C	**Person-hours per Year Available for Use = A x B**	**26,280**

Line	For the Apartment Playground		For the Apartment Basketball court		For the Apartment dog park	
D	Average Hourly Occupancy for Recreation Areas	6	Average Hourly Occupancy for Recreation Areas	3	Average Hourly Occupancy for Recreation Areas	4
E	Hours Per Day areas are Available for Use	8	Hours Per Day areas are Available for Use	4	Hours Per Day areas are Available for Use	8
F	Days per Month areas are Available for Use	30	Days per Month areas are Available for Use	30	Days per Month areas are Available for Use	30
G	Months per Year areas are Available for Use	7	Months per Year areas are Available for Use	5	Months per Year areas are Available for Use	12
H	**Person-hours per Year Available for Use = D x E x F x G**	**10,080**	**Person-hours per Year Available for Use = D x E x F x G**	**1,800**	**Person-hours per Year Available for Use = D x E x F x G**	**11,520**
	Total Person-hours per Year Available for Use	**23,400**				
I	**Equivalent Receptor Unit Value for Outdoor Areas = H/C**	**0.9**				
J	Number of Receptor Points assigned	3				
K	**Equivalent Receptor Value Assigned to Each Receiver = I/J**	**0.3**				
L	Number of Votes Assigned to Area in Barrier Voting Process = I	**1**				

KEY: Input Values

CALCULATION OF EQUIVALENT RECEPTOR VALUE

CASE:	The athletic fields at Cedar Ridge High School are used by approixmately 300 students and 1 instructor per day. An estimated 6 percent of the fields' usable area is predicted to be impacted by noise from the highway project and 34 percent of the usable area is predicted to benefit from a proposed noise wall. Each user uses the fields for 1 hour per day and the fields are open 5 days per week year round. This information was confirmed by the TNR authors with the school's athletics director.	
Cedar Ridge High School Athletic Fields (Activity Category C) 5-001 through 5-047		
Line	**For an Average Single Family Residential Unit in North Carolina**	
A	People per Residence	3.0
B	Hours Available for Use per Year	8760
C	**Person-hours per Year Available for Use = A x B**	**26280**
	For the Park Area Being Evaluated	
D	Percent of Usable Area of Park Impacted by Project Noise	6%
E	Percent of Usable Area of Park Benefited by Proposed Noise Wall	34%
F	**Maximum of D and E**	**34%**
G	Average Number of Visitors per Day	300
H	Number of Park Staff	1
I	**Total Number of Occupants per Day = G + H**	**301**
J	Average Hours per Day Used by Each Visitor	1
K	Operational Days per Week	5
L	Operational Weeks per Year	52
M	**Person-hours per Year Available for Use = F x I x J x K x L**	**26,608**
N	**EQUIVALENT RESIDENCE VALUE = M/C**	**1.0**
O	A grid of receptor points at 100-foot spacing (represented by 47 points) was developed to represent the impacted or benefited park usage area.	47
P	**Equivalent Residence Value Assigned to Each Grid Point = N/O**	**0.02**
Q	Number of Votes Assigned to Park in Barrier Voting Process = N	**1**

KEY:	Input Values
	Calculated Values in Bold Text

CALCULATION OF EQUIVALENT RECEPTOR VALUE

CASE:	A hiking trail at Blackwood Farm Park extends into the noise study area. On average, 4 people per hour are assumed to use the trail. Approximately 1,293 feet of the trail lies within the noise study area. NCDOT assumes the trail is available for use 12 hours per day, 7 days per week for 52 weeks per year.	
Blackwood Farm Park Trail (Activity Category C)		
Line	**For an Average Single Family Residential Unit in North Carolina**	
A	People per Residence	3.0
B	Hours Available for Use per Year	8,760
C	**Person-hours per Year Available for Use = A x B**	**26,280**
	For the Trail Area Being Evaluated	
D	Average Number of Persons per Hour Using Trail	50
E	Length of Trail Within Impacted Area (feet)	1293
F	Length of Trail Within Benefited Area (feet)	1293
F	**Maximum of E and F**	**1293**
G	**Hours that each Person is on the Impacted or Benefited Portion of the Trail (based on average of 2 mph) = (F/5280)/2**	**0.12**
H	Hours that Trail is Available for Use per Day	12
I	Days per Week that Trail is Available for Use	7
J	Weeks per Year that Trail is Availble for Use	52
K	**Person-hours per Year Available for Use = D x G x H x I x J**	**26,742**
L	**EQUIVALENT RESIDENCE VALUE = K/C**	**1.02**
M	Spacing of Receptors Used to Model Trail (feet)	100
N	**Number of Receptors Used to Model Trail within Benefited Area = F/M**	**13**
O	**Equivalent Residence Value Assigned to Each Grid Point = L/N**	**0.08**
P	Number of Votes Assigned to Trail in Barrier Voting Process = L	**1**

KEY:	Input Values
	Calculated Values in Bold Text

CALCULATION OF EQUIVALENT RECEPTOR VALUE

Church Exterior Use Area (Activity Category C) 24-020		
CASE:	The North Chapel Hill Baptist Church has an outdoor seating area with 7 benches. Assuming each bench seats up to 3 people, the benches may be assumed to be used up to 4 hours a day, 4 days a week, 8 months out of the year.	
Line	**For an Average Single Family Residential Unit in North Carolina**	
A	People per Residence	3
B	Hours Available for Use per Year	8,760
C	**Person-hours per Year Available for Use = A x B**	**26,280**
	For the church seating area	
D	Average Hourly Occupancy for Seating Area	21
E	Hours Per Day areas are Available for Use	4
F	Days per Month areas are Available for Use	16
G	Months per Year areas are Available for Use	8
H	**Person-hours per Year Available for Use = D x E x F x G**	**10,752**
I	**Equivalent Receptor Unit Value for Seating Area = H/C**	**0.4**
J	Number of Receptor Points	1
K	**Equivalent Receptor Value Assigned to Each Receiver = I/J**	**0.4**
L	Number of Votes Assigned to Area in Barrier Voting Process = I	**0**
KEY:	Input Values	

Appendix C. Traffic Noise Models

General

This appendix documents the TNM Model Input used in this traffic noise analysis. The TNM Models utilized five TNM object types to approximate the traffic segments assessed for the Project DNR:

- Roadways
- Receptors
- Building Barriers
- Terrain Lines
- Ground Zones

Coordinate System

Each of the TNM Objects was modeled using the North American Datum 1983 (NAD83) horizontal coordinate system, and North American Vertical Datum 1988 (NAVD88).

Modeling Procedure

Roadways

TNM roadway element widths were selected based upon representation of one or two lanes of traffic per TNM roadway element. For the proposed highway facility, TNM Roadway vertices were selected to represent interval lengths that appropriately represent fluctuations in the horizontal and vertical roadway geometry, not to exceed a distance of 100 feet apart. For highways in which more than one parallel TNM roadway element was modeled, the modeled roadway lane widths were set to ensure horizontal overlapping of adjacent modeled roadway elements. Overlapping TNM roadway elements is necessary to accurately represent the contiguous paved surface. TNM roadway elements of various widths were also modeled to represent the existing local roadways. Finally, design speeds (posted plus 5 miles per hour) were implemented in the existing, build, and barrier models.

Receptors

TNM receptor elements were modeled by assigning a point location to the most sensitive likely "area of frequent human use" for each receptor. All receptors in the TNM models were assigned a height of 4.92 feet. Given the non-homogeneous terrain and resulting inconsistent intervening source-to-receptor topography throughout the project vicinity, noise levels at each discrete receptor were determined by means of modeling an individual TNM receptor at all representative locations for "loudest-condition" existing and Design Year 2045 Build-condition predicted traffic.

Building Barriers

TNM barrier elements were used to represent residential buildings, places of worship and large commercial and public buildings in the project area. In these cases, the barrier elements have a fixed height roughly equivalent to the height of the building they represent, and were drawn around the exterior of the structures.

Terrain Lines (Elevation Contours)

Elevations (vertical, “Z” coordinates) were input into TNM manually, using the English coordinate values of vertices that define significant changes in grades and/or slopes throughout the study areas. Existing terrain contours were provided by HDR and supplemented with Wake County contours downloaded from the NC OneMap Geospatial Portal website (http://data.nconemap.com/geoportal/catalog/main/home.page). Future contours associated with the Build Alternative design were provided by HDR.

Ground Zones

TNM Ground Zones were used to models large areas of pavement, water, lawn, and field grass in the project area.

TNM Traffic Noise Level Assessment

The TNM traffic noise level assessment is divided into four tasks:

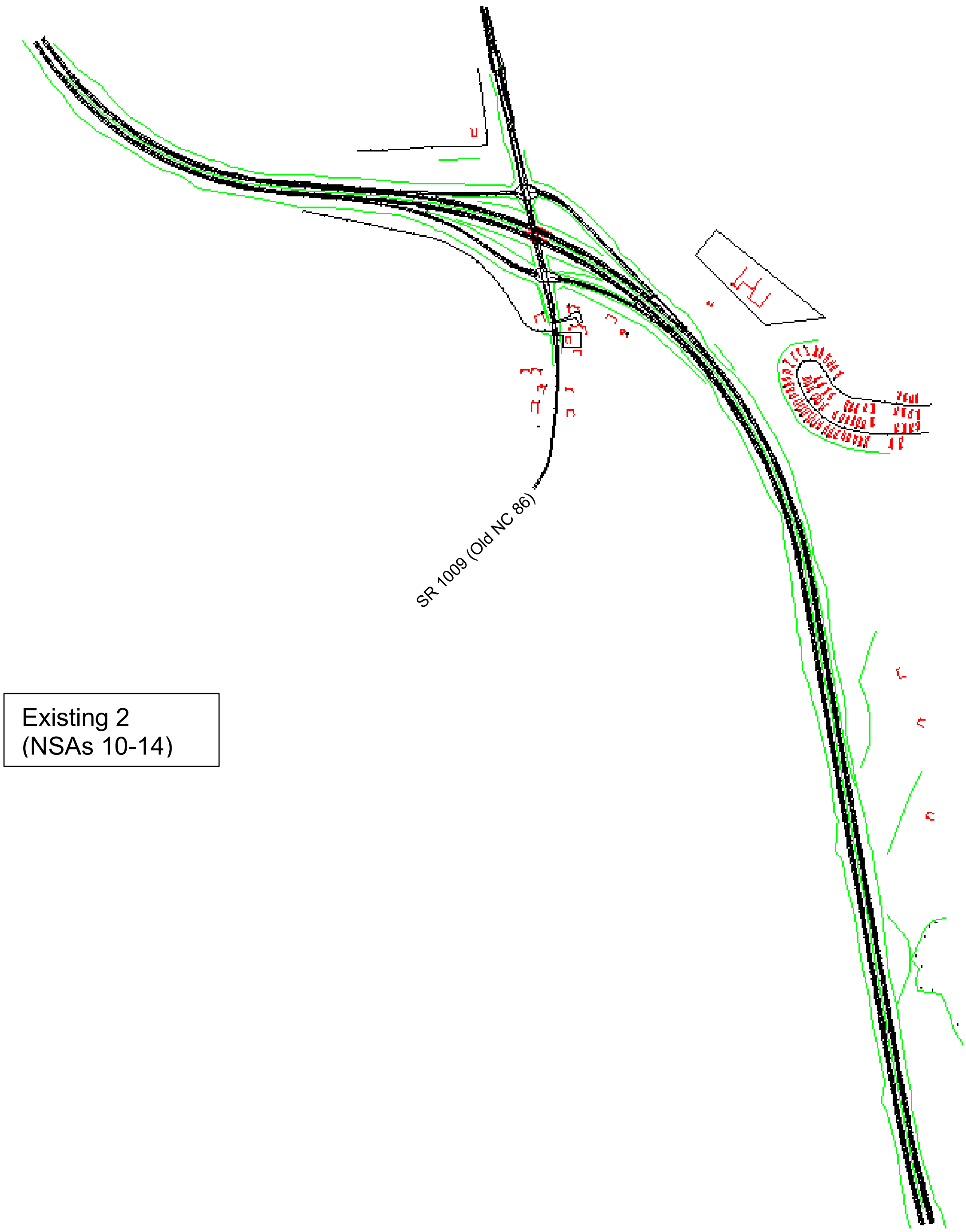
1) Creation of validated TNM computer model(s)
2) Assessment of existing loudest-hour traffic noise levels
3) Assessment of predicted loudest-hour build condition without noise barrier levels
4) Assessment of predicted loudest-hour build condition with noise barrier levels

TNM validation was performed for the DNR using ambient monitoring and traffic data obtained.

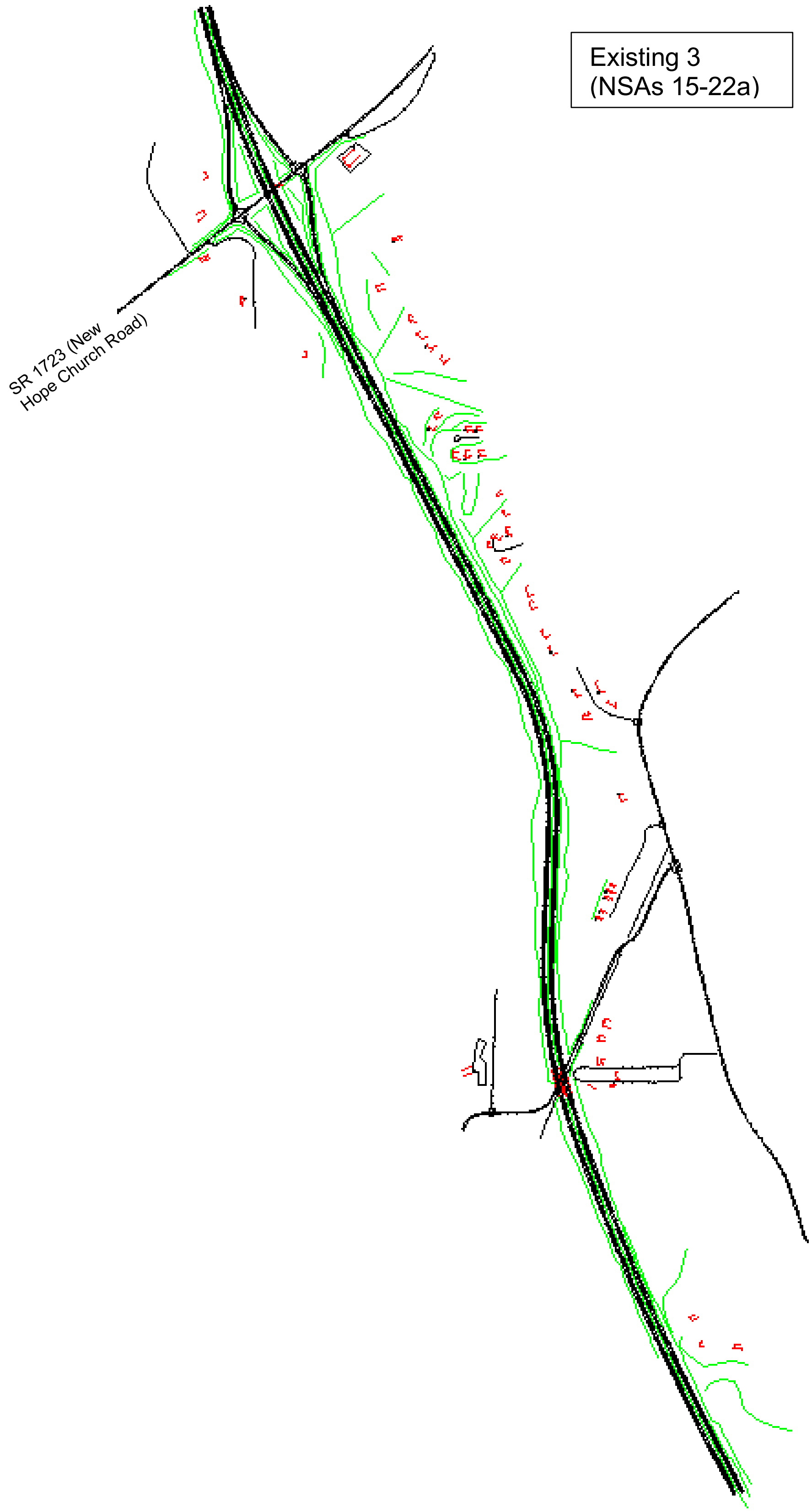
TNM files were transmitted electronically to NCDOT with the DNR.

The study area was divided into different sections in order to allow the models to run more effectively. Sections are presented as follows running west to east.

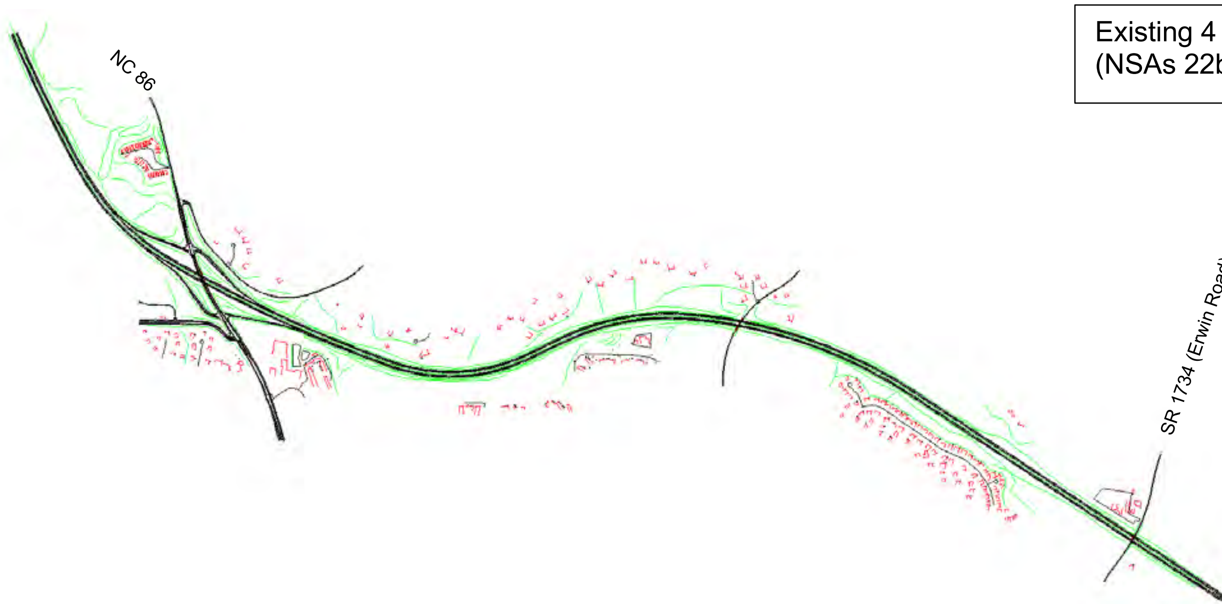
Existing Conditions TNM



Existing 2
(NSAs 10-14)


Existing 3
(NSAs 15-22a)
SR 1723 (New
Hope Church Road)

Existing 4
(NSAs 22b-35)

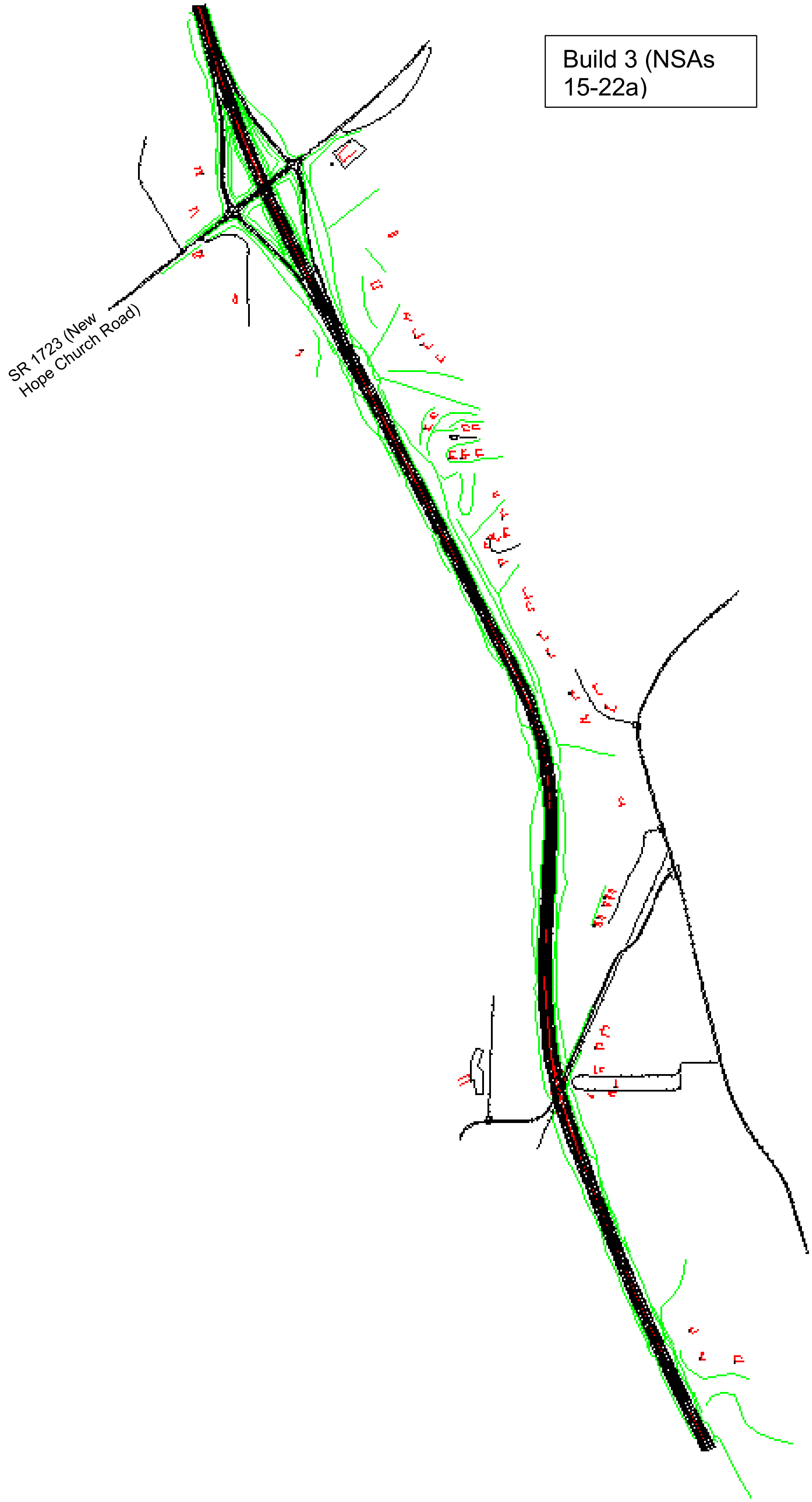


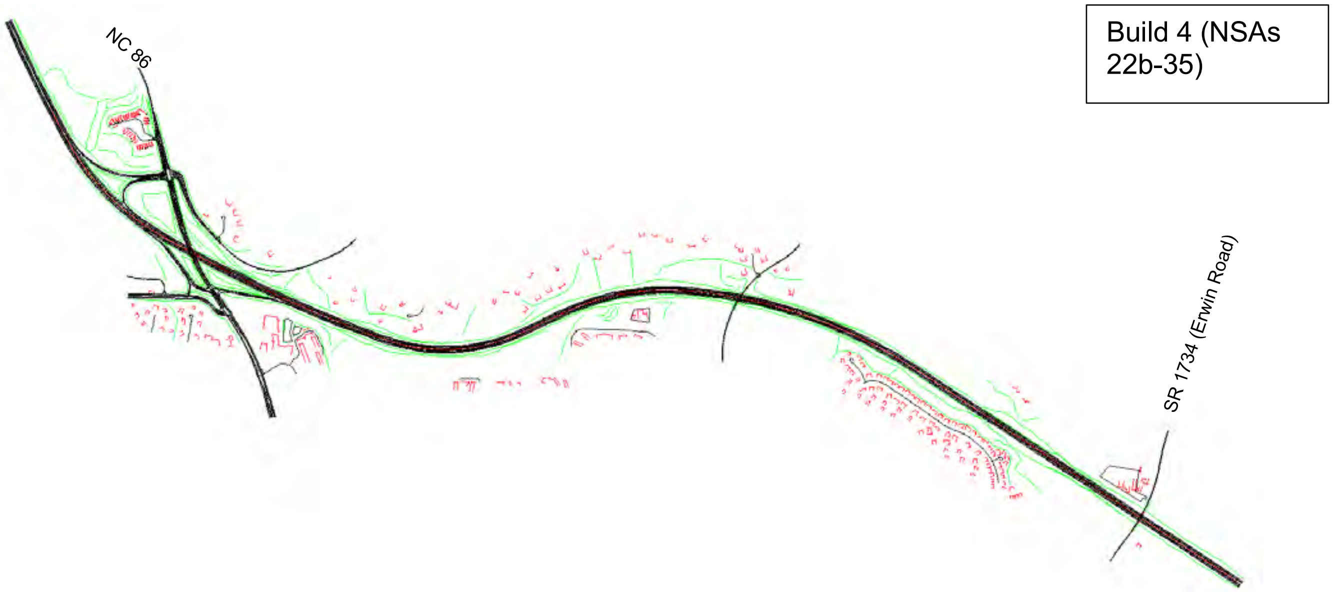
Build Alternative TNM

Build 1
(NSAs 01-09)

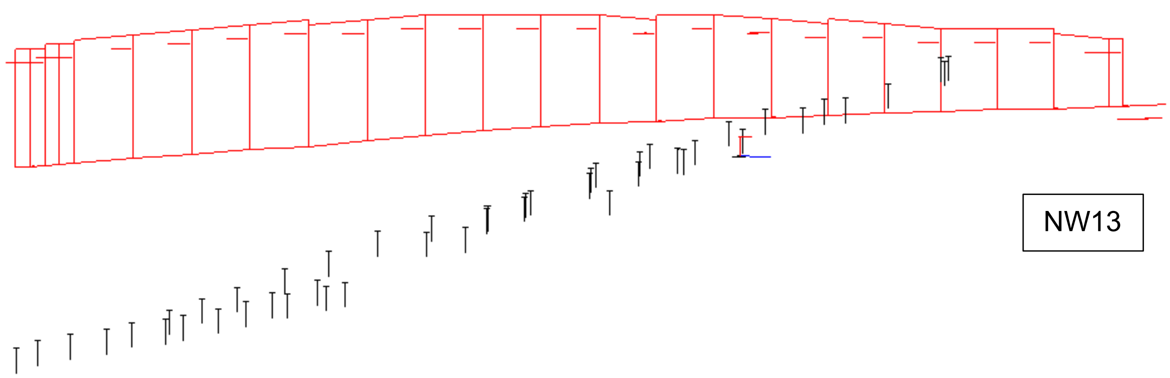

Build 2
(NSAs 10-14)
SR 1009 (Old NC 86)

Build 3 (NSAs 15-22a)





Noise wall Analysis TNM Example



Appendix D. Noise Wall Analysis

-NW02- (Not recommended for construction or further study due to not meeting minimum NRDG requirement)

Location: Adjacent to I-40 westbound west of SR 1134 (Dimmocks Mill Road)

Termini: -YRPD- STA 68+50.92 154.61' RT / -YFLYA- STA 56+87.45 25.76' RT

Dimensions: Length = 765 ft. Average Height = 30 ft. Area = 22,950 sq. ft.

Impacts: 2 Benefited Impacts: 2

Benefits: 2 Benefits ≥ 7 dB(A): 1

Area/Benefit: 11,475 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW02_v0" / NW02_Max

Preliminary Recommendation: Feasible, Not Reasonable

Table D-1 Noise Wall Analysis –NW02– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
02-001: 1218 Dimmocks Mill Rd	RES	B	1	70	64	6
02-002: 1218 Dimmocks Mill Rd	RES	B	1	70	63	7
Noise Wall 02 Predicted Build Condition With-Wall Benefits[1]						**2**
Noise Level Impact		**5 to 6 dB(A) NLR**		**≥ 7 dB(A) NLR**		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW03- (Not recommended for construction or further study due to not meeting minimum benefit requirement)

Location: Adjacent to I-40 eastbound east of SR 1134 (Dimmocks Mill Road)

Termini: -YRPD- STA 59+62.71 79.91' LT / -YRPD- STA 45+79.60 79.96' LT

Dimensions: Length = 1,380 ft. Average Height = 30 ft. Area = 41,400 sq. ft.

Impacts: 2 Benefited Impacts: 1

Benefits: 1 Benefits ≥ 7 dB(A): 0

Area/Benefit: N/A Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW03_v0" / NW03_Max

Preliminary Recommendation: Not Feasible

Table D-2 Noise Wall Analysis –NW03– Performance Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
03-001: 1229 Dimmocks Mill Rd	RES	B	1	68	65	4
03-002: 1414 Dimmocks Mill Rd	RES	B	1	72	68	5
Noise Wall 03 Predicted Build Condition With-Wall Benefits[1]						1
Noise Level Impact		5 to 6 dB(A) NLR		≥ 7 dB(A) NLR		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW06-

Location: Adjacent to I-40 westbound between SR 1006 (Orange Grove Road) and I-85

Termini: -YFLYA- STA 12+80.28 99.00’ RT / -YRPA- STA 16+03.85 86.87’ RT

Dimensions: Length = 1,440 ft. Average Height = 13.5 ft. Area = 19,427 sq. ft.

Impacts: 23 Benefited Impacts: 16

Benefits: 17 Benefits ≥ 7 dB(A): 15

Area/Benefit: 1,143 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: “NW06_v2_rev” / Opt4b.1rev

Preliminary Recommendation: Feasible and Reasonable

Table D-3 Noise Wall Analysis –NW06– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
06-005: 1067 Timbers Dr	RES	B	1	62	62	0
06-006: 1065 Timbers Dr	RES	B	1	61	60	1
06-007: 1063 Timbers Dr	RES	B	1	60	60	0
06-008: 1061 Timbers Dr	RES	B	1	57	57	0
06-009: 1059 Timbers Dr	RES	B	1	59	59	0
06-010: 1057 Timbers Dr	RES	B	1	59	59	0
06-011: 1055 Timbers Dr	RES	B	1	60	60	0
06-012: 1053 Timbers Dr	RES	B	1	59	59	0
06-018: 1068 Timbers Dr	RES	B	1	63	62	1
06-019: 1070 Timbers Dr	RES	B	1	62	62	0
06-020: 1072 Timbers Dr	RES	B	1	65	65	0
06-021: 1074 Timbers Dr	RES	B	1	65	65	0
06-022: 1076 Timbers Dr	RES	B	1	66	66	0
06-023: 1078 Timbers Dr	RES	B	1	68	67	1
06-024: 1080 Timbers Dr	RES	B	1	68	68	0
06-025: 201 Binford St	RES	B	1	68	68	0
06-026: 203 Binford St	RES	B	1	67	66	1
06-029: 211 Binford St	RES	B	1	65	65	0
06-030: 213 Binford St	RES	B	1	64	63	1
06-032: 217 Binford St	RES	B	1	62	61	1
06-047: 208 Binford St	RES	B	1	64	64	0
06-048: 206 Binford St	RES	B	1	64	64	0
06-049: 202 Binford St	RES	B	1	64	64	0
06-050: 150 Binford St	RES	B	1	67	66	1
06-051: 148 Binford St	RES	B	1	65	63	2

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
06-052: 144 Binford St	RES	B	1	64	63	1
06-053: 142 Binford St	RES	B	1	64	63	1
06-054: 140 Binford St	RES	B	1	64	63	1
06-055: 138 Binford St	RES	B	1	64	63	1
06-056: 136 Binford St	RES	B	1	64	63	1
06-057: 134 Binford St	RES	B	1	64	63	1
06-058: 132 Binford St	RES	B	1	63	62	1
06-059: 126 Binford St	RES	B	1	63	62	1
06-060: 118 Binford St	RES	B	1	63	62	1
06-061: 149 Binford St	RES	B	1	72	67	5
06-062: 147 Binford St	RES	B	1	73	66	7
06-063: 145 Binford St	RES	B	1	72	64	8
06-064: 143 Binford St	RES	B	1	72	63	9
06-065: 141 Binford St	RES	B	1	72	64	8
06-066: 139 Binford St	RES	B	1	72	64	8
06-067: 137 Binford St	RES	B	1	73	63	10
06-068: 135 Binford St	RES	B	1	74	63	11
06-069: 133 Binford St	RES	B	1	75	62	13
06-070: 131 Binford St	RES	B	1	75	62	13
06-071: 129 Binford St	RES	B	1	75	63	12
06-072: 127 Binford St	RES	B	1	74	62	12
06-073: 123 Binford St	RES	B	1	75	63	12
06-074: 121 Binford St	RES	B	1	70	61	9
06-075: 119 Binford St	RES	B	1	69	62	7
06-076: 117 Binford St	RES	B	1	65	59	6
06-077: 115 Binford St	RES	B	1	62	58	4
06-078: 113 Binford St	RES	B	1	59	57	2
06-079: 111 Binford St	RES	B	1	59	58	1
06-080: 109 Binford St	RES	B	1	60	58	2
06-081: 107 Binford St	RES	B	1	60	57	3
06-085: 2311 Hedgepath Dr	RES	B	1	68	61	7
06-086: 998 Timbers Dr	RES	B	1	64	60	4
06-091: 2323 Orange Grove Rd	RES	B	1	72	71	1
Noise Wall 06 Predicted Build Condition With-Wall Benefits[1]						**17**
Noise Level Impact		5 to 6 dB(A) NLR		≥ 7 dB(A) NLR		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW09- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound east of SR 1006 (Orange Grove Road)

Termini: -L- STA 12+30.07 129.46’ LT / -L- STA 15+29.09 133.31’ LT

Dimensions: Length = 300 ft. Average Height = 10.3 ft. Area = 3,080 sq. ft.

Impacts: 3 Benefited Impacts: 2

Benefits: 2 Benefits ≥ 7 dB(A): 1

Area/Benefit: 1,540 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: “NW09_v2_rev” / Opt2.1

Preliminary Recommendation: Feasible, Not Reasonable

Table D-4 Noise Wall Analysis –NW09– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
08-043: 817 Oakdale Dr	Res	B	1	50	48	2
09-001: 814 Oakdale Dr	Res	B	1	60	59	1
09-002: 826 Oakdale Dr	Res	B	1	67	62	5
09-003: 836 Oakdale Dr	Res	B	1	73	66	7
09-004: 832 Oakdale Dr	Res	B	1	62	60	2
09-005: 820 Oakdale Dr	Res	B	1	56	55	1
09-006: 810 Oakdale Dr	Res	B	1	55	53	2
09-007: 804 Oakdale Dr	Res	B	1	52	50	2
09-008: 800 Oakdale Dr	Res	B	1	52	51	1
09-009: 2311 Blair Dr	Res	B	1	53	52	1
09-010: 2315 Blair Dr	Res	B	1	54	53	1
09-011: 2321 Blair Dr	Res	B	1	55	54	1
09-012: 2327 Blair Dr	Res	B	1	58	58	0
09-013: 2331 Blair Dr	Res	B	1	64	62	2
09-014: 2335 Blair Dr	Res	B	1	71	68	3
09-015: 2338 Blair Dr	Res	B	1	61	61	0
09-016: 2334 Blair Dr	Res	B	1	56	56	0
Noise Wall 09 Predicted Build Condition With-Wall Benefits[1]						**2**
Noise Level Impact		5 to 6 dB(A) NLR		≥ 7 dB(A) NLR		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW12- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to the onramp from SR 1009 (Old NC 86) to I-40 eastbound

Termini: -Y2- STA 19+11.22 63.63’ RT / -Y2RPD- STA 17+71.52 123.81’ LT

Dimensions: Length = 540 ft. Average Height = 9.5 ft. Area = 5,132 sq. ft.

Impacts: 4 Benefited Impacts: 2

Benefits: 2 Benefits ≥ 7 dB(A): 1

Area/Benefit: 2,566 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: “NW12_v1” / Opt2

Preliminary Recommendation: Feasible, Not Reasonable

Table D-5 Noise Wall Analysis –NW12– Performance Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
12-001: 3210 Old NC 86	RES	B	1	71	64	7
12-002: 3220 Old NC 86	RES	B	1	66	65	1
12-003: 3224 Old NC 86	RES	B	1	67	62	5
12-004: 3300 Old NC 86	RES	B	1	62	62	0
12-005: 3312 Old NC 86	RES	B	1	66	66	0
12-006: 3400 Old NC 86	RES	B	1	65	65	0
Noise Wall 12 Predicted Build Condition With-Wall Benefits[1]						**2**
Noise Level Impact			5 to 6 dB(A) NLR		≥ 7 dB(A) NLR	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW13-

Location: Adjacent to I-40 westbound east of SR 1009 (Old NC 86)

Termini: -L- STA 117+14.02 62.65’ LT / -L- STA 128+50.43 62.5’ LT

Dimensions: Length = 1,155 ft. Average Height = 21.5 ft. Area = 24,880 sq. ft.

Impacts: 10 Benefited Impacts: 10

Benefits: 25 Benefits ≥ 7 dB(A): 11

Area/Benefit: 995 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: “NW13_v2” / Opt1.1

Preliminary Recommendation: Feasible and Reasonable

Table D-6 Noise Wall Analysis –NW13– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
13-001: 430 Waterstone Dr	Hospital	D	1	40	38	2
13-002: 622 Alice Loop	RES	B	1	59	56	3
13-003: 624 Alice Loop	RES	B	1	60	57	3
13-004: 626 Alice Loop	RES	B	1	61	58	3
13-005: 628 Alice Loop	RES	B	1	61	55	6
13-006: 630 Alice Loop	RES	B	1	61	57	4
13-007: 632 Alice Loop	RES	B	1	61	56	5
13-008: 634 Alice Loop	RES	B	1	60	58	2
13-009: 636 Alice Loop	RES	B	1	61	57	4
13-010: 638 Alice Loop	RES	B	1	64	60	4
13-011: 640 Alice Loop	RES	B	1	66	58	8
13-012: 642 Alice Loop	RES	B	1	66	58	8
13-013: 644 Alice Loop	RES	B	1	67	60	7
13-014: 646 Alice Loop	RES	B	1	67	60	7
13-015: 648 Alice Loop	RES	B	1	67	60	7
13-016: 650 Alice Loop	RES	B	1	67	59	8
13-017: 652 Alice Loop	RES	B	1	66	59	7
13-018: 654 Alice Loop	RES	B	1	66	59	7
13-019: 656 Alice Loop	RES	B	1	66	59	7
13-020: 658 Alice Loop	RES	B	1	66	59	7
13-022: 662 Alice Loop	RES	B	1	65	59	6
13-023: 664 Alice Loop	RES	B	1	64	59	5
13-024: 668 Alice Loop	RES	B	1	64	59	5
13-025: 670 Alice Loop	RES	B	1	63	59	4
13-027: 672 Alice Loop	RES	B	1	62	58	4
13-028: 674 Alice Loop	RES	B	1	61	58	3

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
13-029: 676 Alice Loop	RES	B	1	61	58	3
13-030: 678 Alice Loop	RES	B	1	60	57	3
13-031: 680 Alice Loop	RES	B	1	59	57	2
13-032: 677 Alice Loop	RES	B	1	60	56	4
13-033: 675 Alice Loop	RES	B	1	60	57	3
13-034: 673 Alice Loop	RES	B	1	59	56	3
13-035: 671 Alice Loop	RES	B	1	59	57	2
13-036: 669 Alice Loop	RES	B	1	60	57	3
13-037: 665 Alice Loop	RES	B	1	61	56	5
13-038: 659 Alice Loop	RES	B	1	61	57	4
13-039: 657 Alice Loop	RES	B	1	62	57	5
13-040: 655 Alice Loop	RES	B	1	63	57	6
13-041: 651 Alice Loop	RES	B	1	63	58	5
13-042: 649 Alice Loop	RES	B	1	63	57	6
13-043: 647 Alice Loop	RES	B	1	63	57	6
13-044: 625 Alice Loop	RES	B	1	59	54	5
13-045: 623 Alice Loop	RES	B	1	61	54	7
13-046: 621 Alice Loop	RES	B	1	59	54	5
13-047: 619 Alice Loop	RES	B	1	59	56	3
13-048: 617 Alice Loop	RES	B	1	58	55	3
13-049: 615 Alice Loop	RES	B	1	58	56	2
13-050: 613 Alice Loop	RES	B	1	56	54[2]	2
13-121: 660 Alice Loop	RES	B	1	65	60	5
Noise Wall 13 Predicted Build Condition With-Wall Benefits[1]						**25**
Noise Level Impact		**5 to 6 dB(A) NLR**		**≥ 7 dB(A) NLR**		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
2. The lowest attainable NSA 13 equivalent sound level = 54 dB(A) per ambient sound level data acquired at monitoring location M13.6 (Refer to Table 5).

-NW14- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound north of SR 1723 (New Hope Church Road)

Termini: -L- STA 136+88.59 57.01' LT / -L- STA 185+72.68 57.42' LT

Dimensions: Length = 3,960 ft. Average Height = 18.4 ft. Area = 72,960 sq. ft.

Impacts: 3 Benefited Impacts: 3

Benefits: 4 Benefits ≥ 7 dB(A): 4

Area/Benefit: 18,240 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW14_v1_ext" / Opt1

Preliminary Recommendation: Feasible, Not Reasonable

Table D-7 Noise Wall Analysis –NW14– Performance Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
14-001: 1608 Scarlett Mountain Rd	RES	B	1	66	59	7
14-002: 1600 Scarlett Mountain Rd	RES	B	1	65	58	7
14-003: 1600 Cheyenne Dr	RES	B	1	68	59	9
14-004: Blackwood Farm Park Trail	REC	C	0.01	67	59	8
14-005: Blackwood Farm Park Trail	REC	C	0.01	68	59	9
14-006: Blackwood Farm Park Trail	REC	C	0.01	69	59	10
14-007: Blackwood Farm Park Trail	REC	C	0.01	69	59	10
14-008: Blackwood Farm Park Trail	REC	C	0.01	69	59	10
14-009: Blackwood Farm Park Trail	REC	C	0.01	69	59	10
14-010: Blackwood Farm Park Trail	REC	C	0.01	71	61	10
14-011: Blackwood Farm Park Trail	REC	C	0.01	72	61	11
14-012: Blackwood Farm Park Trail	REC	C	0.01	71	61	10
14-013: Blackwood Farm Park Trail	REC	C	0.01	70	61	9
14-014: Blackwood Farm Park Trail	REC	C	0.01	68	59	9
14-015: Blackwood Farm Park Trail	REC	C	0.01	66	59	7
14-016: Blackwood Farm Park Trail	REC	C	0.01	66	59	7
14-017: Blackwood Farm Park Trail	REC	C	0.01	65	60	5
14-018: Blackwood Farm Park Trail	REC	C	0.01	64	60	4
14-019: Blackwood Farm Park Trail	REC	C	0.01	64	60	4
Noise Wall 14 Predicted Build Condition With-Wall Benefits[1]						4
Noise Level Impact		5 to 6 dB(A) NLR		≥ 7 dB(A) NLR		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW17- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound south of SR 1723 (New Hope Church Road)

Termini: -L- STA 226+49.55 74.41' LT / -L- STA 237+19.61 134.28' LT

Dimensions: Length = 1,080 ft. Average Height = 15.0 ft. Area = 16,216 sq. ft.

Impacts: 11 Benefited Impacts: 6

Benefits: 7 Benefits ≥ 7 dB(A): 2

Area/Benefit: 2,317 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW17_v1" / 17A_Opt2

Preliminary Recommendation: Feasible, Not Reasonable

Table D-8 Noise Wall Analysis –NW17– Performance Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
17-004: 6109 Meadowsweet Ln	RES	B	1	60	56	4
17-005: 6114 Meadowsweet Ln	RES	B	1	65	60	5
17-006: 5317 Hideaway Dr	RES	B	1	66	60	6
17-007: 5321 Hideaway Dr	RES	B	1	67	61	6
17-008: 5325 Hideaway Dr	RES	B	1	67	60	7
17-009: 5401 Hideaway Dr	RES	B	1	66	59	7
17-010: 6025 Meadow Greer Rd	RES	B	1	68	62	6
17-011: 6027 Meadow Greer Rd	RES	B	1	71	66	5
17-012: 6019 Meadow Greer Rd	RES	B	1	61	59	2
17-014: 6022 Meadow Greer Rd	RES	B	1	67	67	0
17-015: 6018 Meadow Greer Rd	RES	B	1	63	63	0
17-016: 6014 Meadow Greer Rd	RES	B	1	62	62	0
17-020: 5635 Hideaway Dr	RES	B	1	60	60	0
17-021: 5705 Hideaway Dr	RES	B	1	60	60	0
17-022: 5715 Hideaway Dr	RES	B	1	62	62	0
17-023: 5721 Hideaway Dr	RES	B	1	63	63	0
17-024: 5803 Hideaway Dr	RES	B	1	66	66	0
17-025: 5809 Hideaway Dr	RES	B	1	67	67	0
17-026: 5901 Hideaway Dr	RES	B	1	67	67	0
17-027: 5904 Hideaway Dr	RES	B	1	61	61	0
17-028: 5912 Hideaway Dr	RES	B	1	61	60	1
17-029: 5911 Hideaway Dr	RES	B	1	66	66	0
Noise Wall 17 Predicted Build Condition With-Wall Benefits[1]						7
Noise Level Impact		5 to 6 dB(A) NLR			≥ 7 dB(A) NLR	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW20- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound over SR 1725 (Millhouse Road)

Termini: -L- STA 294+45.89 61.03' LT / -L- STA 303+57.79 62.47' LT

Dimensions: Length = 900 ft. Average Height = 12.2 ft. Area = 10,969 sq. ft.

Impacts: 5 Benefited Impacts: 5

Benefits: 6 Benefits ≥ 7 dB(A): 1

Area/Benefit: 1,828 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW20_v1" / Opt2

Preliminary Recommendation: Feasible, Not Reasonable

Table D-9 Noise Wall Analysis –NW20– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
20-002: 6008 Millhouse Rd	RES	B	1	69	64	5
20-003: 1732 Avery Way	RES	B	1	67	62	5
20-004: 1732 Avery Way	RES	B	1	65	59	6
20-005: 1732 Avery Way	RES	B	1	66	60	6
20-006: 1732 Avery Way	RES	B	1	68	63	5
20-007: 1732 Avery Way	RES	B	1	70	63	7
Noise Wall 20 Predicted Build Condition With-Wall Benefits[1]						**6**
Noise Level Impact		5 to 6 dB(A) NLR			≥ 7 dB(A) NLR	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW22a- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound north of NC 86

Termini: -L- STA 335+79.08 74.53' LT / -Y9RPB- STA 20+51.30 34.82' LT

Dimensions: Length = 1,080 ft. Average Height = 13.2 ft. Area = 14,301 sq. ft.

Impacts: 2 Benefited Impacts: 2

Benefits: 2 Benefits ≥ 7 dB(A): 2

Area/Benefit: 7,150 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW22AB_v1" / 22A-Opt1

Preliminary Recommendation: Feasible, Not Reasonable

Table D-10 Noise Wall Analysis –NW22a– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
22a-001: 2014 Clyde Rd	RES	B	1	72	65	7
22a-002: 2015 Clyde Rd	RES	B	1	70	63	7
22a-003: 2107 Clyde Rd	RES	B	1	65	62	3
Noise Wall 22a Predicted Build Condition With-Wall Benefits[1]						2
Noise Level Impact		5 to 6 dB(A) NLR		≥ 7 dB(A) NLR		

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW22b-

Location: Adjacent to the onramp from NC 86 to I-40 westbound

Termini: -Y9- STA 49+00.89 67.50' LT / -Y9- STA 51+40.04 46.94' LT

Dimensions: Length = 420 ft. Average Height = 13.7 ft. Area = 5,753 sq. ft.

Impacts: 4 Benefited Impacts: 4

Benefits: 4 Benefits ≥ 7 dB(A): 4

Area/Benefit: 1,438 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW22B_v2" / Opt1.1

Preliminary Recommendation: Feasible and Reasonable

Table D-11 Noise Wall Analysis –NW22b– Performance Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
22b-001: 298 Old Moze Trail	RES	B	1	66	59	7
22b-002: 300 Old Moze Trail	RES	B	1	66	59	7
22b-003: 302 Old Moze Trail	RES	B	1	66	59	7
22b-004: 304 Old Moze Trail	RES	B	1	66	59	7
22b-005: 306 Old Moze Trail	RES	B	1	62	61	1
22b-006: 307 Old Moze Trail	RES	B	1	60	60	0
22b-007: 506 Hurricane Alley	RES	B	1	61	61	0
22b-008: 508 Hurricane Alley	RES	B	1	62	62	0
22b-009: 510 Hurricane Alley	RES	B	1	62	62	0
22b-010: 512 Hurricane Alley	RES	B	1	63	63	0
22b-011: 514 Hurricane Alley	RES	B	1	63	63	0
22b-012: 516 Hurricane Alley	RES	B	1	63	63	0
22b-013: 518 Hurricane Alley	RES	B	1	64	64	0
22b-014: 520 Hurricane Alley	RES	B	1	64	64	0
22b-015: 522 Hurricane Alley	RES	B	1	65	65	0
Noise Wall 22b Predicted Build Condition With-Wall Benefits[1]						**4**
Noise Level Impact		5 to 6 dB(A) NLR			≥ 7 dB(A) NLR	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW22b2- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to the onramp from NC 86 to I-40 westbound

Termini: -L- STA 334+58.64 74.52' LT / -Y9RPB- STA 22+36.80 35.52' LT

Dimensions: Length = 1,530 ft. Average Height = 26.4 ft. Area = 40,348 sq. ft.

Impacts: 3 Benefited Impacts: 3

Benefits: 15 Benefits ≥ 7 dB(A): 1

Area/Benefit: 2,690 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW22B2_v1" / 22B2-Opt2

Preliminary Recommendation: Feasible, Not Reasonable

Table D-12 Noise Wall Analysis –NW22b2– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
22b-006: 307 Old Moze Trail	RES	B	1	60	58	2
22b-007: 506 Hurricane Alley	RES	B	1	61	58	3
22b-008: 508 Hurricane Alley	RES	B	1	62	58	4
22b-009: 510 Hurricane Alley	RES	B	1	62	58	4
22b-010: 512 Hurricane Alley	RES	B	1	63	58	5
22b-011: 514 Hurricane Alley	RES	B	1	63	58	5
22b-012: 516 Hurricane Alley	RES	B	1	63	59	4
22b-013: 518 Hurricane Alley	RES	B	1	64	59	5
22b-014: 520 Hurricane Alley	RES	B	1	64	59	5
22b-015: 522 Hurricane Alley	RES	B	1	65	59	6
22b-016: 524 Hurricane Alley	RES	B	1	66	59	7
22b-017: 526 Hurricane Alley	RES	B	1	67	61	6
22b-018: 527 Hurricane Alley	RES	B	1	67	61	6
22b-019: 133 Mary Kathryn Ln	RES	B	1	65	59	6
22b-020: 131 Mary Kathryn Ln	RES	B	1	65	60	5
22b-021: 129 Mary Kathryn Ln	RES	B	1	65	59	6
22b-022: 127 Mary Kathryn Ln	RES	B	1	65	60	5
22b-023: 125 Mary Kathryn Ln	RES	B	1	65	60	5
22b-024: 123 Mary Kathryn Ln	RES	B	1	65	60	5
22b-025: 121 Mary Kathryn Ln	RES	B	1	65	60	5
22b-026: 119 Mary Kathryn Ln	RES	B	1	65	61	4
22b-027: 117 Mary Kathryn Ln	RES	B	1	63	60	3
22b-028: 115 Mary Kathryn Ln	RES	B	1	62	60	2
22b-029: 113 Mary Kathryn Ln	RES	B	1	63	61	2
Noise Wall 22b2 Predicted Build Condition With-Wall Benefits[1]						**15**
Noise Level Impact			**5 to 6 dB(A) NLR**		**≥ 7 dB(A) NLR**	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW26- (Not recommended for construction or further study due to exceeding area per benefit threshold)

Location: Adjacent to I-40 westbound east of NC 86 (Martin Luther King Jr. Boulevard)

Termini: -L- STA 390+78.09 109.54' LT / -L- STA 407+71.99 62.48' LT

Dimensions: Length = 1,680 ft. Average Height = 13.4 ft. Area = 22,566 sq. ft.

Impacts: 5 Benefited Impacts: 5

Benefits: 6 Benefits ≥ 7 dB(A): 1

Area/Benefit: 3,761 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: "NW26_v1" / Opt2

Preliminary Recommendation: Feasible, Not Reasonable

Table D-13 Noise Wall Analysis –NW26– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
26-001: 2623 Whitfield Rd	Res	B	1	63	62	1
26-002: 2715 Whitfield Rd	Res	B	1	70	65	5
26-003: 2719 Whitfield Rd	Res	B	1	66	61	5
26-004: 2719 Whitfield Rd	Res	B	1	63	58	5
26-005: 113 Foxridge Rd	Res	B	1	66	60	6
26-006: 112 Foxridge Rd	Res	B	1	66	60	6
26-007: 111 Foxridge Rd	Res	B	1	73	66	7
26-008: 101 Foxridge Rd	Res	B	1	62	62	0
Noise Wall 26 Predicted Build Condition With-Wall Benefits[1]						6
Noise Level Impact			5 to 6 dB(A) NLR		≥ 7 dB(A) NLR	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).

-NW32-

Location: Adjacent to I-40 eastbound between SR 1732 (Sunrise Road) and SR 1734 (Erwin Road)

32A Termini: -L- STA 475+26.56 104.52’ RT / -L- STA 487+16.30 155.22’ RT

32B Termini: -L- STA 499+11.31 139.79’ RT / -L- STA 514+74.31 62.50’ RT

Dimensions: Length = 2,745 ft. Average Height = 17.0 ft. Area = 46,798 sq. ft.

Impacts: 19 Benefited Impacts: 19

Benefits: 40 Benefits ≥ 7 dB(A): 24

Area/Benefit: 1,170 sq. ft. Allowable Area/Benefit: 1,500 sq. ft.

TNM/SBA: “NW32_v2” / Opt2.1

Preliminary Recommendation: Feasible and Reasonable

Table D-14 Noise Wall Analysis –NW32– Performance
Noise Levels without Wall and with Wall

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
32-003: 3830 Sweeten Creek Rd	RES	B	1	55	53	2
32-004: 103 Yukon Ln	RES	B	1	55	53	2
32-005: 105 Yukon Ln	RES	B	1	57	54	3
32-006: 107 Yukon Ln	RES	B	1	63	59	4
32-007: 106 Yukon Ln	RES	B	1	68	61	7
32-008: 104 Yukon Ln	RES	B	1	69	62	7
32-009: 102 Yukon Ln	RES	B	1	60	57	3
32-010: 100 Yukon Ln	RES	B	1	60	57	3
32-011: 3902 Sweeten Creek Rd	RES	B	1	64	59	5
32-012: 3904 Sweeten Creek Rd	RES	B	1	66	59	7
32-013: 3906 Sweeten Creek Rd	RES	B	1	67	60	7
32-014: 3908 Sweeten Creek Rd	RES	B	1	65	61	4
32-015: 3910 Sweeten Creek Rd	RES	B	1	62	59	3
32-016: 3912 Sweeten Creek Rd	RES	B	1	63	60	3
32-017: 3914 Sweeten Creek Rd	RES	B	1	61	59	2
32-018: 4000 Sweeten Creek Rd	RES	B	1	61	58	3
32-019: 4002 Sweeten Creek Rd	RES	B	1	61	58	3
32-020: 4004 Sweeten Creek Rd	RES	B	1	58	55	3
32-021: 4006 Sweeten Creek Rd	RES	B	1	64	60	4
32-022: 4008 Sweeten Creek Rd	RES	B	1	66	61	5
32-023: 4010 Sweeten Creek Rd	RES	B	1	67	60	7
32-024: 4100 Sweeten Creek Rd	RES	B	1	69	62	7
32-025: 4102 Sweeten Creek Rd	RES	B	1	71	61	10
32-026: 4104 Sweeten Creek Rd	RES	B	1	72	61	11

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
32-027: 4106 Sweeten Creek Rd	RES	B	1	72	60	12
32-028: 4108 Sweeten Creek Rd	RES	B	1	70	60	10
32-029: 604 Perry Creek Dr	RES	B	1	69	60	9
32-030: 602 Perry Creek Dr	RES	B	1	67	57	10
32-031: 600 Perry Creek Dr	RES	B	1	67	56	11
32-032: 103 Hawksbill Pl	RES	B	1	68	59	9
32-033: 105 Hawksbill Pl	RES	B	1	67	59	8
32-034: 104 Hawksbill Pl	RES	B	1	67	59	8
32-035: 102 Hawksbill Pl	RES	B	1	66	59	7
32-036: 508 Perry Creek Dr	RES	B	1	63	54	9
32-037: 506 Perry Creek Dr	RES	B	1	63	59	4
32-038: 504 Perry Creek Dr	RES	B	1	64	59	5
32-039: 502 Perry Creek Dr	RES	B	1	63	59	4
32-040: 503 Perry Creek Dr	RES	B	1	58	55	3
32-041: 505 Perry Creek Dr	RES	B	1	58	53	5
32-042: 507 Perry Creek Dr	RES	B	1	60	54	6
32-043: 509 Perry Creek Dr	RES	B	1	62	54	8
32-044: 601 Perry Creek Dr	RES	B	1	62	58	4
32-045: 406 Silver Creek Trl	RES	B	1	63	55	8
32-046: 5007 Sweeten Creek Rd	RES	B	1	66	59	7
32-047: 4103 Sweeten Creek Rd	RES	B	1	64	59	5
32-048: 101 Alta Ct	RES	B	1	63	58	5
32-049: 4007 Sweeten Creek Rd	RES	B	1	61	56	5
32-071: 203 Alta Ct	RES	B	1	63	58	5
32-072: 405 Silver Creek Trl	RES	B	1	63	58	5
32-073: 403 Silver Creek Trl	RES	B	1	62	55	7
32-074: 404 Silver Creek Trl	RES	B	1	60	53	7
32-075: 400 Silver Creek Trl	RES	B	1	61	56	5
32-076: 101 Sundance Pl	RES	B	1	61	58	3
32-077: 501 Perry Creek Dr	RES	B	1	62	57	5
32-078: 500 Perry Creek Dr	RES	B	1	64	60	4
32-079: 103 Swift Run	RES	B	1	64	60	4
32-080: 100 Swift Run	RES	B	1	64	60	4
32-081: 102 Swift Run	RES	B	1	64	61	3
32-082: 104 Swift Run	RES	B	1	64	62	2
32-083: 408 Perry Creek Dr	RES	B	1	62	55	7
32-084: 406 Perry Creek Dr	RES	B	1	60	56	4
32-085: 415 Perry Creek Dr	RES	B	1	64	59	5
32-086: 413 Perry Creek Dr	RES	B	1	62	58	4

Receptors				Predicted Noise Levels, $L_{eq(h)}$[dB(A)]		
ID	Use	NAC	ERs	Build	With Wall	NLR
32-087: 103 Sundance Pl	RES	B	1	63	58	5
32-088: 100 Sundance Pl	RES	B	1	61	58	3
32-089: 401 Silver Creek Trl	RES	B	1	60	55	5
32-090: 321 Silver Creek Trl	RES	B	1	61	57	4
32-091: 205 Alta Ct	RES	B	1	60	57	3
32-092: 206 Alta Ct	RES	B	1	61	57	4
32-093: 202 Alta Ct	RES	B	1	57	51	6
32-094: 108 San Juan Dr	RES	B	1	50	50	0
32-095: 109 San Juan Dr	RES	B	1	50[2]	50[2]	0
Noise Wall 32 Predicted Build Condition With-Wall Benefits[1]						**40**
Noise Level Impact			**5 to 6 dB(A) NLR**		**≥ 7 dB(A) NLR**	

1. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
2. The lowest attainable NSA 32 equivalent sound level = 50 dB(A) per ambient sound level data acquired at monitoring location M32.6 (Refer to Table 5).

Appendix E. Noise Wall Envelope Drawings

PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-1

R/W SHEET NO.

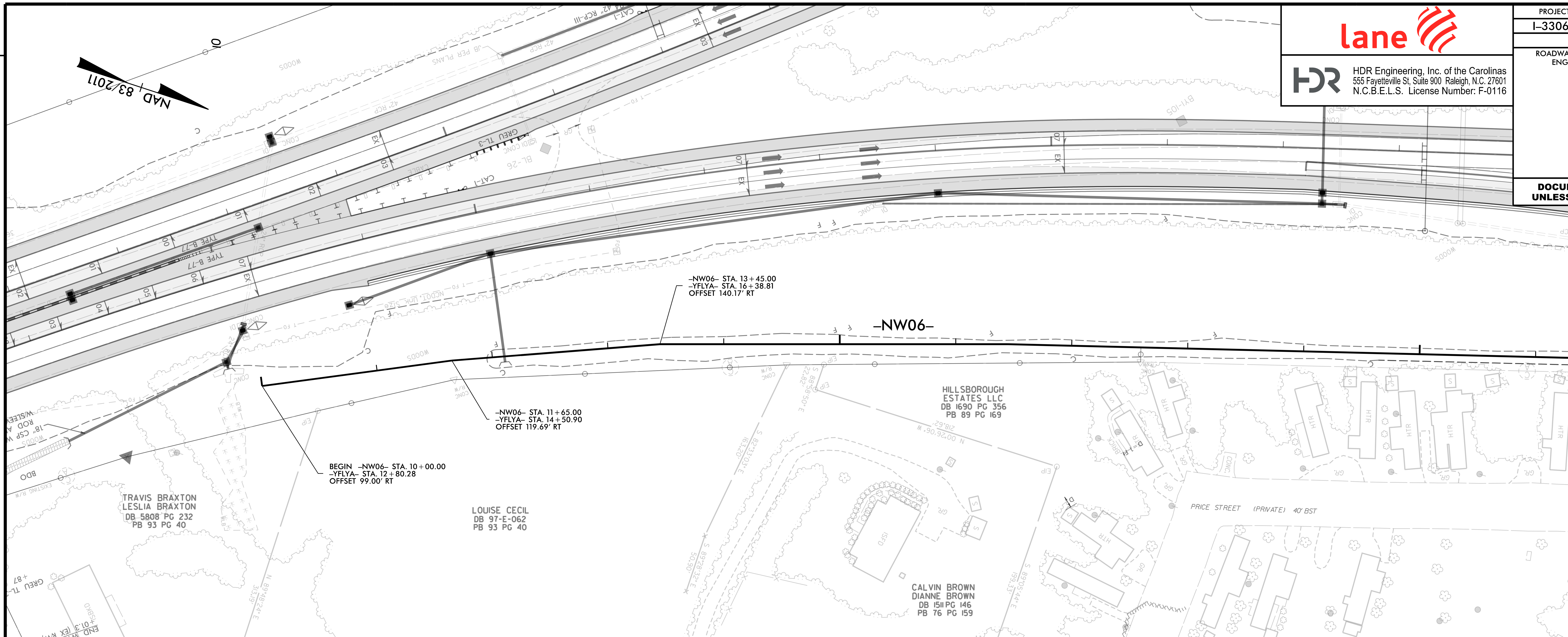
ROADWAY DESIGN ENGINEER

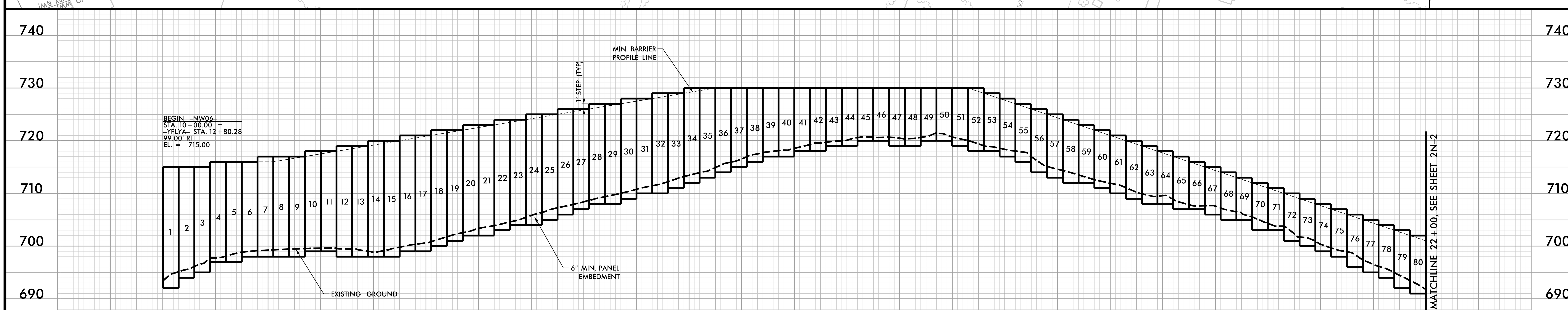
HYDRAULICS ENGINEER

lane

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





PANEL NO.	-NW06-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
1	10+00.00	715.00	692.00	1963797.58	838445.22	23.00	345.00
2	10+15.00	715.00	694.00	1963791.06	838458.73	21.00	315.00
3	10+30.00	715.00	695.00	1963784.54	838472.24	20.00	300.00
4	10+45.00	716.00	697.00	1963778.03	838485.75	19.00	285.00
5	10+60.00	716.00	697.00	1963771.51	838499.26	19.00	285.00
6	10+75.00	716.00	698.00	1963764.99	838512.77	18.00	270.00
7	10+90.00	717.00	698.00	1963758.48	838526.28	19.00	285.00
8	11+05.00	717.00	698.00	1963751.96	838539.79	19.00	285.00
9	11+20.00	717.00	698.00	1963745.44	838553.30	19.00	285.00
10	11+35.00	718.00	699.00	1963738.92	838566.81	19.00	285.00
11	11+50.00	718.00	699.00	1963732.41	838580.32	19.00	285.00
12	11+65.00	719.00	698.00	1963725.89	838593.83	21.00	315.00
13	11+80.00	719.00	698.00	1963720.12	838607.67	21.00	315.00
14	11+95.00	720.00	698.00	1963714.35	838621.52	22.00	330.00
15	12+10.00	720.00	698.00	1963708.58	838635.37	22.00	330.00
16	12+25.00	721.00	699.00	1963702.81	838649.21	22.00	330.00
17	12+40.00	721.00	699.00	1963697.05	838663.06	22.00	330.00
18	12+55.00	722.00	700.00	1963691.28	838676.91	22.00	330.00
19	12+70.00	722.00	701.00	1963685.51	838690.75	21.00	315.00
20	12+85.00	723.00	702.00	1963679.74	838704.60	21.00	315.00

PANEL NO.	-NW06-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
21	13+00.00	723.00	702.00	1963673.97	838718.45	21.00	315.00
22	13+15.00	724.00	703.00	1963668.20	838732.29	21.00	315.00
23	13+30.00	724.00	704.00	1963662.43	838746.14	20.00	300.00
24	13+45.00	725.00	704.00	1963656.67	838759.99	21.00	315.00
25	13+60.00	725.00	705.00	1963652.00	838774.24	20.00	300.00
26	13+75.00	726.00	706.00	1963647.34	838788.50	20.00	300.00
27	13+90.00	726.00	707.00	1963642.67	838802.75	19.00	285.00
28	14+05.00	727.00	708.00	1963638.01	838817.01	19.00	285.00
29	14+20.00	727.00	708.00	1963633.34	838831.27	19.00	285.00
30	14+35.00	728.00	709.00	1963628.68	838845.52	19.00	285.00
31	14+50.00	728.00	710.00	1963624.02	838859.78	18.00	270.00
32	14+65.00	729.00	710.00	1963619.35	838874.04	19.00	285.00
33	14+80.00	729.00	711.00	1963614.69	838888.29	18.00	270.00
34	14+95.00	730.00	712.00	1963610.02	838902.55	18.00	270.00
35	15+10.00	730.00	713.00	1963605.36	838916.81	17.00	255.00
36	15+25.00	730.00	714.00	1963600.69	838931.06	16.00	240.00
37	15+40.00	730.00	715.00	1963596.03	838945.32	15.00	225.00
38	15+55.00	730.00	716.00	1963591.37	838959.57	14.00	210.00
39	15+70.00	730.00	717.00	1963586.70	838973.83	13.00	195.00
40	15+85.00	730.00	717.00	1963582.04	838988.09	13.00	195.00

-NW06-

PANEL NO.	-NW06-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
41	16+00.00	730.00	718.00	1963577.37	839002.34	12.00	180.00
42	16+15.00	730.00	718.00	1963572.71	839016.60	12.00	180.00
43	16+30.00	730.00	719.00	1963568.04	839030.86	11.00	165.00
44	16+45.00	730.00	719.00	1963563.38	839045.11	11.00	165.00
45	16+60.00	730.00	720.00	1963559.06	839059.48	10.00	150.00
46	16+75.00	730.00	720.00	1963554.75	839073.84	10.00	150.00
47	16+90.00	730.00	719.00	1963550.43	839088.21	11.00	165.00
48	17+05.00	730.00	719.00	1963546.11	839102.58	11.00	165.00
49	17+20.00	730.00	720.00	1963541.80	839116.94	10.00	150.00
50	17+35.00	730.00	720.00	1963537.48	839131.31	10.00	150.00
51	17+50.00	730.00	719.00	1963533.17	839145.67	11.00	165.00
52	17+65.00	730.00	718.00	1963528.85	839160.04	12.00	180.00
53	17+80.00	729.00	718.00	1963524.53	839174.40	11.00	165.00
54	17+95.00	728.00	717.00	1963520.22	839188.77	11.00	165.00
55	18+10.00	727.00	716.00	1963515.90	839203.13	11.00	165.00
56	18+25.00	726.00	714.00	1963511.58	839217.50	12.00	180.00
57	18+40.00	725.00	713.00	1963507.27	839231.87	12.00	180.00
58	18+55.00	724.00	712.00	1963502.95	839246.23	12.00	180.00
59	18+70.00	723.00	712.00	1963498.64	839260.60	11.00	165.00
60	18+85.00	722.00	711.00	1963494.32	839274.96	11.00	165.00

PANEL NO.	-NW06-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
61	19+00.00	721.00	710.00	1963490.00	839289.33	11.00	165.00
62	19+15.00	720.00	709.00	1963485.69	839303.69	11.00	165.00
63	19+30.00	719.00	708.00	1963481.37	839318.06	11.00	165.00
64	19+45.00	718.00	708.00	1963477.06	839332.42	10.00	150.00
65	19+60.00	717.00	707.00	1963472.74	839346.79	10.00	150.00
66	19+75.00	716.00	707.00	1963468.42	839361.16	9.00	135.00
67	19+90.00	715.00	706.00	1963464.11	839375.52	9.00	135.00
68	20+05.00	714.00	705.00	1963459.79	839389.89	9.00	135.00
69	20+20.00	713.00	705.00	1963455.47	839404.25	8.00	120.00
70	20+35.00	712.00	703.00	1963451.16	839418.62	9.00	135.00
71	20+50.00	711.00	703.00	1963446.84	839432.98	8.00	120.00
72	20+65.00	710.00	701.00	1963442.53	839447.35	9.00	135.00
73	20+80.00	709.00	700.00	1963438.21	839461.71	9.00	135.00
74	20+95.00	708.00	699.00	1963433.89	839476.08	9.00	135.00
75	21+10.00	707.00	698.00	1963429.58	839490.45	9.00	135.00
76	21+25.00	706.00	696.00	1963425.26	839504.81	10.00	150.00
77	21+40.00	705.00	695.00	1963420.94	839519.18	10.00	150.00
78	21+55.00	704.00	694.00	1963416.63	839533.54	10.00	150.00
79	21+70.00	703.00	692.00	1963412.31	839547.91	11.00	165.00
80	21+85.00	702.00	691.00	1963408.00	839562.27	11.00	165.00

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00

REVISIONS

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R/W SHEET NO.

ROADWAY DESIGN ENGINEER

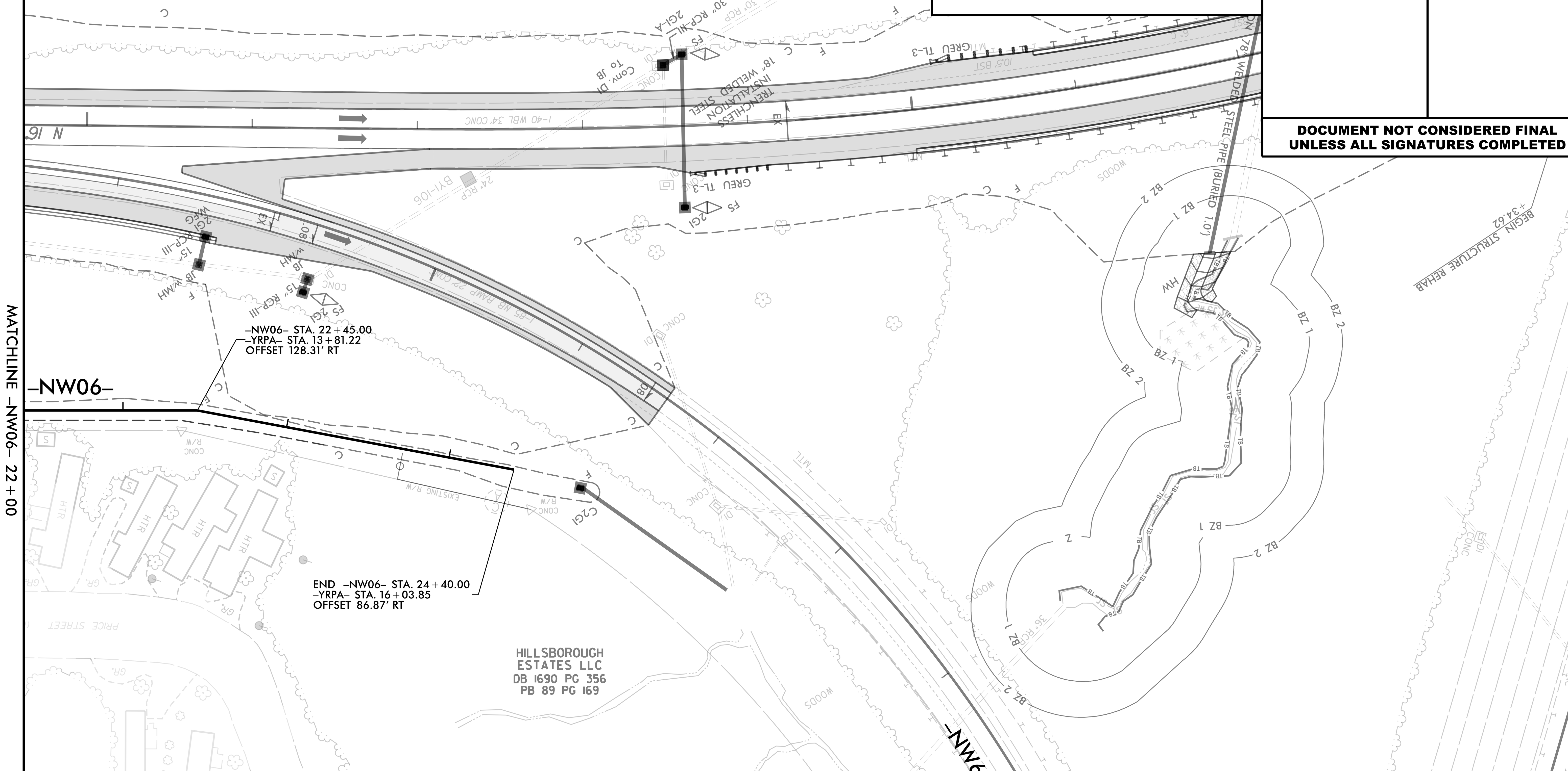
HYDRAULICS ENGINEER

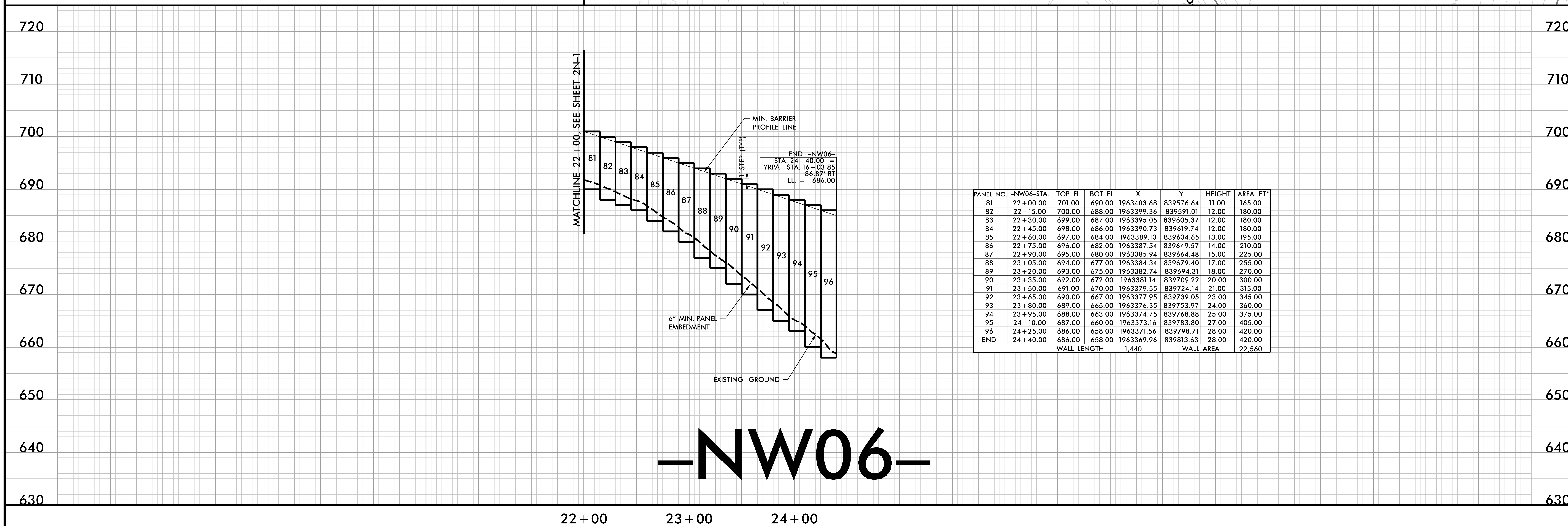
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

lane

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NAD 83/2011





PANEL NO.	-NW06-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT^2
81	22+00.00	701.00	690.00	1963403.68	839576.64	11.00	165.00
82	22+15.00	700.00	688.00	1963399.36	839591.01	12.00	180.00
83	22+30.00	699.00	687.00	1963395.05	839605.37	12.00	180.00
84	22+45.00	698.00	686.00	1963390.73	839619.74	12.00	180.00
85	22+60.00	697.00	684.00	1963389.13	839634.65	13.00	195.00
86	22+75.00	696.00	682.00	1963387.54	839649.57	14.00	210.00
87	22+90.00	695.00	680.00	1963385.94	839664.48	15.00	225.00
88	23+05.00	694.00	677.00	1963384.34	839679.40	17.00	255.00
89	23+20.00	693.00	675.00	1963382.74	839694.31	18.00	270.00
90	23+35.00	692.00	672.00	1963381.14	839709.22	20.00	300.00
91	23+50.00	691.00	670.00	1963379.55	839724.14	21.00	315.00
92	23+65.00	690.00	667.00	1963377.95	839739.05	23.00	345.00
93	23+80.00	689.00	665.00	1963376.35	839753.97	24.00	360.00
94	23+95.00	688.00	663.00	1963374.75	839768.88	25.00	375.00
95	24+10.00	687.00	660.00	1963373.16	839783.80	27.00	405.00
96	24+25.00	686.00	658.00	1963371.56	839798.71	28.00	420.00
END	24+40.00	686.00	658.00	1963369.96	839813.63	28.00	420.00
		WALL LENGTH		1,440	WALL AREA		22,560

-NW06-

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-3

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

lane

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
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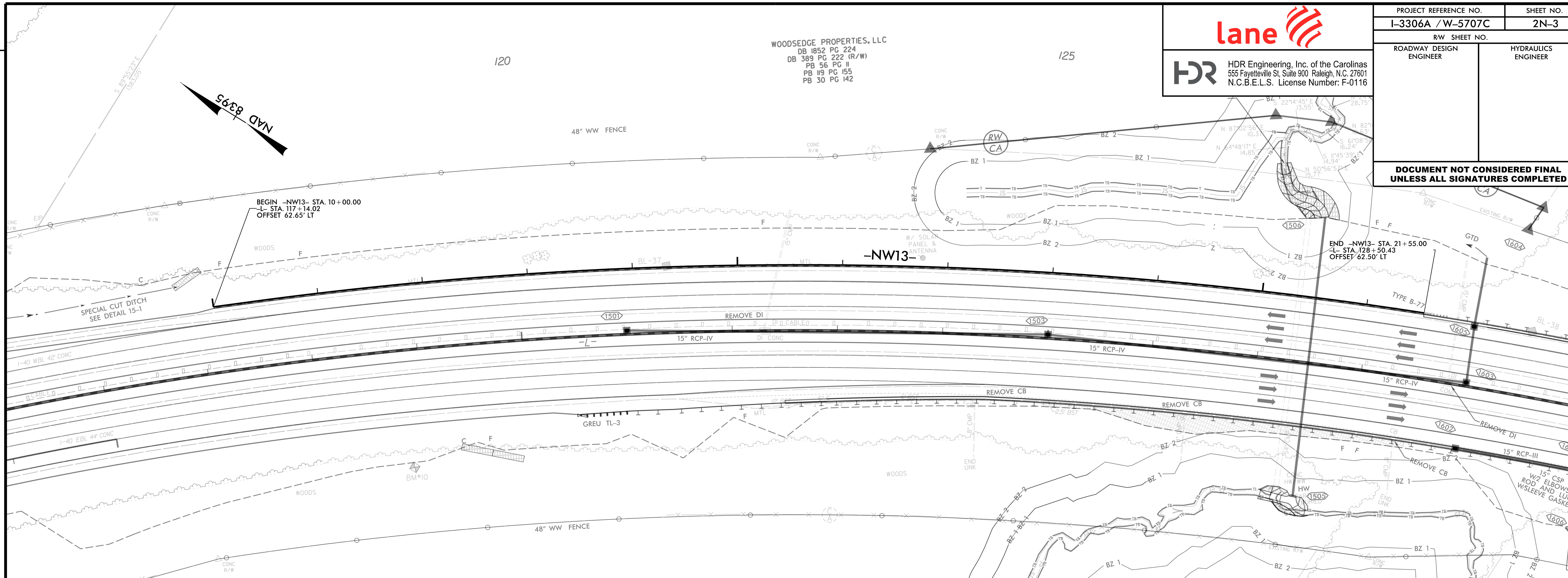

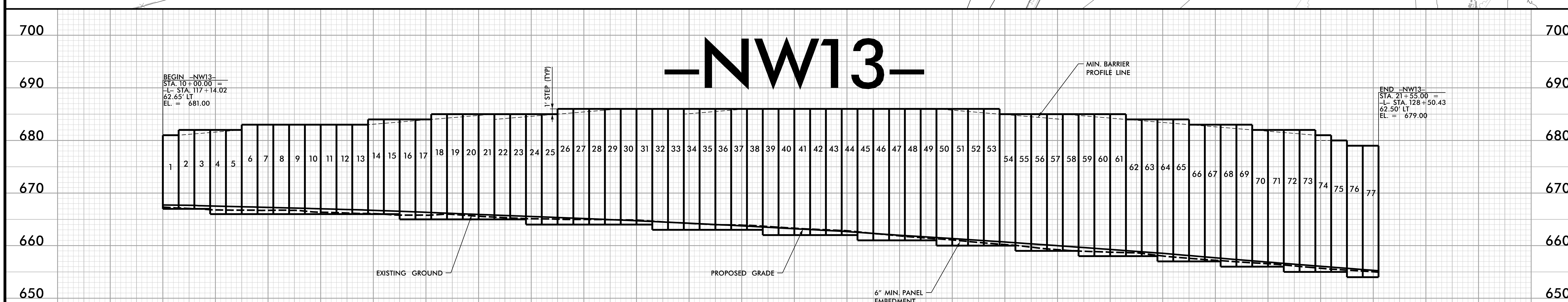

PANEL NO.	-NW13-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT^2
1	10+00.00	681.00	667.00	1972670.88	831314.79	14.00	210.00
2	10+15.00	682.00	667.00	1972680.40	831303.20	15.00	225.00
3	10+30.00	682.00	667.00	1972689.92	831291.60	15.00	225.00
4	10+45.00	682.00	666.00	1972699.43	831280.01	16.00	240.00
5	10+60.00	682.00	666.00	1972708.90	831268.37	16.00	240.00
6	10+75.00	683.00	666.00	1972718.32	831256.70	17.00	255.00
7	10+90.00	683.00	666.00	1972727.70	831244.99	17.00	255.00
8	11+05.00	683.00	666.00	1972737.03	831233.25	17.00	255.00
9	11+20.00	683.00	666.00	1972746.31	831221.47	17.00	255.00
10	11+35.00	683.00	666.00	1972755.55	831209.65	17.00	255.00
11	11+50.00	683.00	666.00	1972764.75	831197.80	17.00	255.00
12	11+65.00	683.00	666.00	1972773.90	831185.92	17.00	255.00
13	11+80.00	683.00	666.00	1972783.00	831173.99	17.00	255.00
14	11+95.00	684.00	666.00	1972792.06	831162.04	18.00	270.00
15	12+10.00	684.00	666.00	1972801.07	831150.04	18.00	270.00
16	12+25.00	684.00	665.00	1972810.03	831138.02	19.00	285.00
17	12+40.00	684.00	665.00	1972818.95	831125.96	19.00	285.00
18	12+55.00	685.00	665.00	1972827.82	831113.86	20.00	300.00
19	12+70.00	685.00	665.00	1972836.65	831101.73	20.00	300.00
20	12+85.00	685.00	665.00	1972845.42	831089.57	20.00	300.00
21	13+00.00	685.00	665.00	1972854.15	831077.37	20.00	300.00
22	13+15.00	685.00	665.00	1972862.84	831065.14	20.00	300.00
23	13+30.00	685.00	665.00	1972871.47	831052.87	20.00	300.00
24	13+45.00	685.00	664.00	1972880.06	831040.58	21.00	315.00
25	13+60.00	685.00	664.00	1972888.60	831028.25	21.00	315.00
26	13+75.00	686.00	664.00	1972897.10	831015.88	22.00	330.00
27	13+90.00	686.00	664.00	1972905.54	831003.48	22.00	330.00
28	14+05.00	686.00	664.00	1972913.94	830991.06	22.00	330.00
29	14+20.00	686.00	664.00	1972922.29	830978.59	22.00	330.00
30	14+35.00	686.00	664.00	1972930.59	830966.10	22.00	330.00
31	14+50.00	686.00	664.00	1972938.84	830953.57	22.00	330.00
32	14+65.00	686.00	663.00	1972947.05	830941.02	23.00	345.00
33	14+80.00	686.00	663.00	1972955.20	830928.43	23.00	345.00
34	14+95.00	686.00	663.00	1972963.31	830915.81	23.00	345.00
35	15+10.00	686.00	663.00	1972971.37	830903.16	23.00	345.00
36	15+25.00	686.00	663.00	1972979.38	830890.47	23.00	345.00
37	15+40.00	686.00	663.00	1972987.34	830877.76	23.00	345.00
38	15+55.00	686.00	663.00	1972995.25	830865.02	23.00	345.00
39	15+70.00	686.00	662.00	1973003.11	830852.24	24.00	360.00
40	15+85.00	686.00	662.00	1973010.92	830839.44	24.00	360.00
41	16+00.00	686.00	662.00	1973018.68	830826.60	24.00	360.00
42	16+15.00	686.00	662.00	1973026.40	830813.74	24.00	360.00
43	16+30.00	686.00	662.00	1973034.06	830800.84	24.00	360.00
44	16+45.00	686.00	662.00	1973041.67	830787.92	24.00	360.00
45	16+60.00	686.00	661.00	1973049.24	830774.96	25.00	375.00
46	16+75.00	686.00	661.00	1973056.75	830761.98	25.00	375.00
47	16+90.00	686.00	661.00	1973064.21	830748.97	25.00	375.00
48	17+05.00	686.00	661.00	1973071.63	830735.93	25.00	375.00
49	17+20.00	686.00	661.00	1973078.99	830722.86	25.00	375.00
50	17+35.00	686.00	660.00	1973086.30	830709.76	26.00	390.00
51	17+50.00	686.00	660.00	1973093.56	830696.64	26.00	390.00
52	17+65.00	686.00	660.00	1973100.77	830683.48	26.00	390.00
53	17+80.00	686.00	660.00	1973107.93	830670.30	26.00	390.00
54	17+95.00	685.00	660.00	1973115.04	830657.09	25.00	375.00
55	18+10.00	685.00	659.00	1973122.10	830643.86	26.00	390.00
56	18+25.00	685.00	659.00	1973129.10	830630.59	26.00	390.00
57	18+40.00	685.00	659.00	1973136.06	830617.30	26.00	390.00
58	18+55.00	685.00	659.00	1973142.96	830603.99	26.00	390.00
59	18+70.00	685.00	658.00	1973149.82	830590.64	27.00	405.00
60	18+85.00	685.00	658.00	1973156.62	830577.27	27.00	405.00
61	19+00.00	685.00	658.00	1973163.36	830563.88	27.00	405.00
62	19+15.00	684.00	658.00	1973170.06	830550.46	26.00	390.00
63	19+30.00	684.00	658.00	1973176.71	830537.01	26.00	390.00
64	19+45.00	684.00	657.00	1973183.30	830523.54	27.00	405.00
65	19+60.00	684.00	657.00	1973189.84	830510.04	27.00	405.00
66	19+75.00	683.00	657.00	1973196.33	830496.51	26.00	390.00
67	19+90.00	683.00	657.00	1973202.77	830482.96	26.00	390.00
68	20+05.00	683.00	656.00	1973209.15	830469.39	27.00	405.00
69	20+20.00	683.00	656.00	1973215.48	830455.79	27.00	405.00
70	20+35.00	682.00	656.00	1973221.76	830442.17	26.00	390.00
71	20+50.00	682.00	656.00	1973227.99	830428.52	26.00	390.00
72	20+65.00	682.00	655.00	1973234.16	830414.85	27.00	405.00
73	20+80.00	682.00	655.00	1973240.28	830401.16	27.00	405.00
74	20+95.00	681.00	655.00	1973246.35	830387.44	26.00	390.00
75	21+10.00	680.00	655.00	1973252.36	830373.70	25.00	375.00
76	21+25.00	679.00	654.00	1973258.33	830359.93	25.00	375.00
77	21+40.00	679.00	654.00	1973264.23	830346.15	25.00	375.00
END	21+55.00	679.00	654.00	1973270.09	830332.34	25.00	375.00
			WALL LENGTH	1,155	WALL AREA		26,520

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-4

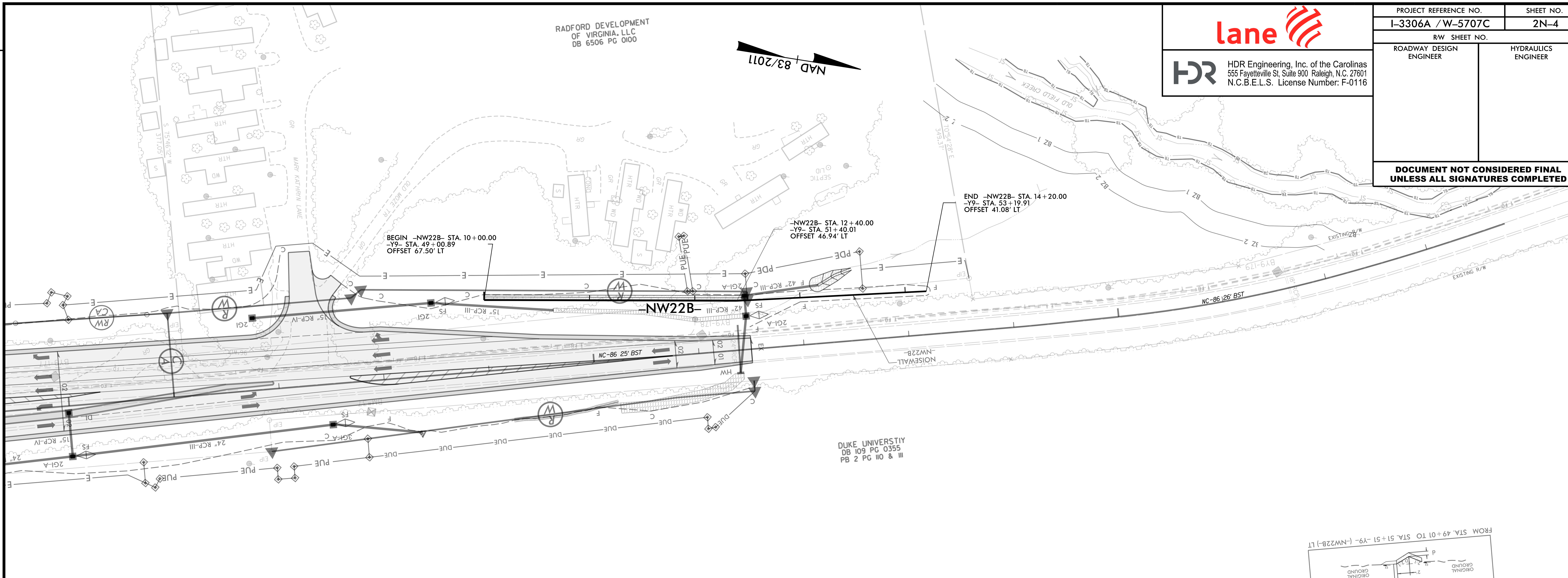
R/W SHEET NO.

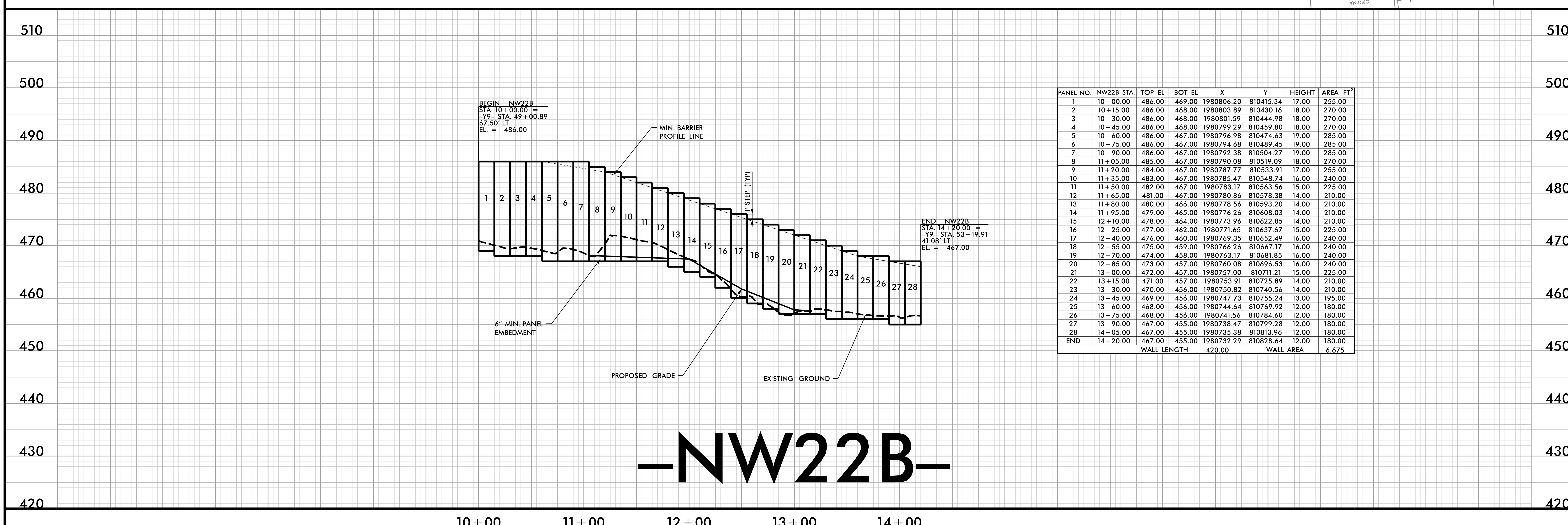
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116





PANEL NO.	-NW22B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
1	10+00.00	486.00	469.00	1980806.20	810415.34	17.00	255.00
2	10+15.00	486.00	468.00	1980803.89	810430.16	18.00	270.00
3	10+30.00	486.00	468.00	1980801.59	810444.98	18.00	270.00
4	10+45.00	486.00	468.00	1980799.29	810459.80	18.00	270.00
5	10+60.00	486.00	467.00	1980796.98	810474.63	19.00	285.00
6	10+75.00	486.00	467.00	1980794.68	810489.45	19.00	285.00
7	10+90.00	486.00	467.00	1980792.38	810504.27	19.00	285.00
8	11+05.00	485.00	467.00	1980790.08	810519.09	18.00	270.00
9	11+20.00	484.00	467.00	1980787.77	810533.91	17.00	255.00
10	11+35.00	483.00	467.00	1980785.47	810548.74	16.00	240.00
11	11+50.00	482.00	467.00	1980783.17	810563.56	15.00	225.00
12	11+65.00	481.00	467.00	1980780.86	810578.38	14.00	210.00
13	11+80.00	480.00	466.00	1980778.56	810593.20	14.00	210.00
14	11+95.00	479.00	465.00	1980776.26	810608.03	14.00	210.00
15	12+10.00	478.00	464.00	1980773.96	810622.85	14.00	210.00
16	12+25.00	477.00	462.00	1980771.65	810637.67	15.00	225.00
17	12+40.00	476.00	460.00	1980769.35	810652.49	16.00	240.00
18	12+55.00	475.00	459.00	1980766.26	810667.17	16.00	240.00
19	12+70.00	474.00	458.00	1980763.17	810681.85	16.00	240.00
20	12+85.00	473.00	457.00	1980760.08	810696.53	16.00	240.00
21	13+00.00	472.00	457.00	1980757.00	810711.21	15.00	225.00
22	13+15.00	471.00	457.00	1980753.91	810725.89	14.00	210.00
23	13+30.00	470.00	456.00	1980750.82	810740.56	14.00	210.00
24	13+45.00	469.00	456.00	1980747.73	810755.24	13.00	195.00
25	13+60.00	468.00	456.00	1980744.64	810769.92	12.00	180.00
26	13+75.00	468.00	456.00	1980741.56	810784.60	12.00	180.00
27	13+90.00	467.00	455.00	1980738.47	810799.28	12.00	180.00
28	14+05.00	467.00	455.00	1980735.38	810813.96	12.00	180.00
END	14+20.00	467.00	455.00	1980732.29	810828.64	12.00	180.00
		WALL LENGTH		420.00	WALL AREA		6,675

-NW22B-

REVISIONS

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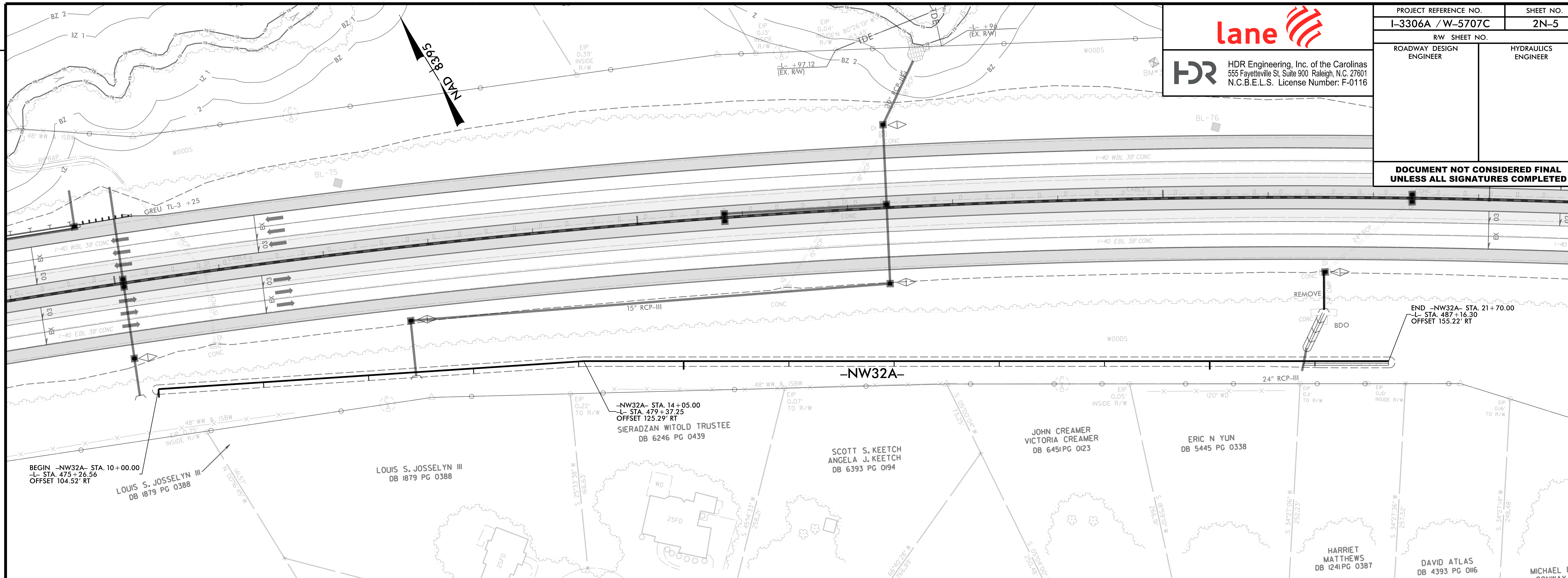
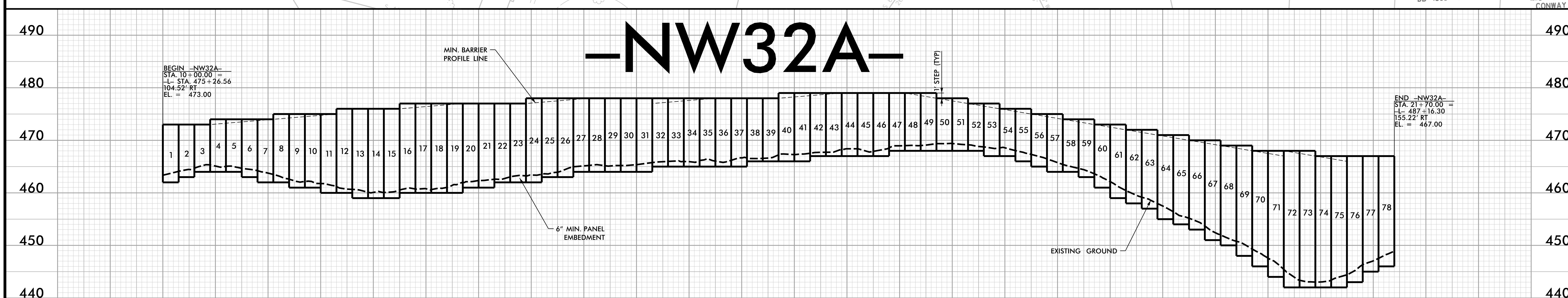
PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

lane

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





PANEL NO.	-NW32A-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
1	10+00.00	473.00	462.00	1991525.68	807189.40	11.00	165.00
2	10+15.00	473.00	463.00	1991538.98	807182.47	10.00	150.00
3	10+30.00	473.00	464.00	1991552.29	807175.54	9.00	135.00
4	10+45.00	474.00	464.00	1991565.59	807168.61	10.00	150.00
5	10+60.00	474.00	464.00	1991578.89	807161.68	10.00	150.00
6	10+75.00	474.00	463.00	1991592.19	807154.75	11.00	165.00
7	10+90.00	474.00	462.00	1991605.50	807147.82	12.00	180.00
8	11+05.00	475.00	462.00	1991618.80	807140.89	13.00	195.00
9	11+20.00	475.00	461.00	1991632.10	807133.96	14.00	210.00
10	11+35.00	475.00	461.00	1991645.41	807127.03	14.00	210.00
11	11+50.00	475.00	460.00	1991658.71	807120.10	15.00	225.00
12	11+65.00	476.00	460.00	1991672.01	807113.17	16.00	240.00
13	11+80.00	476.00	459.00	1991685.32	807106.24	17.00	255.00
14	11+95.00	476.00	459.00	1991698.62	807099.31	17.00	255.00
15	12+10.00	476.00	459.00	1991711.92	807092.38	17.00	255.00
16	12+25.00	477.00	460.00	1991725.23	807085.45	17.00	255.00
17	12+40.00	477.00	460.00	1991738.53	807078.52	17.00	255.00
18	12+55.00	477.00	460.00	1991751.83	807071.59	17.00	255.00
19	12+70.00	477.00	460.00	1991765.14	807064.66	17.00	255.00
20	12+85.00	477.00	461.00	1991778.44	807057.73	16.00	240.00

PANEL NO.	-NW32A-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
21	13+00.00	477.00	461.00	1991791.74	807050.80	16.00	240.00
22	13+15.00	477.00	462.00	1991805.05	807043.87	15.00	225.00
23	13+30.00	477.00	462.00	1991818.35	807036.94	15.00	225.00
24	13+45.00	478.00	462.00	1991831.65	807030.01	16.00	240.00
25	13+60.00	478.00	463.00	1991844.96	807023.08	15.00	225.00
26	13+75.00	478.00	463.00	1991858.26	807016.15	15.00	225.00
27	13+90.00	478.00	464.00	1991871.56	807009.22	14.00	210.00
28	14+05.00	478.00	464.00	1991884.86	807002.29	14.00	210.00
29	14+20.00	478.00	464.00	1991897.68	806994.50	14.00	210.00
30	14+35.00	478.00	464.00	1991910.50	806986.72	14.00	210.00
31	14+50.00	478.00	464.00	1991923.32	806978.93	14.00	210.00
32	14+65.00	478.00	465.00	1991936.14	806971.14	13.00	195.00
33	14+80.00	478.00	465.00	1991948.96	806963.35	13.00	195.00
34	14+95.00	478.00	465.00	1991961.78	806955.56	13.00	195.00
35	15+10.00	478.00	465.00	1991974.60	806947.78	13.00	195.00
36	15+25.00	478.00	465.00	1991987.42	806939.99	13.00	195.00
37	15+40.00	478.00	465.00	1992000.24	806932.20	13.00	195.00
38	15+55.00	478.00	466.00	1992013.06	806924.41	12.00	180.00
39	15+70.00	478.00	466.00	1992025.88	806916.63	12.00	180.00
40	15+85.00	479.00	466.00	1992038.70	806908.84	13.00	195.00

PANEL NO.	-NW32A-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
41	16+00.00	479.00	466.00	1992051.52	806901.05	13.00	195.00
42	16+15.00	479.00	467.00	1992064.34	806893.26	12.00	180.00
43	16+30.00	479.00	467.00	1992077.16	806885.47	12.00	180.00
44	16+45.00	479.00	467.00	1992089.98	806877.69	12.00	180.00
45	16+60.00	479.00	467.00	1992102.80	806869.90	12.00	180.00
46	16+75.00	479.00	467.00	1992115.62	806862.11	12.00	180.00
47	16+90.00	479.00	468.00	1992128.44	806854.32	11.00	165.00
48	17+05.00	479.00	468.00	1992141.26	806846.53	11.00	165.00
49	17+20.00	479.00	468.00	1992154.08	806838.75	11.00	165.00
50	17+35.00	478.00	468.00	1992166.90	806830.96	10.00	150.00
51	17+50.00	478.00	468.00	1992179.72	806823.17	10.00	150.00
52	17+65.00	477.00	468.00	1992192.54	806815.38	9.00	135.00
53	17+80.00	477.00	467.00	1992205.36	806807.59	10.00	150.00
54	17+95.00	476.00	467.00	1992218.18	806799.81	9.00	135.00
55	18+10.00	476.00	466.00	1992231.00	806792.02	10.00	150.00
56	18+25.00	475.00	465.00	1992243.82	806784.23	10.00	150.00
57	18+40.00	475.00	464.00	1992256.64	806776.44	11.00	165.00
58	18+55.00	474.00	464.00	1992269.46	806768.65	10.00	150.00
59	18+70.00	474.00	463.00	1992282.28	806760.87	11.00	165.00
60	18+85.00	473.00	461.00	1992295.10	806753.08	12.00	180.00

PANEL NO.	-NW32A-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
61	19+00.00	473.00	459.00	1992307.92	806745.29	14.00	210.00
62	19+15.00	472.00	458.00	1992320.74	806737.50	14.00	210.00
63	19+30.00	472.00	457.00	1992333.56	806729.71	15.00	225.00
64	19+45.00	471.00	455.00	1992346.38	806721.93	16.00	240.00
65	19+60.00	471.00	454.00	1992359.20	806714.14	17.00	255.00
66	19+75.00	470.00	453.00	1992372.02	806706.35	17.00	255.00
67	19+90.00	470.00	451.00	1992384.84	806698.56	19.00	285.00
68	20+05.00	469.00	450.00	1992397.66	806690.78	19.00	285.00
69	20+20.00	469.00	448.00	1992410.48	806682.99	21.00	315.00
70	20+35.00	468.00	446.00	1992423.30	806675.20	22.00	330.00
71	20+50.00	468.00	444.00	1992436.12	806667.41	24.00	360.00
72	20+65.00	468.00	442.00	1992448.94	806659.62	26.00	390.00
73	20+80.00	468.00	442.00	1992461.76	806651.84	26.00	390.00
74	20+95.00	467.00	442.00	1992474.58	806644.05	25.00	375.00
75	21+10.00	467.00	442.00	1992487.40	806636.26	25.00	375.00
76	21+25.00	467.00	443.00	1992500.22	806628.47	24.00	360.00
77	21+40.00	467.00	445.00	1992513.04	806620.68	22.00	330.00
78	21+55.00	467.00	446.00	1992525.86	806612.90	21.00	315.00
END	21+70.00	467.00	446.00	1992538.68	806605.11	21.00	315.00
			WALL LENGTH	1,170	WALL AREA		17,445

REVISIONS

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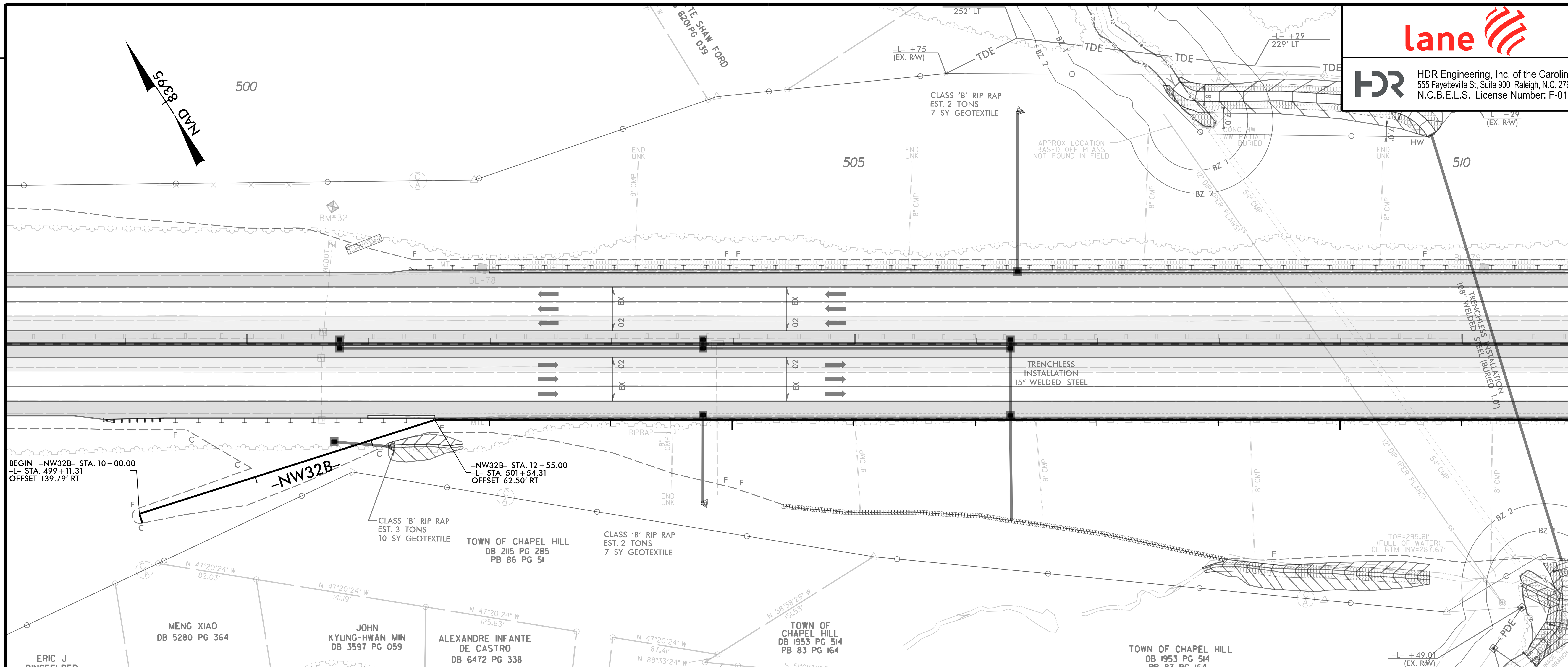
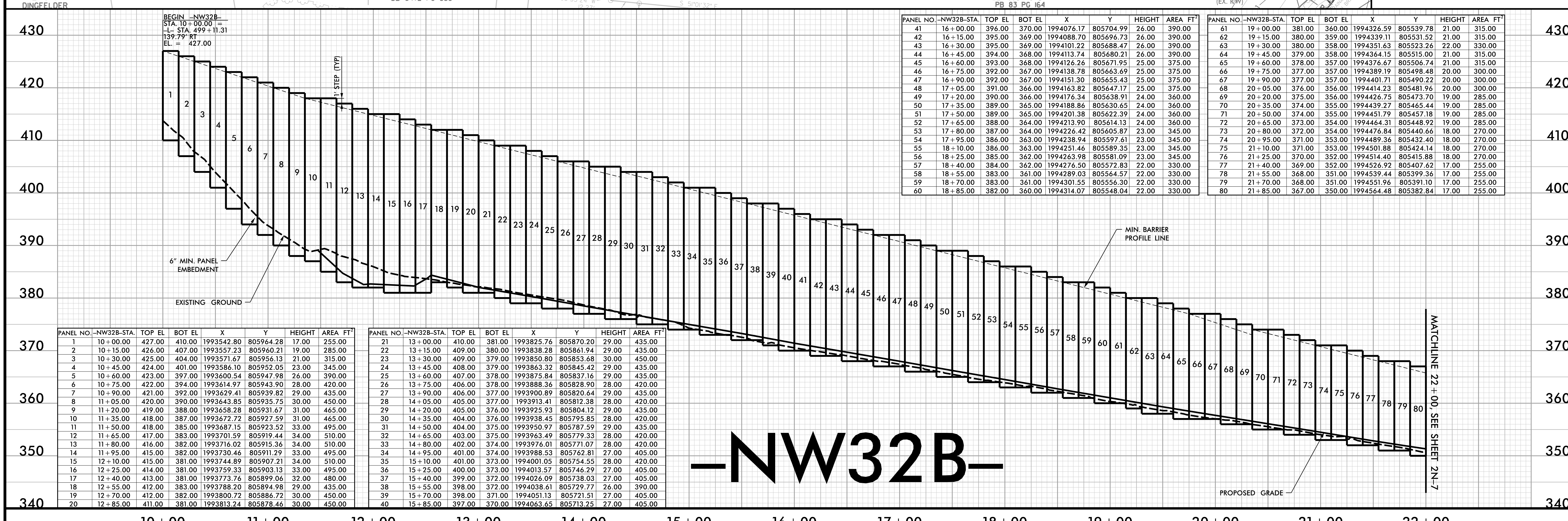
PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





PANEL NO.	-NW32B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
1	10+00.00	427.00	410.00	1993542.80	805964.28	17.00	255.00
2	10+15.00	426.00	407.00	1993557.23	805960.21	19.00	285.00
3	10+30.00	425.00	404.00	1993571.67	805956.13	21.00	315.00
4	10+45.00	424.00	401.00	1993586.10	805952.05	23.00	345.00
5	10+60.00	423.00	397.00	1993600.54	805947.98	26.00	390.00
6	10+75.00	422.00	394.00	1993614.97	805943.90	28.00	420.00
7	10+90.00	421.00	392.00	1993629.41	805939.82	29.00	435.00
8	11+05.00	420.00	390.00	1993643.85	805935.75	30.00	450.00
9	11+20.00	419.00	388.00	1993658.28	805931.67	31.00	465.00
10	11+35.00	418.00	387.00	1993672.72	805927.59	31.00	465.00
11	11+50.00	418.00	385.00	1993687.15	805923.52	33.00	495.00
12	11+65.00	417.00	383.00	1993701.59	805919.44	34.00	510.00
13	11+80.00	416.00	382.00	1993716.02	805915.36	34.00	510.00
14	11+95.00	415.00	382.00	1993730.46	805911.29	33.00	495.00
15	12+10.00	415.00	381.00	1993744.89	805907.21	34.00	510.00
16	12+25.00	414.00	381.00	1993759.33	805903.13	33.00	495.00
17	12+40.00	413.00	381.00	1993773.76	805899.06	32.00	480.00
18	12+55.00	412.00	383.00	1993788.20	805894.98	29.00	435.00
19	12+70.00	412.00	382.00	1993800.72	805886.72	30.00	450.00
20	12+85.00	411.00	381.00	1993813.24	805878.46	30.00	450.00

PANEL NO.	-NW32B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
21	13+00.00	410.00	381.00	1993825.76	805870.20	29.00	435.00
22	13+15.00	409.00	380.00	1993838.28	805861.94	29.00	435.00
23	13+30.00	409.00	379.00	1993850.80	805853.68	30.00	450.00
24	13+45.00	408.00	379.00	1993863.32	805845.42	29.00	435.00
25	13+60.00	407.00	378.00	1993875.84	805837.16	29.00	435.00
26	13+75.00	406.00	378.00	1993888.36	805828.90	28.00	420.00
27	13+90.00	406.00	377.00	1993900.89	805820.64	29.00	435.00
28	14+05.00	405.00	377.00	1993913.41	805812.38	28.00	420.00
29	14+20.00	405.00	376.00	1993925.93	805804.12	29.00	435.00
30	14+35.00	404.00	376.00	1993938.45	805795.85	28.00	420.00
31	14+50.00	404.00	375.00	1993950.97	805787.59	29.00	435.00
32	14+65.00	403.00	375.00	1993963.49	805779.33	28.00	420.00
33	14+80.00	402.00	374.00	1993976.01	805771.07	28.00	420.00
34	14+95.00	401.00	374.00	1993988.53	805762.81	27.00	405.00
35	15+10.00	401.00	373.00	1994001.05	805754.55	28.00	420.00
36	15+25.00	400.00	373.00	1994013.57	805746.29	27.00	405.00
37	15+40.00	399.00	372.00	1994026.09	805738.03	27.00	405.00
38	15+55.00	398.00	372.00	1994038.61	805729.77	26.00	390.00
39	15+70.00	398.00	371.00	1994051.13	805721.51	27.00	405.00
40	15+85.00	397.00	370.00	1994063.65	805713.25	27.00	405.00

PANEL NO.	-NW32B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
41	16+00.00	396.00	370.00	1994076.17	805704.99	26.00	390.00
42	16+15.00	395.00	369.00	1994088.70	805696.73	26.00	390.00
43	16+30.00	395.00	369.00	1994101.22	805688.47	26.00	390.00
44	16+45.00	394.00	368.00	1994113.74	805680.21	26.00	390.00
45	16+60.00	393.00	368.00	1994126.26	805671.95	25.00	375.00
46	16+75.00	392.00	367.00	1994138.78	805663.69	25.00	375.00
47	16+90.00	392.00	367.00	1994151.30	805655.43	25.00	375.00
48	17+05.00	391.00	366.00	1994163.82	805647.17	25.00	375.00
49	17+20.00	390.00	366.00	1994176.34	805638.91	24.00	360.00
50	17+35.00	389.00	365.00	1994188.86	805630.65	24.00	360.00
51	17+50.00	389.00	365.00	1994201.38	805622.39	24.00	360.00
52	17+65.00	388.00	364.00	1994213.90	805614.13	24.00	360.00
53	17+80.00	387.00	364.00	1994226.42	805605.87	23.00	345.00
54	17+95.00	386.00	363.00	1994238.94	805597.61	23.00	345.00
55	18+10.00	386.00	363.00	1994251.46	805589.35	23.00	345.00
56	18+25.00	385.00	362.00	1994263.98	805581.09	23.00	345.00
57	18+40.00	384.00	362.00	1994276.50	805572.83	22.00	330.00
58	18+55.00	383.00	361.00	1994289.03	805564.57	22.00	330.00
59	18+70.00	383.00	361.00	1994301.55	805556.30	22.00	330.00
60	18+85.00	382.00	360.00	1994314.07	805548.04	22.00	330.00

PANEL NO.	-NW32B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT²
61	19+00.00	381.00	360.00	1994326.59	805539.78	21.00	315.00
62	19+15.00	380.00	359.00	1994339.11	805531.52	21.00	315.00
63	19+30.00	380.00	358.00	1994351.63	805523.26	22.00	330.00
64	19+45.00	379.00	358.00	1994364.15	805515.00	21.00	315.00
65	19+60.00	378.00	357.00	1994376.67	805506.74	21.00	315.00
66	19+75.00	377.00	357.00	1994389.19	805498.48	20.00	300.00
67	19+90.00	377.00	357.00	1994401.71	805490.22	20.00	300.00
68	20+05.00	376.00	356.00	1994414.23	805481.96	20.00	300.00
69	20+20.00	375.00	356.00	1994426.75	805473.70	19.00	285.00
70	20+35.00	374.00	355.00	1994439.27	805465.44	19.00	285.00
71	20+50.00	374.00	355.00	1994451.79	805457.18	19.00	285.00
72	20+65.00	373.00	354.00	1994464.31	805448.92	19.00	285.00
73	20+80.00	372.00	354.00	1994476.84	805440.66	18.00	270.00
74	20+95.00	371.00	353.00	1994489.36	805432.40	18.00	270.00
75	21+10.00	371.00	353.00	1994501.88	805424.14	18.00	270.00
76	21+25.00	370.00	352.00	1994514.40	805415.88	18.00	270.00
77	21+40.00	369.00	352.00	1994526.92	805407.62	17.00	255.00
78	21+55.00	368.00	351.00	1994539.44	805399.36	17.00	255.00
79	21+70.00	368.00	351.00	1994551.96	805391.10	17.00	255.00
80	21+85.00	367.00	350.00	1994564.48	805382.84	17.00	255.00

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
I-3306A / W-5707C	2N-7

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

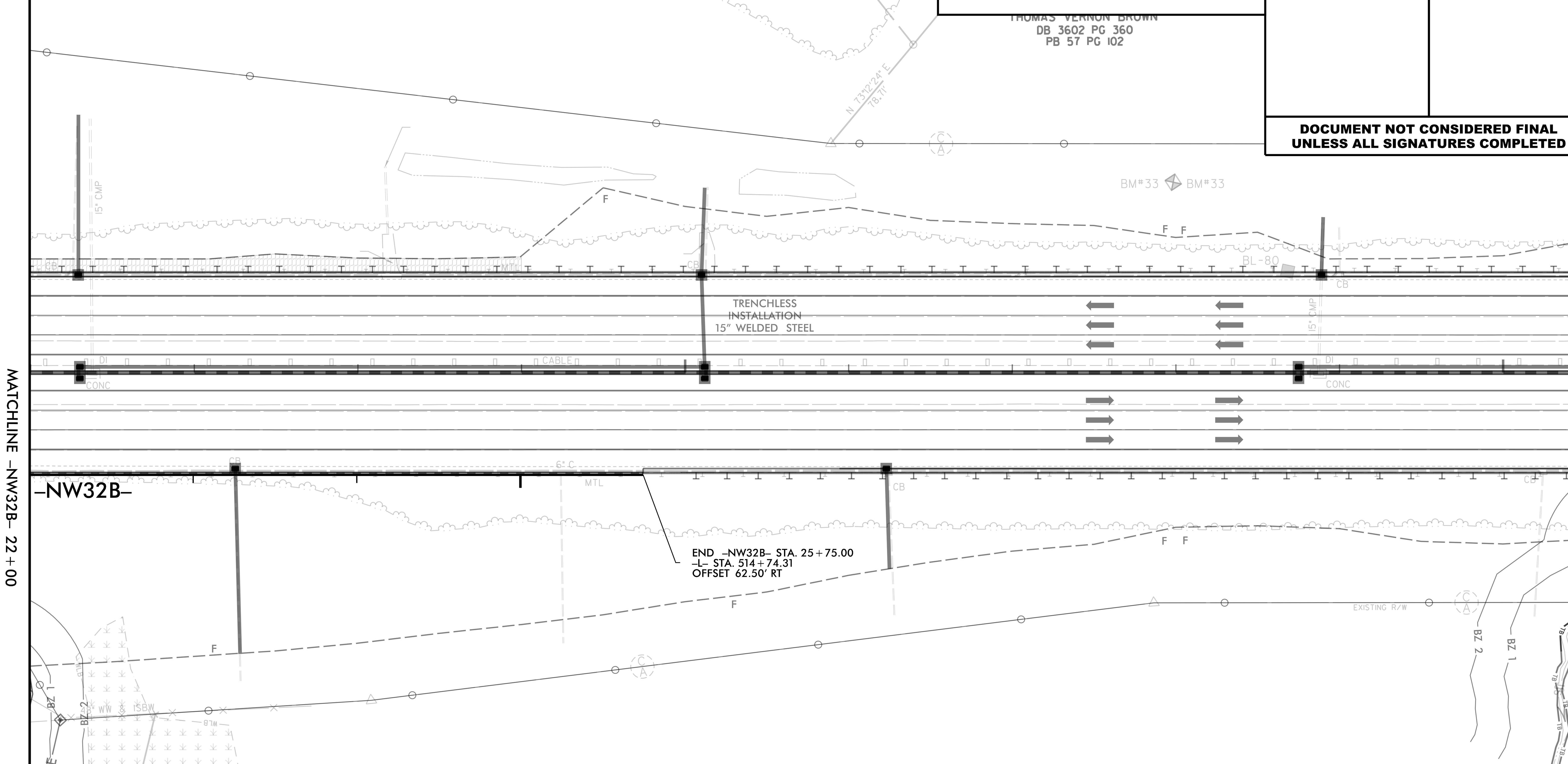
HYDRAULICS ENGINEER

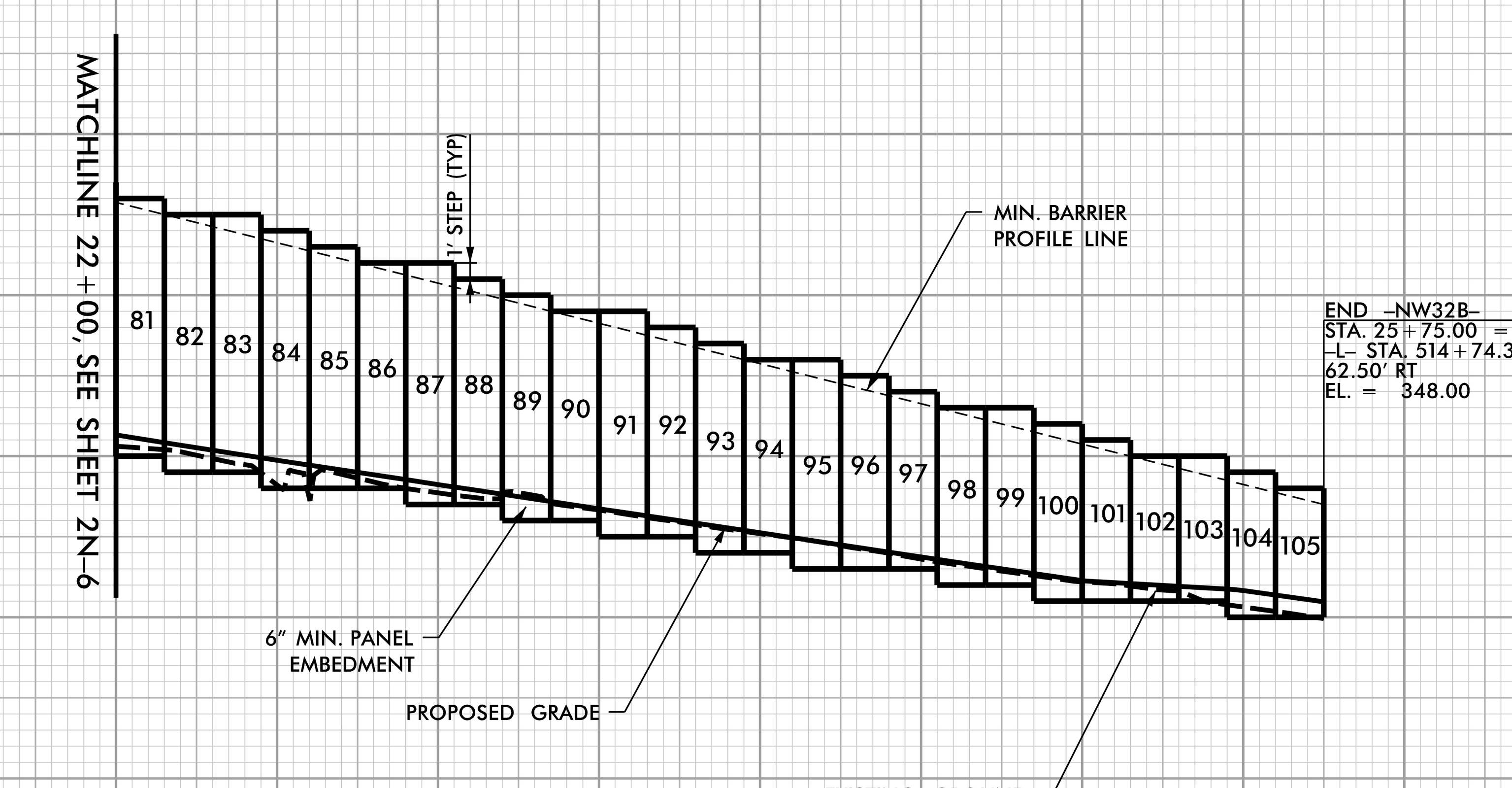
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

lane

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NAD 83/95





PANEL NO.	-NW32B-STA.	TOP EL	BOT EL	X	Y	HEIGHT	AREA FT^2
81	22+00.00	366.00	350.00	1994577.00	805374.58	16.00	240.00
82	22+15.00	365.00	349.00	1994589.52	805366.32	16.00	240.00
83	22+30.00	365.00	349.00	1994602.04	805358.06	16.00	240.00
84	22+45.00	364.00	348.00	1994614.56	805349.80	16.00	240.00
85	22+60.00	363.00	348.00	1994627.08	805341.54	15.00	225.00
86	22+75.00	362.00	348.00	1994639.60	805333.28	14.00	210.00
87	22+90.00	362.00	347.00	1994652.12	805325.01	15.00	225.00
88	23+05.00	361.00	347.00	1994664.64	805316.75	14.00	210.00
89	23+20.00	360.00	346.00	1994677.17	805308.49	14.00	210.00
90	23+35.00	359.00	346.00	1994689.69	805300.23	13.00	195.00
91	23+50.00	359.00	345.00	1994702.21	805291.97	14.00	210.00
92	23+65.00	358.00	345.00	1994714.73	805283.71	13.00	195.00
93	23+80.00	357.00	344.00	1994727.25	805275.45	13.00	195.00
94	23+95.00	356.00	344.00	1994739.77	805267.19	12.00	180.00
95	24+10.00	356.00	343.00	1994752.29	805258.93	13.00	195.00
96	24+25.00	355.00	343.00	1994764.81	805250.67	12.00	180.00
97	24+40.00	354.00	343.00	1994777.33	805242.41	11.00	165.00
98	24+55.00	353.00	342.00	1994789.85	805234.15	11.00	165.00
99	24+70.00	353.00	342.00	1994802.37	805225.89	11.00	165.00
100	24+85.00	352.00	341.00	1994814.89	805217.63	11.00	165.00
101	25+00.00	351.00	341.00	1994827.41	805209.37	10.00	150.00
102	25+15.00	350.00	341.00	1994839.93	805201.11	9.00	135.00
103	25+30.00	350.00	341.00	1994852.45	805192.85	9.00	135.00
104	25+45.00	349.00	340.00	1994864.98	805184.59	9.00	135.00
105	25+60.00	348.00	340.00	1994877.50	805176.33	8.00	120.00
END	25+75.00	348.00	340.00	1994890.02	805168.07	8.00	120.00
		WALL LENGTH		1,575	WALL AREA		34,860

390 380 370 360 350 340 330 320 310 300

-NW32B-

22+00 23+00 24+00 25+00

REVISIONS

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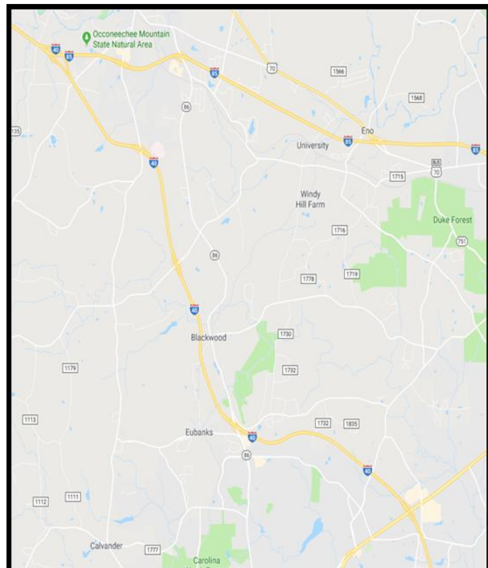
Appendix F. Traffic Data



I-3306A

2019
No Build (AM)

Without Widening

\## Vehicles Per Day in 100s — 1- Less than 50 VPD

$DHV \xrightarrow[(d,t)]{AM} D$

DHV Design Hourly Volume (%) = K30
AM AM Peak Period
D Peak Hour Directional Split (%)
→ Indicates Direction of D
(d,t) Dual, TT-STs (%)

Existing Roadway
Road Widening
Proposed Roadway

EXTENTS

I-85 (Exit 163) to NC 54 (Exit 273)

Orange County and Durham County — Division 7

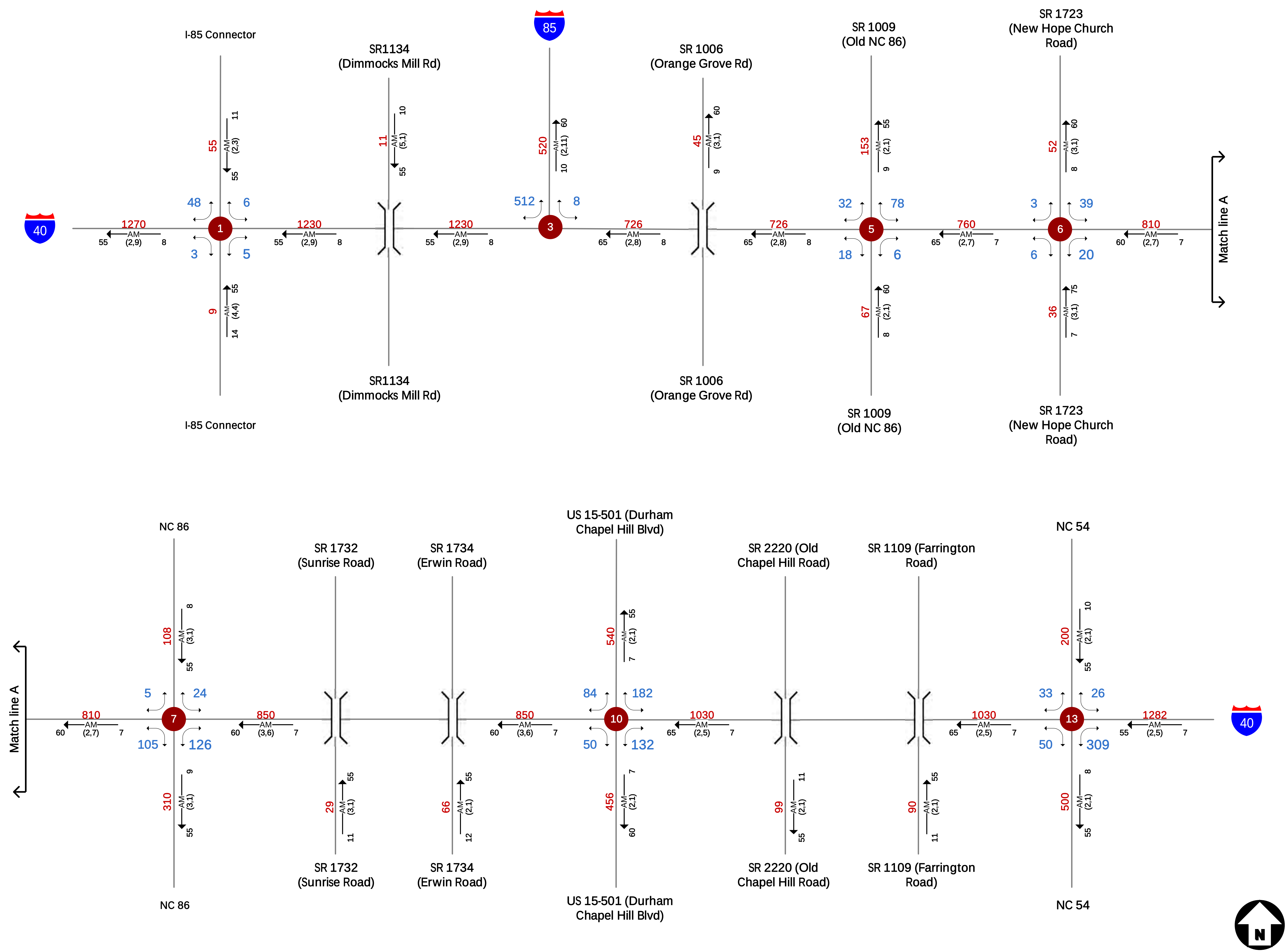
PROJECT

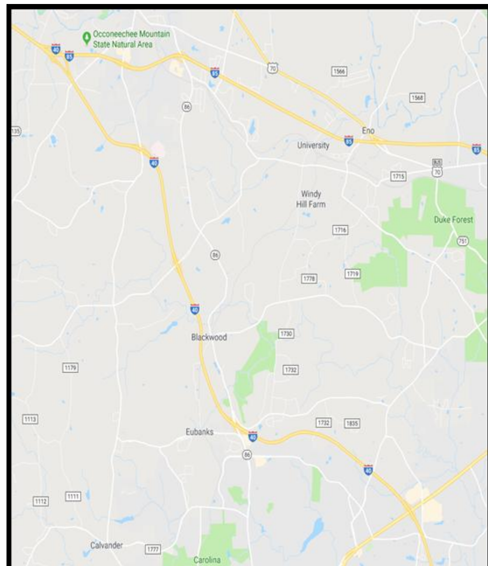
Widening of I-40 in Durham and Orange Counties from I-85 to NC 54

WBS# 47537.1.1

July 17, 2019

Kimley»Horn





I-3306A

2019
No Build (PM)

Without Widening

Vehicles Per Day in 100s
1- Less than 50 VPD

DHV —PM / (d, t)→ D

DHV Design Hourly Volume (%) = K30
PM PM Peak Period
D Peak Hour Directional Split (%)
→ Indicates Direction of D
(d,t) Dual, TT-STs (%)

Existing Roadway
Road Widening
Proposed Roadway

EXTENTS

I-85 (Exit 163) to NC 54 (Exit 273)

Orange County and Durham County — Division 7

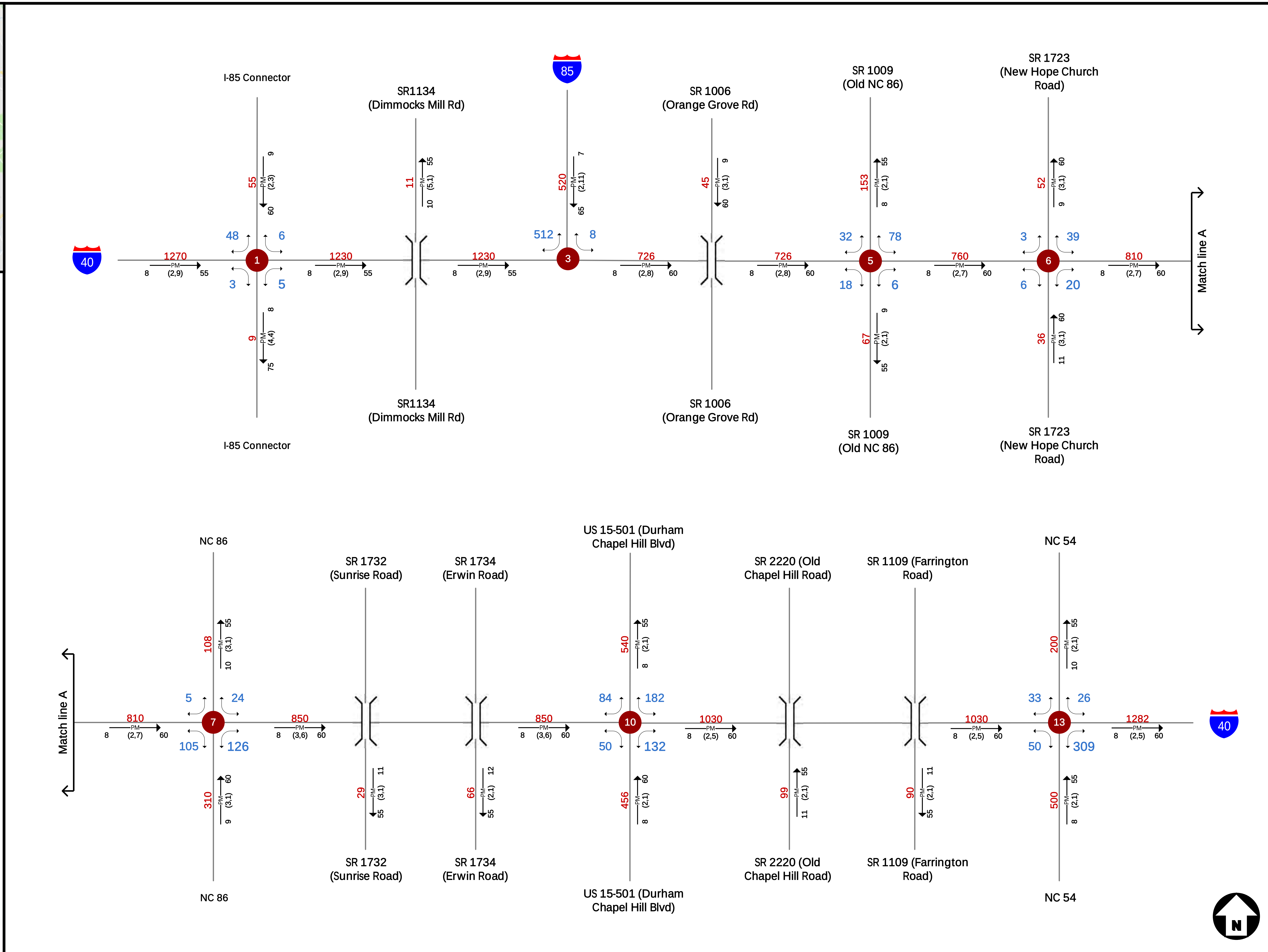
PROJECT

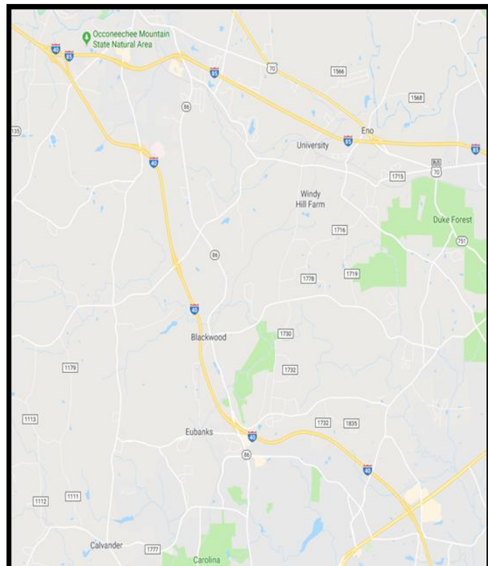
Widening of I-40 in Durham and Orange Counties from I-85 to NC 54

WBS# 47537.1.1

July 17, 2019

Kimley»Horn





I-3306A

2045
Build 1 (AM)

Widening I-40 to 6 lanes

## Vehicles Per Day in 100s	1- Less than 50 VPD

DHV $\xrightarrow[(d,t)]{AM}$ D

DHV Design Hourly Volume (%) = K30
AM AM Peak Period
D Peak Hour Directional Split (%)
Indicates Direction of D
(d,t) Dual, TT-STs (%)

Existing Roadway
Road Widening
Proposed Roadway

EXTENTS

I-85 (Exit 163) to NC 54 (Exit 273)

Orange County and Durham County Division 7

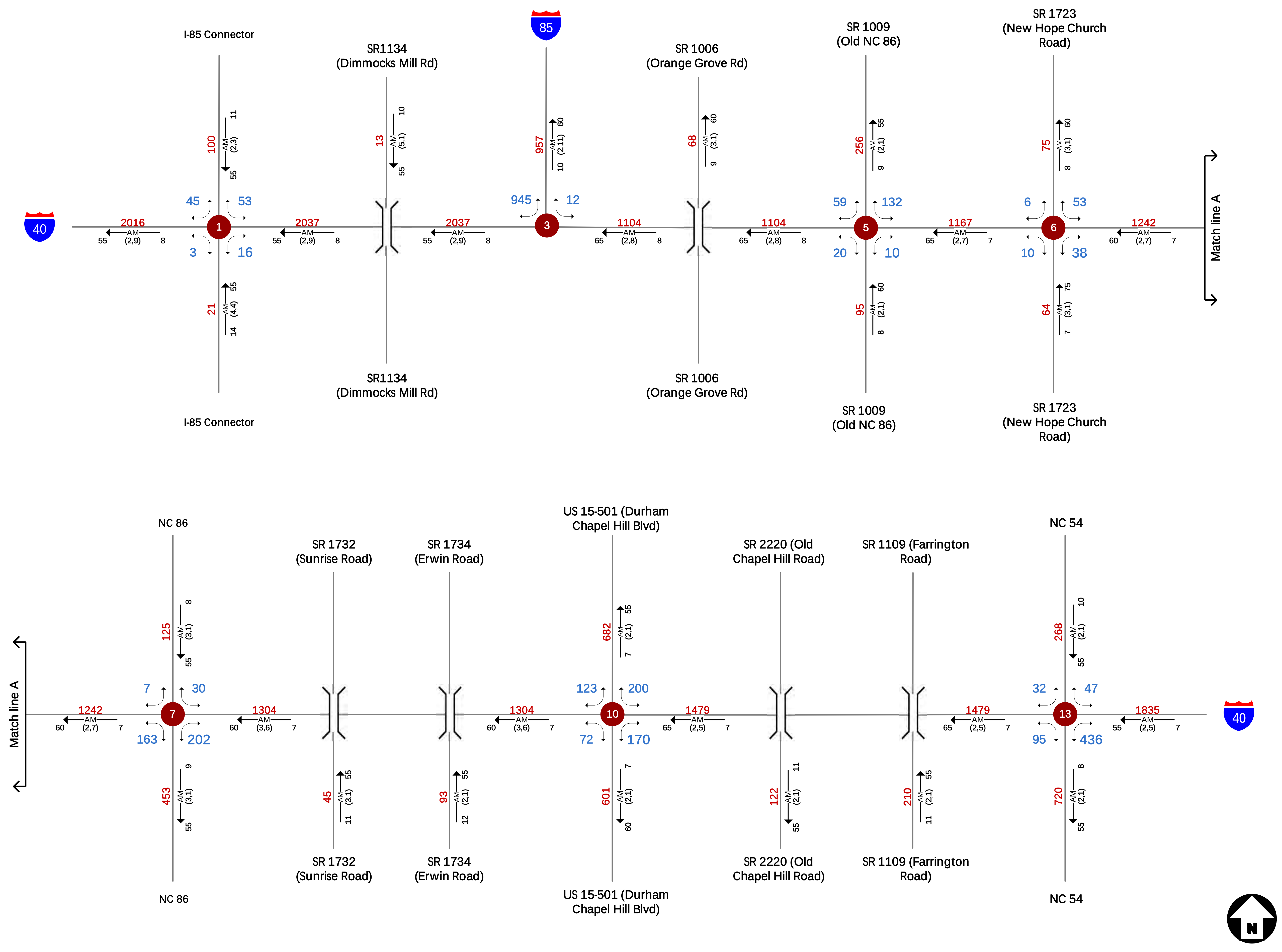
PROJECT

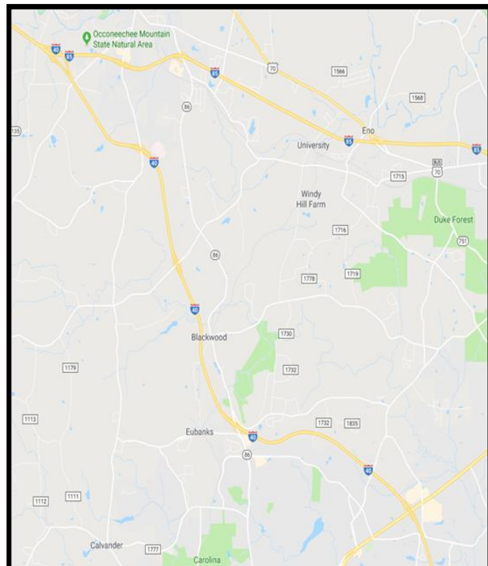
Widening of I-40 in Durham and Orange Counties from I-85 to NC 54

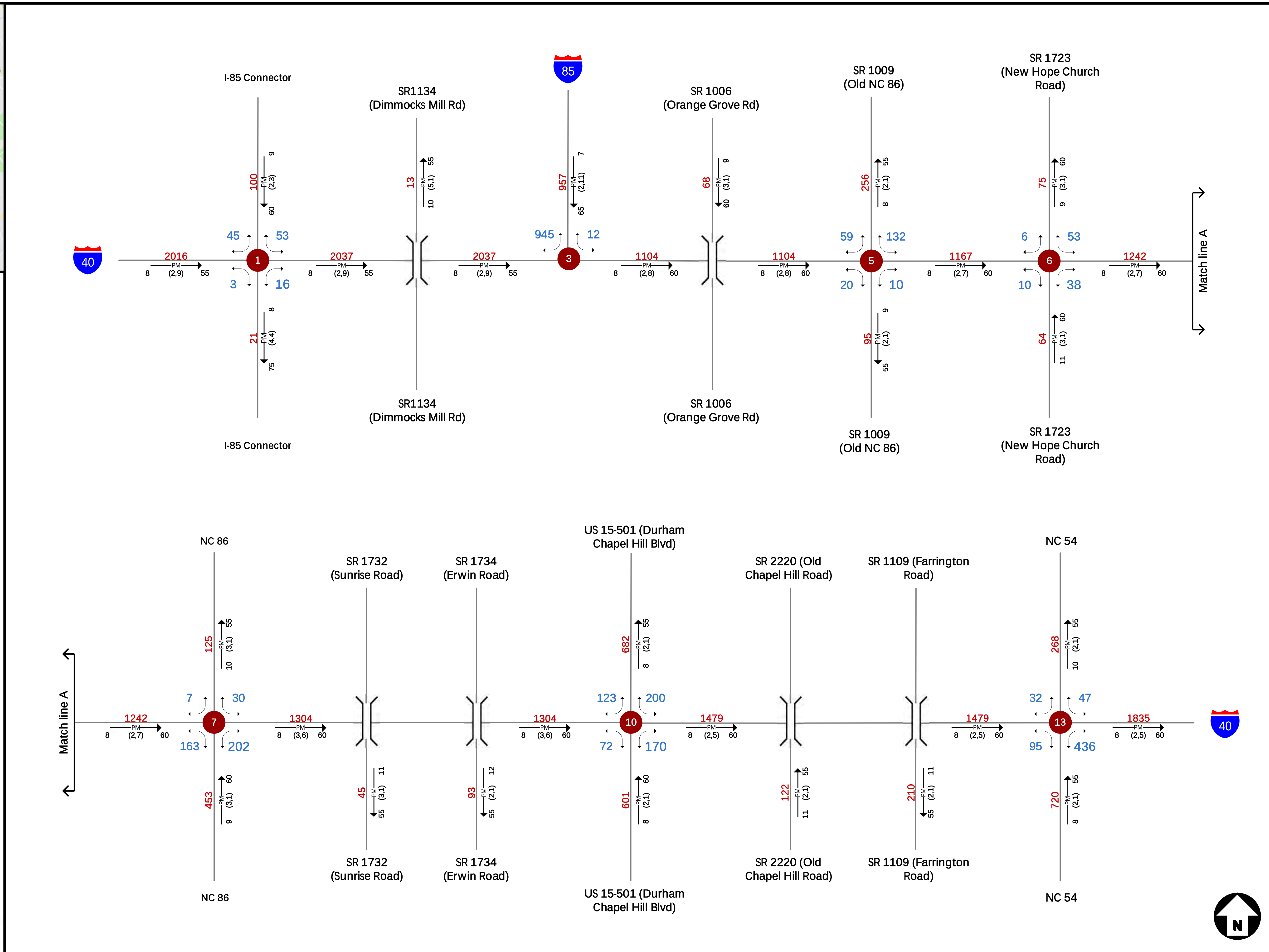
WBS# 47537.1.1

July 17, 2019

Kimley»Horn







I-3306A

2045
Build 1 (PM)

Widening I-40 to 6 lanes

Vehicles Per Day in 100s; 1- Less than 50 VPD

DHV →(PM / (d, t)) D

DHV Design Hourly Volume (%) = K30
PM PM Peak Period
D Peak Hour Directional Split (%)
→ Indicates Direction of D
(d,t) Dual, TT-STs (%)

Existing Roadway
Road Widening
Proposed Roadway

EXTENTS

I-85 (Exit 163) to NC 54 (Exit 273)

Orange County and Durham County — Division 7

PROJECT

Widening of I-40 in Durham and Orange Counties from I-85 to NC 54

WBS# 47537.1.1

July 17, 2019

Kimley»Horn

Links				2019 No Build														2045 Build Forecast					2045 Build Alt									
											Forecast		LOS C													Forecast		LOS C				
Seg.	From	To	Dir.	K	D	%Auto	%MT	%HT	Lanes	Design Speed (mph)	AADT (vpd)	PHV (vph)	PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)	K	D	%Auto	%MT	%HT	Lanes	SL (mph)	Design Speed (mph)	AADT (vpd)	PHV (vph)	PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)
I-40	Western Project Extents	I-85	EB	0.08	0.50	0.89	0.02	0.09	4	70	123,000	**4,920**	5,760	Pk Hr	**1,095**	**25**	**111**	0.08	0.50	0.89	0.02	0.09	4	65	70	203,700	8,148	**5,760**	LOS C	**1,282**	**29**	**130**
			WB		0.50				5			**4,920**	7,200	Pk Hr	**876**	**20**	**89**		0.50				5				8,148	**7,200**	LOS C	**1,282**	**29**	**130**
	I-85	Old NC 86	EB	0.08	0.50	0.90	0.02	0.08	2	70	72,600	2,904	**2,880**	LOS C	**1,296**	**29**	**115**	0.08	0.50	0.90	0.02	0.08	3	65	70	110,400	4,416	**4,320**	LOS C	**1,296**	**29**	**115**
			WB		0.50				2			2,904	**2,880**	LOS C	**1,296**	**29**	**115**		0.50				3				4,416	**4,320**	LOS C	**1,296**	**29**	**115**
	Old NC 86	SR 1723 (New Hope Church Road)	EB	0.08	0.50	0.91	0.02	0.07	2	70	76,000	3,040	**2,920**	LOS C	**1,329**	**29**	**102**	0.08	0.50	0.91	0.02	0.07	3	65	70	116,700	4,668	**4,380**	LOS C	**1,329**	**29**	**102**
			WB		0.50				2			3,040	**2,920**	LOS C	**1,329**	**29**	**102**		0.50				3				4,668	**4,380**	LOS C	**1,329**	**29**	**102**
	SR 1723 (New Hope Church Road)	NC 86	EB	0.08	0.50	0.91	0.02	0.07	2	70	81,000	3,240	**2,920**	LOS C	**1,329**	**29**	**102**	0.08	0.50	0.91	0.02	0.07	3	65	70	124,200	4,968	**4,380**	LOS C	**1,329**	**29**	**102**
			WB		0.50				2			3,240	**2,920**	LOS C	**1,329**	**29**	**102**		0.50				3				4,968	**4,380**	LOS C	**1,329**	**29**	**102**
	NC 86	US 15/501	EB	0.08	0.50	0.91	0.03	0.06	2	70	85,000	3,400	**2,920**	LOS C	**1,329**	**44**	**88**	0.08	0.50	0.91	0.03	0.06	3	65	70	130,400	5,216	**4,380**	LOS C	**1,329**	**44**	**88**
			WB		0.50				2			3,400	**2,920**	LOS C	**1,329**	**44**	**88**		0.50				3				5,216	**4,380**	LOS C	**1,329**	**44**	**88**
	US 15/501	Eastern Project Extents	EB	0.08	0.50	0.93	0.02	0.05	3	70	103,000	**4,120**	4,470	Pk Hr	**1,277**	**27**	**69**	0.08	0.50	0.93	0.02	0.05	3	65	70	147,900	5,916	**4,470**	LOS C	**1,386**	**30**	**75**
			WB		0.50				3			**4,120**	4,470	Pk Hr	**1,277**	**27**	**69**		0.50				3				5,916	**4,470**	LOS C	**1,386**	**30**	**75**
I-40 Under/Overpasses	I-85 Underpass		EB	0.08	0.50	0.89	0.02	0.09	2	70	71,800	**2,872**	2,880	Pk Hr	**1,278**	**29**	**129**	0.08	0.50	0.89	0.02	0.09	3	65	70	109,200	4,368	**4,320**	LOS C	**1,282**	**29**	**130**
			WB		0.50				2			**2,872**	2,880	Pk Hr	**1,278**	**29**	**129**		0.50				3				4,368	**4,320**	LOS C	**1,282**	**29**	**130**
	Old NC 86 Overpass		EB	0.08	0.50	0.90	0.02	0.08	2	70	67,600	**2,704**	2,880	Pk Hr	**1,217**	**27**	**108**	0.08	0.50	0.90	0.02	0.08	3	65	70	102,500	**4,100**	4,320	Pk Hr	**1,230**	**27**	**109**
			WB		0.50				2			**2,704**	2,880	Pk Hr	**1,217**	**27**	**108**		0.50				3				**4,100**	4,320	Pk Hr	**1,230**	**27**	**109**
	SR 1723 (New Hope Church Road) Underpass		EB	0.08	0.50	0.91	0.02	0.07	2	70	75,100	3,004	**2,920**	LOS C	**1,329**	**29**	**102**	0.08	0.50	0.91	0.02	0.07	3	65	70	115,100	4,604	**4,380**	LOS C	**1,329**	**29**	**102**
			WB		0.50				2			3,004	**2,920**	LOS C	**1,329**	**29**	**102**		0.50				3				4,604	**4,380**	LOS C	**1,329**	**29**	**102**
	NC 86 Underpass		EB	0.08	0.50	0.91	0.02	0.07	2	70	70,000	**2,800**	2,920	Pk Hr	**1,274**	**28**	**98**	0.08	0.50	0.91	0.02	0.07	3	65	70	107,200	**4,288**	4,380	Pk Hr	**1,301**	**29**	**100**
			WB		0.50				2			**2,800**	2,920	Pk Hr	**1,274**	**28**	**98**		0.50				3				**4,288**	4,380	Pk Hr	**1,301**	**29**	**100**
	US 15/501 Underpass		EB	0.08	0.50	0.91	0.03	0.06	3	70	71,600	**2,864**	4,380	Pk Hr	**869**	**29**	**57**	0.08	0.50	0.91	0.03	0.06	3	65	70	110,900	4,436	**4,380**	LOS C	**1,329**	**44**	**88**
			WB		0.50				3			**2,864**	4,380	Pk Hr	**869**	**29**	**57**		0.50				3				4,436	**4,380**	LOS C	**1,329**	**44**	**88**
I-85	Northern I-40 Connection	Eastern I-40 Connection	EB	0.10	0.50	0.87	0.02	0.11	3	70	51,200	**2,560**	4,230	Pk Hr	**742**	**17**	**94**	0.10	0.50	0.87	0.02	0.11	3	65	70	94,500	4,725	**4,230**	LOS C	**1,227**	**28**	**155**
			WB		0.50				3			**2,560**	4,230	Pk Hr	**742**	**17**	**94**		0.50				3				4,725	**4,230**	LOS C	**1,227**	**28**	**155**
	Eastern I-40 Connection	East of I-40	EB	0.10	0.50	0.87	0.02	0.11	3	70	52,000	**2,600**	4,230	Pk Hr	**754**	**17**	**95**	0.10	0.50	0.87	0.02	0.11	3	65	70	95,700	4,785	**4,230**	LOS C	**1,227**	**28**	**155**
			WB		0.50				3			**2,600**	4,230	Pk Hr	**754**	**17**	**95**		0.50				3				4,785	**4,230**	LOS C	**1,227**	**28**	**155**

Links				2019 No Build														2045 Build Forecast					2045 Build Alt									
											Forecast		LOS C													Forecast		LOS C				
Seg.	From	To	Dir.	K	D	%Auto	%MT	%HT	Lanes	Design Speed (mph)	AADT (vpd)	PHV (vph)	PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)	K	D	%Auto	%MT	%HT	Lanes	SL (mph)	Design Speed (mph)	AADT (vpd)	PHV (vph)	PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)
	East of I-40	Eastern Project Extents	EB	0.10	0.50	0.87	0.02	0.11	2	70	52,000	2,600	2,820	Pk Hr	1,131	26	143	0.10	0.50	0.87	0.02	0.11	2	65	70	95,700	4,785	2,820	LOS C	1,227	28	155
			WB		0.50				2			2,600	2,820	Pk Hr	1,131	26	143		0.50				2				4,785	2,820	LOS C	1,227	28	155
I-40 Ramps	EB On Ramp from I-85		EB	0.08	1.00	0.90	0.02	0.08	1	40	400	32	840	Pk Hr	29	1	3	0.08	1.00	0.90	0.02	0.08	1	35	40	600	48	840	Pk Hr	43	1	4
	WB Off Ramp to I-85		WB	0.10	1.00	0.87	0.02	0.11	1	50	400	40	840	Pk Hr	35	1	4	0.10	1.00	0.87	0.02	0.11	1	45	50	600	60	840	Pk Hr	52	1	7
	EB Off Ramp to Old NC 86		EB	0.09	1.00	0.97	0.02	0.01	1	50	2,500	225	670	Pk Hr	218	5	2	0.09	1.00	0.97	0.02	0.01	1	45	50	3,950	356	670	Pk Hr	345	7	4
	EB On Ramp from Old NC 86		EB	0.08	1.00	0.91	0.02	0.07	1	50	4,200	336	670	Pk Hr	306	7	24	0.08	1.00	0.91	0.02	0.07	1	45	50	7,100	568	670	Pk Hr	517	11	40
	WB Off Ramp to Old NC 86		WB	0.09	1.00	0.97	0.02	0.01	1	50	4,200	378	670	Pk Hr	367	8	4	0.09	1.00	0.97	0.02	0.01	1	45	50	7,100	639	670	Pk Hr	620	13	6
	WB On Ramp from Old NC 86		WB	0.08	1.00	0.90	0.02	0.08	1	50	2,500	200	670	Pk Hr	180	4	16	0.08	1.00	0.90	0.02	0.08	1	45	50	3,950	316	670	Pk Hr	284	6	25
	EB Off Ramp to SR 1723 (New Hope Church Road)		EB	0.11	1.00	0.96	0.03	0.01	1	50	450	50	660	Pk Hr	48	1	0	0.11	1.00	0.96	0.03	0.01	1	45	50	800	88	660	Pk Hr	84	3	1
	EB On Ramp from SR 1723 (New Hope Church Road)		EB	0.08	1.00	0.91	0.02	0.07	1	50	2,950	236	660	Pk Hr	215	5	17	0.08	1.00	0.91	0.02	0.07	1	45	50	4,550	364	660	Pk Hr	331	7	25
	WB Off Ramp to SR 1723 (New Hope Church Road)		WB	0.11	1.00	0.96	0.03	0.01	1	50	2,950	325	660	Pk Hr	312	10	3	0.11	1.00	0.96	0.03	0.01	1	45	50	4,550	501	660	Pk Hr	480	15	5
	WB On Ramp from SR 1723 (New Hope Church Road)		WB	0.08	1.00	0.91	0.02	0.07	1	50	450	36	660	Pk Hr	33	1	3	0.08	1.00	0.91	0.02	0.07	1	45	50	800	64	660	Pk Hr	58	1	4
	EB Off Ramp to NC 86		EB	0.10	1.00	0.96	0.03	0.01	1	50	5,500	550	660	Pk Hr	528	17	6	0.10	1.00	0.96	0.03	0.01	1	45	50	8,500	850	660	LOS C	634	20	7
	EB On Ramp from NC 86		EB	0.08	1.00	0.91	0.03	0.06	1	50	7,500	600	660	Pk Hr	546	18	36	0.08	1.00	0.91	0.03	0.06	1	45	50	11,600	928	660	LOS C	601	20	40
	WB Off Ramp to NC 86		WB	0.10	1.00	0.96	0.03	0.01	1	50	7,500	750	660	LOS C	634	20	7	0.10	1.00	0.96	0.03	0.01	1	45	50	11,600	1,160	660	LOS C	634	20	7
	WB On Ramp from NC 86		WB	0.08	1.00	0.91	0.02	0.07	1	50	5,500	440	660	Pk Hr	400	9	31	0.08	1.00	0.91	0.02	0.07	1	45	50	8,500	680	660	LOS C	601	13	46
	EB Off Ramp to US 15/501		EB	0.08	1.00	0.97	0.02	0.01	1	50	6,700	536	670	Pk Hr	520	11	5	0.08	1.00	0.97	0.02	0.01	1	45	50	9,750	780	670	LOS C	650	13	7
	EB On Ramp from US 15/501		EB	0.08	1.00	0.93	0.02	0.05	1	50	15,700	1,256	670	LOS C	623	13	34	0.08	1.00	0.93	0.02	0.05	1	45	50	18,500	1,480	670	LOS C	623	13	34
	WB Off Ramp to US 15/501		WB	0.08	1.00	0.97	0.02	0.01	1	50	15,700	1,256	670	LOS C	650	13	7	0.08	1.00	0.97	0.02	0.01	1	45	50	18,500	1,480	670	LOS C	650	13	7
	WB On Ramp from US 15/501		WB	0.08	1.00	0.91	0.03	0.06	1	50	6,700	536	670	Pk Hr	488	16	32	0.08	1.00	0.91	0.03	0.06	1	45	50	9,750	780	670	LOS C	610	20	40
Old NC 86	North of I-40		NB	0.09	0.50	0.97	0.02	0.01	2	50	15,300	689	1,860	Pk Hr	334	7	3	0.09	0.50	0.97	0.02	0.01	1	45	50	25,600	1,152	930	LOS C	902	19	9
			SB		0.50				2			689	1,860	Pk Hr	334	7	3		0.50				1				1,152	930	LOS C	902	19	9
	Overpass at I-40		NB	0.09	0.50	0.97	0.02	0.01	1	50	11,000	495	930	Pk Hr	480	10	5	0.09	0.50	0.97	0.02	0.01	1	45	50	17,550	790	930	Pk Hr	766	16	8
			SB		0.50				1			495	930	Pk Hr	480	10	5		0.50				1				790	930	Pk Hr	766	16	8
Old NC 86	South of I-40		NB	0.09	0.50	0.97	0.02	0.01	1	50	6,700	302	930	Pk Hr	292	6	3	0.09	0.50	0.97	0.02	0.01	1	45	50	9,500	428	930	Pk Hr	415	9	4
			SB		0.50				1			302	930	Pk Hr	292	6	3		0.50				1				428	930	Pk Hr	415	9	4

Seg.	Links: From / To	Dir.	2019 No Build: K	D	%Auto	%MT	%HT	Lanes	Design Speed (mph)	Forecast: AADT (vpd)	Forecast: PHV (vph)	LOS C: PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)	2045 Build Forecast: K	D	%Auto	%MT	%HT	2045 Build Alt: Lanes	SL (mph)	Design Speed (mph)	Forecast: AADT (vpd)	Forecast: PHV (vph)	LOS C: PHV (vph)	Volumes: Peak Hour or LOS C?	Auto (vph per lane)	MT (vph per lane)	HT (vph per lane)
SR 1723 (New Hope Church Road)	East of I-40	EB	0.09	0.50	0.96	0.03	0.01	1	50	5,200	**234**	780	Pk Hr	**225**	**7**	**2**	0.09	0.50	0.96	0.03	0.01	1	45	50	7,500	**338**	780	Pk Hr	**324**	**10**	**3**
		WB		0.50				1			**234**	780	Pk Hr	**225**	**7**	**2**		0.50				1				**338**	780	Pk Hr	**324**	**10**	**3**
	Underpass at I-40	EB	0.11	0.50	0.96	0.03	0.01	1	50	4,400	**242**	780	Pk Hr	**232**	**7**	**2**	0.11	0.50	0.96	0.03	0.01	1	45	50	6,950	**382**	780	Pk Hr	**367**	**11**	**4**
		WB		0.50				1			**242**	780	Pk Hr	**232**	**7**	**2**		0.50				1				**382**	780	Pk Hr	**367**	**11**	**4**
	West of I-40	EB	0.11	0.50	0.96	0.03	0.01	1	50	3,600	**198**	780	Pk Hr	**190**	**6**	**2**	0.11	0.50	0.96	0.03	0.01	1	45	50	6,400	**352**	780	Pk Hr	**338**	**11**	**4**
		WB		0.50				1			**198**	780	Pk Hr	**190**	**6**	**2**		0.50				1				**352**	780	Pk Hr	**338**	**11**	**4**
NC 86	North of I-40	NB	0.10	0.50	0.96	0.03	0.01	1	50	10,800	**540**	910	Pk Hr	**518**	**16**	**5**	0.10	0.50	0.96	0.03	0.01	1	45	50	12,500	**625**	910	Pk Hr	**600**	**19**	**6**
		SB		0.50				2			**540**	1,820	Pk Hr	**259**	**8**	**3**		0.50				2				**625**	1,820	Pk Hr	**300**	**9**	**3**
	Overpass at I-40	NB	0.10	0.50	0.96	0.03	0.01	1	50	20,900	1,045	**910**	LOS C	**874**	**27**	**9**	0.10	0.50	0.96	0.03	0.01	1	45	50	28,900	1,445	**910**	LOS C	**874**	**27**	**9**
		SB		0.50				2			**1,045**	1,820	Pk Hr	**502**	**16**	**5**		0.50				2				**1,445**	1,820	Pk Hr	**694**	**22**	**7**
	South of I-40	NB	0.09	0.50	0.96	0.03	0.01	2	50	31,000	**1,395**	1,820	Pk Hr	**670**	**21**	**7**	0.09	0.50	0.96	0.03	0.01	2	45	50	45,300	2,039	**1,820**	LOS C	**874**	**27**	**9**
		SB		0.50				2			**1,395**	1,820	Pk Hr	**670**	**21**	**7**		0.50				2				2,039	**1,820**	LOS C	**874**	**27**	**9**
US 15/501	East of I-40	EB	0.08	0.50	0.97	0.02	0.01	3	50	54,000	**2,160**	2,790	Pk Hr	**698**	**14**	**7**	0.08	0.50	0.97	0.02	0.01	3	45	50	68,200	**2,728**	2,790	Pk Hr	**882**	**18**	**9**
		WB		0.50				3			**2,160**	2,790	Pk Hr	**698**	**14**	**7**		0.50				3				**2,728**	2,790	Pk Hr	**882**	**18**	**9**
	Overpass at I-40	EB	0.08	0.50	0.97	0.02	0.01	3	50	49,800	**1,992**	2,790	Pk Hr	**644**	**13**	**7**	0.08	0.50	0.97	0.02	0.01	3	45	50	64,150	**2,566**	2,790	Pk Hr	**830**	**17**	**9**
		WB		0.50				3			**1,992**	2,790	Pk Hr	**644**	**13**	**7**		0.50				3				**2,566**	2,790	Pk Hr	**830**	**17**	**9**
	West of I-40	EB	0.08	0.50	0.97	0.02	0.01	2	50	45,600	**1,824**	1,860	Pk Hr	**885**	**18**	**9**	0.08	0.50	0.97	0.02	0.01	2	45	50	60,100	2,404	**1,860**	LOS C	**902**	**19**	**9**
		WB		0.50				2			**1,824**	1,860	Pk Hr	**885**	**18**	**9**		0.50				2				2,404	**1,860**	LOS C	**902**	**19**	**9**
SR 1006 (Orange Grove Road)	Overpass at I-40	NB	0.09	0.50	0.96	0.03	0.01	1	50	4,500	**203**	910	Pk Hr	**194**	**6**	**2**	0.09	0.50	0.96	0.03	0.01	1	45	50	6,800	**306**	910	Pk Hr	**294**	**9**	**3**
		SB		0.50				1			**203**	910	Pk Hr	**194**	**6**	**2**		0.50				1				**306**	910	Pk Hr	**294**	**9**	**3**

Appendix G. NCDOT Traffic Noise Policy

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

TRAFFIC NOISE POLICY

Effective Date: October 6, 2016

Noise Policy Committee:

Glenn Mumford, PE ....Roadway Design Unit
Drew Joyner, PE...............Human Environment Section
Brian Hanks, PE..............Structures Management Unit
Daniel Keel, PE................Division of Highways
Mike Mills, PE.................Division Engineer
Pat Ivey, PE.....................Division Engineer
Greg Smith, PE.................Human Environment Section

Sponsors:

Clarence Coleman, PE ....Federal Highway Administration
Felix Davila, PE................Federal Highway Administration
Edward L. Curran..............Board of Transportation

APPROVED BY:

10-6-16
Date of Approval

John F. Sullivan, III, PE, Division Administrator
Federal Highway Administration

10.6.16
Date of Approval

Nicholas J. Tennyson
Secretary of Transportation

10-6-16
Date of Approval

Edward L. Curran, Chairman
Board of Transportation

Person Responsible for Policy:

Traffic Noise & Air Quality Supervisor
Human Environment Section
1598 Mail Service Center
Raleigh, North Carolina 27699-1598
(919) 707-6087

DEFINITIONS

a) Decibel (dB) - The logarithmic unit for measuring sound pressure levels. For traffic noise measurements, decibels are most commonly reported in terms of the A-weighing frequency scale, which best includes the frequencies to which human hearing is typically most sensitive and is denoted by the abbreviation dB(A).

b) Leq – The equivalent steady -state sound level which, in a defined period of time, contains the same amount of acoustic energy as a time-varying sound level during the same period of time.

c) Receptor – Any location that receives traffic noise.

d) Impacted Receptor – A receptor for which the predicted hourly equivalent traffic noise level 1) meets or exceeds the approach criteria value found in Table 1 of this policy or 2) exceeds the existing ambient noise level by 10 dB(A) or more.

e) Benefited Receptor - All receptors, both impacted and non-impacted, that receive a noise level reduction of 5 dB(A) or more through placement of a noise abatement measure.

f) Noise Abatement Measure – Any method used to reduce traffic noise levels, such as noise walls and earthen berms.

g) Worst Noise Hour – The hour within a day in which the highest magnitude hourly equivalent sound level occurs. The worst traffic noise hour typically occurs when traffic is flowing freely at a high volume relative to the peak traffic hour volume, with a high percentage of trucks.

h) Practicable – Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

INTRODUCTION

This document represents the North Carolina Department of Transportation (hereinafter NCDOT) policy on highway traffic noise and construction noise and describes the implementation of the requirements of the Federal Highway Administration (hereinafter FHWA) Noise Standard at 23 Code of Federal Regulations Part 772 (23 CFR 772) as they relate to federal-aid and select state-funded highway construction in North Carolina. This policy was developed by the NCDOT and reviewed and approved by the FHWA.

The North Carolina Department of Transportation Traffic Noise Manual and 23 CFR 772 are intended to be companion documents to this policy.

PURPOSE

This policy describes the NCDOT process that is used in determining traffic noise impacts and abatement measures and the equitable and cost-effective expenditure of public funds for noise abatement. Where the FHWA has given highway agencies flexibility in implementing the 23 CFR 772 standards, this policy describes the NCDOT approach to implementation.

APPLICABILITY

Projects with a Date of Public Knowledge on or after the effective date of this policy shall comply with the criteria of this policy.

Federal–Aid Projects

This policy applies to all "Type I" federal or federal-aid highway projects in the State of North Carolina, including federal projects that are administered by local public agencies. Therefore, this policy applies to any highway project that is funded with federal-aid highway funds or requires FHWA approval regardless of funding sources. NCDOT does not participate in nor fund Type II (retrofit) projects along existing transportation facilities. Noise analyses are not required for Type III projects. Each of these project types are defined below. This policy shall be applied uniformly and consistently to all Type I federal projects throughout North Carolina.

Type I Project

(a) The construction of a highway on new location; or,

(b) The physical alteration of an existing highway where there is either:
   (i) Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,
   (ii) Substantial Vertical Alteration. A project that removes shielding, therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,

(c) The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,

(d) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,

(e) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,

(f) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,

(g) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

(h) If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project.

Type II Project.

A Federal or Federal-aid highway project for noise abatement on an existing highway. For a Type II project to be eligible for Federal-aid funding, the highway agency must develop and implement a Type II program in accordance with 23 CFR 772.7(e).

Type III Project

A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

The highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in 23 CFR 772 and this policy constitute the noise standards mandated by 23 U.S.C. 109(1). All federally-funded highway projects which are developed in conformance with this policy shall be deemed to be in accordance with the FHWA noise standards.

State-Funded Projects

Projects that are State funded do not use the federal project type designation for applicability.

This policy will apply to State funded projects located on a US or Interstate route that is full control of access where the project involves adding a through-traffic lane.

All other State-funded projects for which a State Environmental Assessment (EA) or State Environmental Impact Statement (EIS) is prepared will comply with the North Carolina Environmental Policy Act (SEPA) and the North Carolina Administrative Code. For these projects, noise barriers will be considered where practicable.

DATE OF PUBLIC KNOWLEDGE

The Date of Public Knowledge of the location and potential noise impacts of a proposed highway project is the approval date of the final environmental document, e.g., Categorical Exclusion (CE), State or Federal Finding of No Significant Impact (FONSI) or State or Federal Record of Decision (ROD).

NCDOT is not responsible for evaluating or implementing any noise barriers to protect developed lands that were not permitted before the Date of Public Knowledge.

The criterion for determining when undeveloped land is permitted for development is the approval date of a building permit for an individual lot or site. Approval of a development plat or any other development plan does not meet the permitted criteria.

NCDOT advocates use of local government authority to regulate land development, planning, design and construction in such a way that noise impacts are minimized.

TRAFFIC NOISE PREDICTION

All traffic noise analyses performed by or for NCDOT must utilize the most current version of the FHWA Traffic Noise Model (TNM®) or any other model determined by the FHWA to be consistent with the methodology of the TNM® model, pursuant to 23 CFR 772.9.

Average pavement type shall be used in the FHWA TNM® for future noise level prediction.

Noise contour lines may be used only for project alternative screening or for providing information to local officials for their land use planning efforts associated with undeveloped lands as per 23 CFR 772.17. Noise contours shall not be used for determining highway traffic noise impacts or assessing noise barriers.

Traffic characteristics that yield the worst noise hour equivalent traffic noise levels, expressed in Leq(h), for the Design Year shall be used in predicting noise levels and assessing noise impacts.

Traffic noise prediction must adhere to all direction contained in the NCDOT Traffic Noise Manual.

NOISE IMPACT DETERMINATION

Noise abatement measures for NCDOT highway projects must be considered when traffic noise impacts are created by either of the following two conditions:

(a) The predicted worst noise hour Leq(h) traffic noise levels for the Design Year approach (reach one decibel less than) or exceed the Noise Abatement Criteria (NAC) contained in 23 CFR 772 and in Table 1 of this policy, OR

(b) The predicted worst noise hour Leq(h) traffic noise levels for the Design Year substantially exceed existing noise by 10 dB(A) or more.

A receptor is a discrete or representative location within a noise sensitive area(s) for any of the land uses listed in Table 1. For multifamily dwellings, each residence shall be counted as one receptor when determining impacted and benefited receptors. Non-residential receptors shall be represented by Equivalent Receptors calculated according to direction contained in the NCDOT Traffic Noise Manual.

Primary consideration shall be given to exterior areas where frequent human use occurs in the determination of traffic noise impacts.

A traffic noise analysis shall be completed for each project alternative under detailed study and for all receptors and Equivalent Receptors defined to represent land use activities A, B, C, D, and E listed in Table 1 that are present in the study area. FHWA approval is required for designating a Category A Activity on federally-funded projects. Traffic noise analyses are not required for Activity Category F land uses. Noise predictions are required for Activity Category G land uses to the extent needed to develop estimated noise levels to provide to local officials for planning purposes.

Table 1			
Noise Abatement Criteria Hourly Equivalent A-Weighted Sound Level (decibels (dB(A))			
Activity Category	**Activity Criteria[1] Leq(h)[2]**	**Evaluation Location**	**Activity Description**
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67	Exterior	Residential
C [3]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section4(f) sites, schools, television studios, trails, and trail crossings
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E [3]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

[1] The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

[2] The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

[3] Includes undeveloped lands permitted for this activity category.

ANALYSIS OF NOISE ABATEMENT MEASURES

When traffic noise impacts are identified, noise abatement measures shall be considered and evaluated for feasibility for all impacted receptors and reasonableness for all benefited receptors. All of the following conditions must be met in order for noise abatement measures to be justified and incorporated into project design, as applicable. Failure to achieve any single element of feasibility or reasonableness will result in the noise abatement measure being deemed not feasible or not reasonable, whichever applies.

NCDOT will provide noise barriers for all possible impacted receptors that meet the feasibility and reasonableness criteria found in this policy. Noise barriers will not be extended solely to provide noise reduction for non-impacted receptors. Benefits for non-impacted receptors will only occur when they are incidental in noise barriers designed for impacted receptors.

Feasibility

The combination of acoustical and engineering factors considered in the evaluation of a noise barrier.

(a) Any receptor that receives a minimum noise level reduction of five dB(A) due to a noise barrier shall be considered a benefited receptor. Noise reduction of five dB(A) must be achieved for at least two impacted receptors.

(b) Engineering feasibility of noise barriers shall consider adverse impacts created by or upon property access, drainage, topography, utilities, safety, and maintenance requirements.

Reasonableness

The combination of social, economic, and environmental factors considered in the evaluation of a noise barrier.

(a) Property owners and tenants of all benefited receptors shall be solicited to obtain their preferences for or against a proposed noise barrier. No tenant ballots are distributed for vacant rental property. Points per ballot shall be distributed in the following weighted manner:

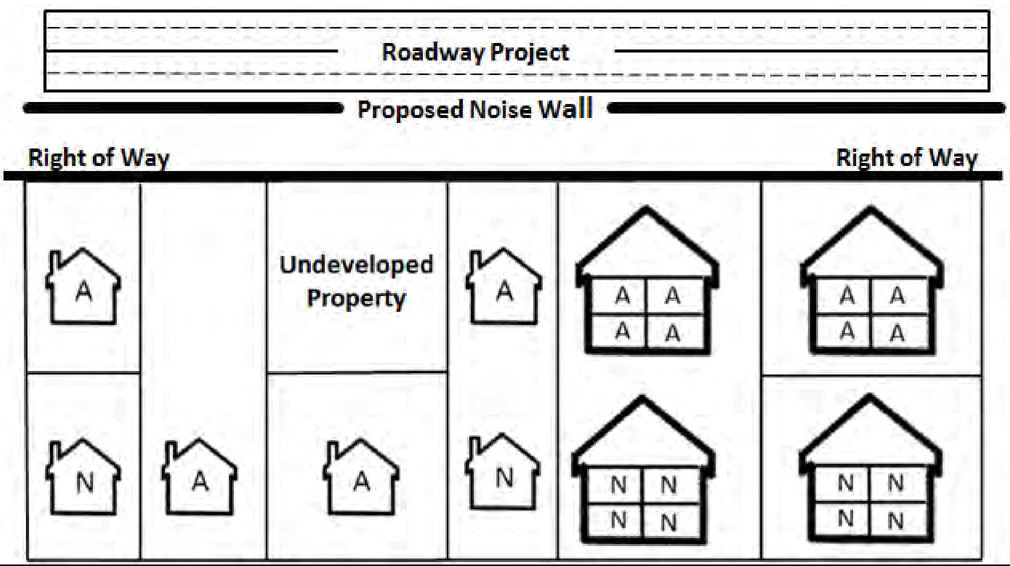
- 5 points/ballot for adjacent property owners who reside at property
- 4 points/ballot for adjacent property owners who rent property to others
- 3 points/ballot for all non-adjacent property owners who reside at property
- 2 points/ballot for all non-adjacent property owners who rent property to others
- 1 point/ballot vote for all tenants of rental property

Adjacent Receptor is a benefited receptor that 1) represents a property that abuts the highway right of way or 2) has no benefited receptor between it and the highway. Where multiple buildings containing benefited receptors are on the same property, such as an apartment or condominium complex, only the building closest to the highway is an adjacent receptor. Adjacent receptors will most often, but not always, be part of the front row of benefited receptors. Figure 1 provides graphic examples of Adjacent Receptors.

Owners of multi-unit rental locations will receive the applicable number of owner points for each individual benefited receptor (rental unit) owned.

Figure 1

Examples of Adjacent Receptors



A = Adjacent Receptor   N = Non-Adjacent Receptor
Undeveloped Property = Vacant property for which no building permit has been issued and is not a park or recreation area

If 50% or greater of all possible voting points from benefited receptors for each noise barrier are received on the first solicitation, a simple majority of voting points cast will be used to determine if the proposed noise barrier will be constructed.

If less than 50% of all possible points for each noise barrier are received on the first solicitation, a second solicitation will be sent to benefited receptors who did not respond to the first solicitation.

If a second solicitation is conducted and 50% or greater of all possible voting points for each noise barrier are received after the second solicitation, a simple majority of voting points cast will be used to determine whether or not the proposed noise barrier will be constructed.

If less than 50% of total possible points for a noise barrier are received after the second solicitation, the noise barrier will not be constructed.

Noise barriers will be constructed in the case of a tie (equal number of points for and against a noise barrier).

All balloting soliciting the viewpoints of benefited property owners and applicable residents/tenants that occurs after the effective date of this policy, regardless of the Date of Public Knowledge, shall comply with the criteria of this policy.

(b) The allowable quantities for noise barriers per benefited receptor, with allowances for incremental increases based upon existing and predicted noise levels of all impacted receptors within each noise study area, are shown in Table 2.

For the purpose of calculating the incremental increase, the Noise Abatement Criteria (NAC) values for Activity Categories A, B, C, D, and E, as shown in Table 1, are to be used and not the NCDOT "approach" values used in traffic noise impact determinations.

Table 2

Allowable Noise Barrier Base Quantities

Maximum Allowable Base Quantity	Noise Level Consideration	Noise Wall	Earthen Berm
		1,500 ft^2	4,200 yd^3
Average dB(A) Increase Between Existing and Future Build for All Impacted Receptors	< 5 dB(A)	+ 0 ft^2	+ 0 yd^3
	5-10 dB(A)	+ 500 ft^2	+ 1,400 yd^3
	> 10 dB(A)	+ 1,000 ft^2	+ 2,800 yd^3
Average Exposure to Absolute Noise Levels for All Impacted Receptors	< 5 dB(A) Over NAC Activity Category	+ 0 ft2	+ 0 yd^3
	5-10 dB(A) Over NAC Activity Category	+ 500 ft^2	+ 1,400 yd^3
	> 10 dB(A) Over NAC Activity Category	+ 1,000 ft^2	+ 2,800 yd^3

(c) A noise reduction design goal of at least 7 dB(A) must be evaluated for all benefited receptors. At least one benefited receptor must achieve the noise reduction design goal of 7 dB(A) to indicate the proposed noise barrier effectively reduces traffic noise.

Other Considerations

Prior to CE approval or issuance of a FONSI or ROD, NCDOT shall identify in all applicable environmental documents:

(a) Noise barriers that are feasible and reasonable,

(b) Noise impacts for which no noise barrier appears to be feasible and reasonable;

(c) Locations where noise impacts will occur, where noise barriers are feasible and reasonable, and the locations that have no feasible and reasonable noise barriers.

(d) Whether it is "likely" or "unlikely" that noise barriers will be installed for each noise sensitive area identified. "Likely" does not mean a firm commitment. The final decision on the installation of noise barriers shall be made upon completion of the project design, the public involvement process, compliance with the NCDOT Policy, and FHWA approval.

Third Party Participation

(a) Third party funding of noise barriers cannot be used to make up the difference between the reasonable quantity allowance and the actual quantity of noise barriers. Third party funding is allowed only by local, state and federal government agencies, and can only be used to pay for additional features such as landscaping and aesthetic treatments for noise barriers that meet all feasible and reasonable criteria previously detailed in this policy. Private parties may freely enter into agreements with government agencies to develop noise barrier enhancements; however, all funding for enhancements paid to NCDOT must come from government agencies

(b) Traditional highway construction resources pay for required noise barriers. Should a local government request that materials be used that are more costly than the standard materials proposed by NCDOT, the requesting entity must assume 100% of the actual additional construction cost.

(c) If a local government insists on the provision of a noise barrier deemed not reasonable by NCDOT, a noise barrier may be installed provided the local government assumes 100% of the costs and obtains an encroachment permit from NCDOT to perform the work. These costs include, but are not limited to, preliminary and final engineering, actual construction and all related maintenance. In addition, local governments must ensure that NCDOT's material, design and construction specifications are met. The local government must also assume 100% of the liability associated with the measure and hold harmless the NCDOT.

(d) For (b) and (c) above, the settlement agreement shall be signed before third party noise barrier design begins and payment shall be made to NCDOT in accordance with N.C.G.S. 136-66.3(e).

ARCHITECTURAL TREATMENT OF NOISE WALLS

The standard noise wall architectural treatment consists of:

(a) Concrete columns; Steel piles may be used when necessary to address site conditions adverse to the use of concrete columns;

(b) Precast concrete panels textured on both sides;

(c) No texture on the uppermost foot of each wall segment;

(d) A single color of stain in brown or gray tones applied to both sides of textured panels;

(e) No stain applied to the uppermost foot of each wall segment and the concrete columns.

All enhancements to this standard noise wall must be paid for in accordance with Third Party Participation provisions in this policy.

NCDOT Division Engineers are responsible for determining noise wall textures and colors in their respective Divisions.

PUBLIC INVOLVEMENT

Communication with the community regarding noise impacts and possible noise abatement shall occur at the start of the noise study process and continue throughout the development of the project. NCDOT will communicate with citizens to present information on the nature of highway traffic noise and discuss the effects of noise abatement and how public preferences for noise abatement is solicited via a balloting process.

Noise study areas showing “likely” noise barriers and/or proposed locations of any “recommended” noise barriers will be presented and discussed when holding Public Hearings and Public Meetings. Likely noise barriers are based on preliminary design traffic noise analyses and are described in environmental documents. Recommended noise barriers are based on final design noise analyses and are usually identified after the environmental document is completed. Property owners and tenants who are being balloted for a recommended noise barrier will be provided a visual of the noise barrier location prior to their casting a ballot.

COORDINATION WITH LOCAL OFFICIALS

NCDOT will provide all traffic noise analyses to local government officials within whose jurisdiction a highway project is proposed as early in the project planning process as possible to protect future development from becoming incompatible with traffic noise levels. Specifically, environmental documents and design noise reports will contain information identifying areas that may be impacted by traffic noise, predicted noise level contour information, the best estimation of future noise levels for developed and undeveloped lands or properties in the immediate vicinity of the project and other appropriate design information. If requested, NCDOT will assist local officials with coordination and distribution of this information to residents, property owners and developers. NCDOT will provide information to assist local jurisdictions in the development of local noise controls, when requested. NCDOT strongly advocates the planning, design and construction of noise-compatible development and encourage its practice among planners, building officials, developers and others.

CONSTRUCTION NOISE

To minimize the impacts of construction noise on the public, NCDOT shall:

(a) Identify land uses or activities that may be affected by noise from construction of the project.

(b) Determine the measures that are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community. This determination shall consider the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the abatement measures.

(c) Consider construction techniques and scheduling to reduce construction noise impacts to nearby receptors and incorporate the needed abatement measures in the project plans and specifications.

FEDERAL PARTICIPATION

The costs of noise barriers may be included in federal-aid participating project costs with the federal share being the same as that for the system on which the project is located when:

(a) Traffic noise impacts have been identified; and

(b) Noise barriers have been determined to be feasible and reasonable pursuant to 23 CFR 772 and this policy.

REVIEW OF POLICY

This policy shall be reviewed by the NCDOT Board of Transportation at least every five years.