

**Preliminary Noise Analysis
Technical Report
I-81 Widening Project, MM 136-142**

**From: Fort Lewis Boulevard
To: 0.3 mi. north of Route 419 Overpass**

UPC 116203

Project Number: 0081-80-946

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EXECUTIVE SUMMARY

This report describes the details of a noise impact assessment and preliminary noise abatement evaluation performed for the Interstate 81 MM 136-142 Widening project within the City of Salem and Roanoke County, Virginia. The noise analysis was conducted in accordance with Federal highway Administration (FHWA) and Virginia Department of Transportation (VDOT) noise assessment regulations and guidelines, both of which were revised and updated significantly in 2011. The FHWA regulations are set forth in 23 CFR Part 772. VDOT’s revised policy was updated most recently on February 20, 2018.

The I-81 Widening project will increase capacity on I-81 by adding one 12-foot-wide through lane in each direction between mile marker 136.6 and Exit 141 in Roanoke County. Additional activities include the installation of median barrier, drainage system improvements and bridge replacements or bridge rehabilitations. The Route 705 (Red Lane) and Route 419 (Electric Road) bridges over I-81 will require pier protection. The I-81 northbound and southbound bridges over Route 311 (Thompson Memorial Drive) will be widened in place. The I-81 northbound and southbound bridges over Route 635 (Goodwin Avenue) and Route 619 (Wildwood Road) will be full structure replacements.

The study used noise monitoring data and existing traffic noise models created within the FHWA-approved Traffic Noise Model. This information was prepared in 2015 for the *VDOT I-81 Corridor Improvement Study, SIU#4 Tier 2 EA Preliminary Noise Analysis*, and were used to assist with modeling existing and future noise levels for this project. The modeling of existing (2019) and design year (2043) No-build and Build noise conditions in the study area accounted for the existing terrain and buildings, and for existing and proposed roadways with projected loudest-hour traffic. Noise impact was assessed for all project alternatives and is summarized by FHWA land use activity category in the table below. Traffic noise projections are preliminary and will be reevaluated during the final design noise analysis.

Noise Impact Summary

Alternative	Impact Type	Number of Impacted Units by Land Use and FHWA Activity Category ¹				
		Residential Exterior (B)	Recreational Exterior (C)	Institutional Interior (D)	Commercial Exterior (E)	Total
Existing	NAC	164	5	0	0	169
No-Build	NAC	211	7	0	0	218
Build	NAC	253	7	0	1	261

Source: HMMH, 2020

Notes:

1.) The FHWA Activity Category is shown in parenthesis.

Noise abatement must be considered where noise impact is predicted to occur with the 2043 Build alternative. Noise abatement is evaluated to determine if it is warranted, feasible and reasonable. The following table summarizes the total length, estimated cost and benefits that would be provided by the potential noise barriers evaluated that were evaluated in this study.

Summary of Potential Noise Barriers

Barrier ID	Number of Impacted Receptors	Impacted & Benefited Receptors	Non-Impacted & Benefited Receptors	Noise Barrier Parameters				Surface Area/Benefited Receptor (SF/BR) ¹	Barrier Status ²
				Length (feet)	Height (feet)	Surface Area (sq feet)	Cost at \$42/sq ft		
Barrier A	13	4	6	2,148	30	64,375	\$2,703,750	6,438	NF
Barrier B	17	15	9	2,596	18-26	62,700	\$2,633,400	2,613	F & NR
Barrier C	17	14	1	2,104	30	63,078	\$2,649,276	4,205	F & NR
Barrier D-E-F-G-I	99	95	138	11,191	26	290,911	\$12,218,262	1,249	F & R
Barrier H	12	11	10	3,713	20	74,231	\$3,117,702	3,535	F & NR
Barrier I-K	36	31	25	3,462	16	55,360	\$2,325,120	989	F & R
Barrier J	9	9	17	2,481	18-21	49,774	\$2,090,508	1,914	F & NR
Barrier L-N	5	3	6	3,755	30	112,594	\$4,728,948	12,510	F & NR
Barrier M	8	6	0	1,683	30	50,528	\$2,122,176	8,421	F & NR
Barrier Q	15 (43) ³	14	19	2,409	30	72,211	\$3,032,862	2,188	F & NR
Barrier R	2	2	1	1,666	30	49,961	\$2,098,362	16,654	F & NR

Source: HMMH, 2020

Notes:

- 1.) Where SF/BR exceeds VDOT's maximum of 1600, a noise barrier would not be considered cost-reasonable.
- 2.) Barrier Status: F & R = Feasible and Reasonable; F & NR = Feasible and Not Reasonable; NF = Not Feasible.
- 3.) Number in parentheses indicates total impacts, including those above the line of intersection with a 30-ft barrier. Numbers of impacts and benefits for this barrier not in parentheses are below the line of intersection and considered in the feasibility and reasonableness evaluation.

This report presents the results of a preliminary noise evaluation; a more detailed review will be completed during the final design of the Project. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis. Conversely, noise barriers that were not considered feasible and reasonable may meet the established criteria and be recommended for construction.

Construction activity may cause intermittent fluctuations in noise levels. During the construction phase of the project, all reasonable measures will be taken to minimize noise impact from these activities.

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1 INTRODUCTION

1.1 Background and Purpose

The Federal Highway Administration (FHWA) regulations for mitigation of highway traffic noise in the planning and design of federally aided highway projects are contained in Title 23 of the United States Code of Federal Regulations Part 772 (23 CFR 772). These regulations state that a “Type I” traffic noise impact analysis is required when there is the addition of through-traffic lanes or ramps in an interchange. The methods and procedures used in this preliminary noise impact evaluation are consistent with the latest noise assessment policies issued by FHWA and the Virginia Department of Transportation (VDOT); VDOT’s Highway Traffic Noise Impact Analysis Guidance Manual was updated most recently on February 20, 2018.

This report presents a summary of the roadway improvements under study, description of noise terminology, the applicable standards and criteria, an evaluation of the existing noise conditions, a description of the computations of existing and future noise levels, a prediction of future noise impact, an evaluation of potential noise abatement measures, construction noise considerations, and information for local government officials. Appendix A presents predicted noise levels, Appendix B tabulates the traffic data used in the noise modeling, Appendix C presents the response from VDOT project management on alternative noise abatement measures, Appendix D presents VDOT’s Warranted, Feasible and Reasonable barrier worksheets, and Appendix E provides the list of preparers.

1.2 Project Description

The project will increase capacity on I-81 by adding one 12-foot-wide through lane in each direction between mile marker 136.6 and Exit 141 in Roanoke County. Additional activities include the installation of median barrier, drainage system improvements and bridge replacements or bridge rehabilitations. The Route 705 (Red Lane) and Route 419 (Electric Road) bridges over I-81 will require pier protection. The I-81 northbound and southbound bridges over Route 311 (Thompson Memorial Drive) will be widened in place. The I-81 northbound and southbound bridges over Route 635 (Goodwin Avenue) and Route 619 (Wildwood Road) will be full structure replacements.

1.3 Study Area Description and Land Use

Noise sensitive land uses in the project study area include single- and multi-family residences along both sides of I-81, Salem High School football field and track, the Church of Christ of Westside, the Fellowship Community Church, and several hotels with outdoor use. Following VDOT and FHWA policies and procedures, the receptors used in the model to represent exterior activity areas at noise-sensitive land uses were grouped into Common Noise Environments (CNEs). Receptors in a CNE are exposed to similar noise sources and levels and generally occur between secondary noise sources, such as cross-streets. The modeled receptors for the Project were grouped into the CNEs listed below. Figure 1 shows the locations of the CNEs on an overview map of the study area.

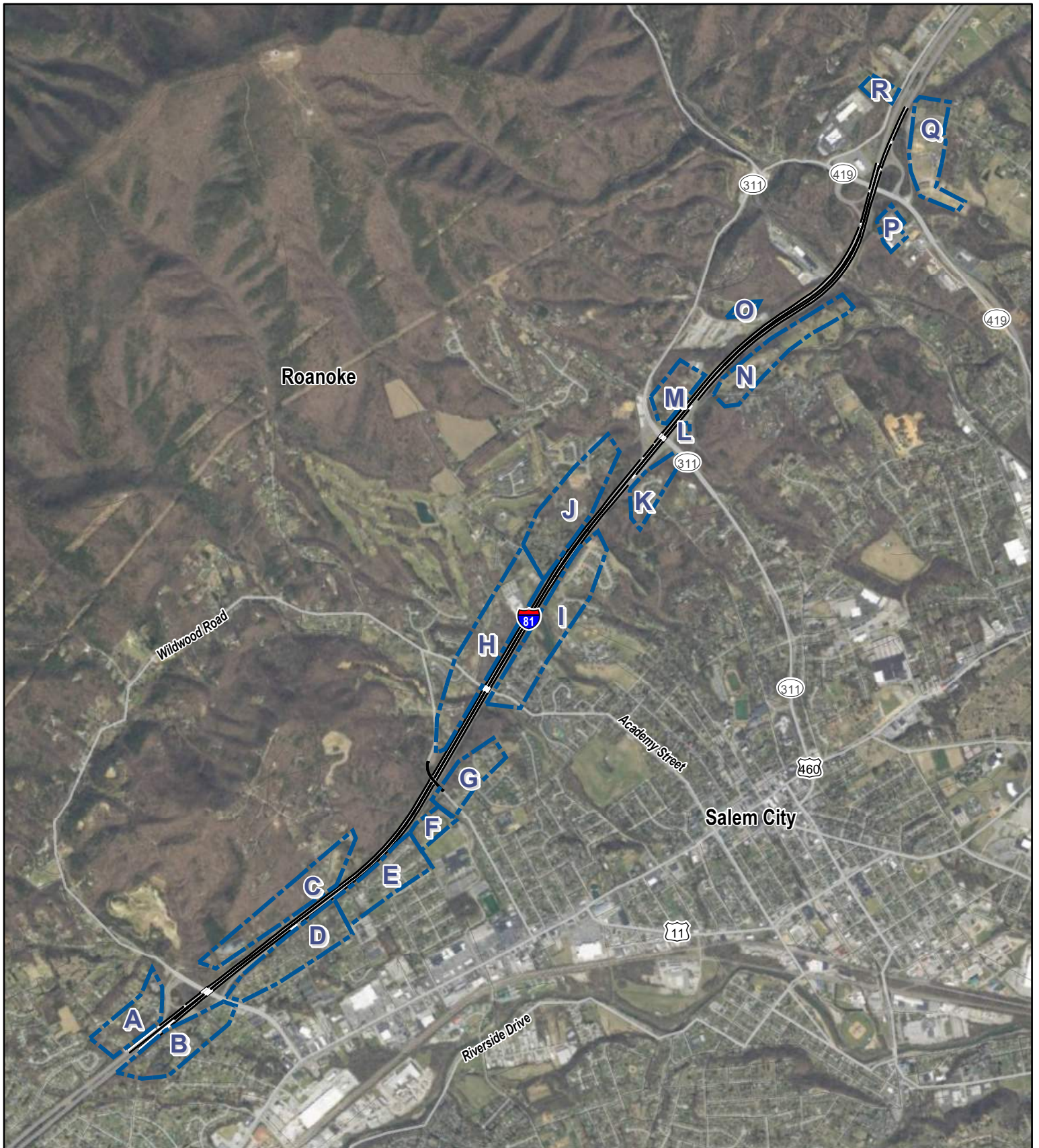
- CNE A is located near the southern project limit, on the west side of I-81, between Fort Lewis Boulevard and Wildwood Road (Route 112). It consists of single-family residential use

as well as the Hampton Inn Salem. Future Build noise impacts are predicted to residential land use in this CNE.

- CNE B is located near the southern project limit, on the east side of I-81. It is located between Fort Lewis Boulevard and Wildwood Road (Route 112) and comprised of single-family residential land use, where future Build noise impacts are predicted.
- CNE C is located on the west side of I-81 and includes single-family homes and the Howard Johnson hotel along Skyview Road. Future noise impacts are predicted to both the residential and commercial recreational land use in this CNE.
- CNE D is located on the east side of I-81 between Wildwood Road (Route 112) and Turner Road. This CNE includes single-family residential land use where future noise impacts are predicted.
- CNE E is located on the east side of I-81 and extends north from Turner Road to the property line of Salem High School. CNE E includes single-family residential land use as well as the Church of Christ of Westside. Future Build noise impacts are predicted to the residential land use in this CNE.
- CNE F is located east of I-81 and includes Salem High School's football field and track, which is predicted to be impacted in the future Build alternative.
- CNE G is also located east of I-81 and includes single-family residential land use between Goodwin Avenue (Route 635) and Pendleton Drive. The future Build alternative is predicted to result in noise impacts in this CNE.
- CNE H is located to the west of I-81 and includes single family homes scattered through Goodwin Avenue, Wildwood Road (Route 619), Waldheim Road, and Red Lane. The Fellowship Community Church, located south of Red Lane, is also included within CNE H. Future Build noise impacts are predicted to residential land use in this CNE.
- CNE I includes single-family land use and is located to the east of I-81. CNE I begins at Academy Street and extends north, up to and including residences within the North Oaks community. The future Build alternative is predicted to result in noise impacts in this CNE.
- CNE J is located to the west of I-81 and includes single-family residences between Red Lane and Thompson Memorial Drive (Route 311). Future Build noise impacts are predicted in this CNE.
- CNE K includes single-family residences to the east of I-81, between Walnut Road and Thompson Memorial Drive (Route 311). Some residences are predicted to be impacted by noise in the future Build alternative.
- CNE L is located to the east of I-81 and includes one single-family residence along Freedman Lane, adjacent to the on-ramp from Thompson Memorial Drive (Route 311) to I-81 northbound. The residence is predicted to be impacted under the future Build alternative.
- CNE M includes single-family residences along Deborah Lane, located to the west of I-81, directly north of Thompson Memorial Drive (Route 311). Future Build noise impacts are predicted to some residential land use in this CNE.

- CNE N extends from north of Thompson Memorial Drive (Route 311) to Kessler Mill Road, east of I-81 and consists of single-family residential land uses, some of which would be impacted by noise under the Build alternative.
- CNE O is located to the west of I-81 and includes single-family residences along Dalmation Lane. No noise impacts are predicted in this CNE under the future Build alternative, therefore no further analysis is required.
- CNE P is located to the east of I-81 and includes the Baymont by Wyndham Hotel and Fairfield Inn and Suites on Sheraton Drive. No noise impacts are predicted in this CNE under the future Build alternative, therefore no further analysis is required.
- CNE Q is located directly north of North Electric Road (Route 419) and includes The Retreat Apartments community and single-family residences along Cove Road. The Retreat Apartments community is being developed in phases and at the time of this study, consists of eight residential buildings and one clubhouse already constructed. The remaining four residential buildings are permitted to be constructed on the south side of Rolling Brook Road. Noise impacts are predicted in this CNE under the future Build alternative.
- CNE R is located to the west of I-81 and includes single-family land use on Louise Wells Drive, north of North Electric Road (Route 419). Noise impacts are predicted in this CNE under the future Build alternative.

Figure 1 provides an overview map of the study area that shows the locations of the CNEs.




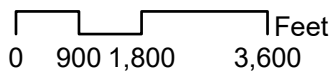
 CNE Boundary

Figure 1
Locations of Common Noise Environments

I-81 Widening Project
 City of Salem and Roanoke County, VA



2 NOISE ABATEMENT CRITERIA AND DESIGN GOALS

2.1 Regulations and Guidelines

The potential noise impact of the I-81 Widening Project was assessed in accordance with FHWA and VDOT noise assessment regulations and guidelines. The FHWA regulations are set forth in 23 CFR Part 772. On July 13, 2010, FHWA published revised noise regulations which became effective on July 13, 2011. FHWA has also published a guidance document to support the new regulations. VDOT prepared revisions to its noise policy in accordance with FHWA's requirements and revised policy. VDOT's revised policy has received approval from FHWA and was last updated on February 20, 2018.

2.2 Noise Abatement Criteria

To assess the degree of impact of highway traffic and noise on human activity, the FHWA established Noise Abatement Criteria (NAC) for different categories of land use activity (see Table 1). The NAC are given in terms of the hourly, A-weighted, equivalent sound level in decibels (dBA). The A-weighted sound level is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response to noise because the sensitivity of human hearing varies with frequency. The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise. Most environmental noise (and the A-weighted sound level) fluctuates from moment to moment, and it is common practice to characterize the fluctuating level by a single number called the equivalent sound level (L_{eq}). The L_{eq} is the value or level of a steady, non-fluctuating sound that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, L_{eq} is typically evaluated over a one-hour period and may be denoted as $L_{eq}(h)$.

In this study, residential areas (Activity Category B), recreational areas (Activity Category C), institutional interior spaces (Activity Category D), and commercial recreation areas (Activity Category E) were evaluated for noise impact. For Categories B and C, noise impact would occur when predicted exterior noise levels, due to the project, approach or exceed 67 dBA in terms of $L_{eq}(h)$ during the loudest hour of the day. For Category D, noise impact would occur where predicted interior sound levels due to the project approach or exceed 52 dBA $L_{eq}(h)$. For Category E, noise impact would occur where predicted exterior sound levels due to the project approach or exceed 72 dBA $L_{eq}(h)$. VDOT defines the word "approach" in "approach or exceed" as within 1 decibel. Therefore, the threshold for noise impact is where exterior noise levels are within 1 decibel of 67 dBA $L_{eq}(h)$, or 66 dBA. Noise impact also would occur wherever project noise causes a substantial increase over existing noise levels. VDOT defines a substantial increase as an increase of 10 decibels or more above existing noise levels.

Table 1 FHWA Noise Abatement Criteria

Activity Category	L_{eq}(h)¹	Description of Activity Category
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 ²	67 (Exterior)	Residential
C ²	67 (Exterior)	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care 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 ²	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 (without building permits)

¹ Hourly Equivalent A-weighted Sound Level (dBA)
² Includes undeveloped lands permitted for this activity category
 Source: 23 CFR Part 772.

When the predicted design-year Build case noise levels approach or exceed the NAC during the loudest hour of the day or cause a substantial increase in existing noise, consideration of traffic noise reduction measures is necessary. If it is found that such mitigation measures will cause adverse social, economic or environmental effects that outweigh the benefits received, they may be dismissed from consideration. For this study, noise levels throughout the study area were determined for Existing (2019) conditions and the design-year (2043) No-build and Build alternative.

All noise-sensitive land uses potentially affected by the project are near roads for which traffic data was developed as part of the environmental study. Therefore, all noise levels were computed from the appropriate loudest-hour traffic data. The prediction methods and predicted noise levels appear in Section 4.

3 EXISTING NOISE CONDITIONS

This section of the report describes the noise monitoring program and the investigation of undeveloped lands and permitted developments.

3.1 Monitoring of Existing Noise Levels

A noise monitoring program conducted as part of the *I-81 Corridor Improvement Study, SIU#4* in 2015 was utilized to represent existing conditions for this project. This approach is appropriate for the current project for several reasons. First, the noise measurements were conducted recently enough to be representative of current geometric and traffic conditions. Second, there were enough sites chosen in the current project’s study area to be sufficiently representative. And third, the results of the noise measurements were found to validate well with the noise prediction model subsequently developed for the study area. The validation exercise is described in Section 4.2.

The noise levels from the 2015 noise study were also used for validation of the traffic noise model in the previous study. Of the 33 noise measurements documented in 2015, 11 are within the project extents of the I-81 MM 136-142 Widening Project. Figure 2 presented in Section 6 shows the locations of the 2015 noise measurement sites within the project study area. The short-term noise monitoring locations are shown in the study area graphic, and numbered with the prefix “M.”

The measured noise levels obtained in 2015 located within the current project’s I-81 Widening study area appear in Table 2 as equivalent sound levels (L_{eq}). As described above, the L_{eq} is a sound-energy average of the fluctuating sound level (in A-weighted decibels, dBA) measured over a specified period of time. The measurement period duration was 15 minutes.

As shown in Table 2, the Total L_{eq} noise levels documented in 2015 ranged from a low of 55 dBA at Site M16 to a high of 74 dBA at Site M14. The locations of the measurement sites are shown in Figure 2, presented in Section 6.

Table 2 Monitored Noise Levels (2015)

Site No.	Monitored Total L_{eq} (dBA)
MR14	74
MR15	66
MR16	55
MR17	62
MR18	62
MR24	59
MR25	65
MR26	58
MR27	64
MR28	56

Source: VDOT *I-81 Corridor Improvement Study, SIU#4 Tier 2 Environmental Assessment Preliminary Noise Analysis, November 2015.*

3.2 Predicted Existing Noise Levels

For calculation of loudest-hour noise levels throughout the study area, many additional receiver locations were added to the measurement sites in the noise prediction model to provide a comprehensive basis of comparison for the analysis of noise impacts from the existing and future project conditions. Using the appropriate loudest-hour traffic data, existing and future traffic noise levels were predicted for the measurement sites and the additional receiver locations. The computation methods and predicted noise levels are presented in the next section of this report.

The noise measurements provided valuable information on current noise conditions and the effects of terrain and shielding on sound propagation from the roadway to the nearby residential land uses. However, because existing noise levels are not always measured during the loudest hour of the day, estimates of the loudest-hour existing noise levels were computed with an FHWA-approved noise prediction model using the appropriate traffic data as input. These predicted estimates of existing noise levels for the loudest hour of the day are then used as the baseline against which probable future noise levels are compared and potential noise impacts assessed. Additional information on the computation methods and computed levels used in this study are provided in Section 4.

3.3 Undeveloped Lands and Permitted Developments

Highway traffic noise analyses are (and will be) performed for developed lands as well as undeveloped lands if they are considered “permitted.” Undeveloped lands are deemed to be permitted when there is a definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of at least one building permit.

In accordance with the VDOT Traffic Noise Policy, an undeveloped lot is considered to be planned, designed, and programmed if a building permit has been issued by the local authorities prior to the Date of Public Knowledge for the relevant project. VDOT considers the “Date of Public Knowledge” as the date that the final National Environmental Protection Act (NEPA) approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after this date.

Noise-sensitive land uses within the study corridor were identified with active building permits. The land uses were identified from information received from Roanoke County Development Services and the City of Salem Department of Community Development. Within Roanoke County, one such land use with active building permits was identified. The Retreat Apartments community located along Cove Road (in CNE Q), has ongoing construction of residences on the property. Construction plans received from the County show twelve residential structures and a clubhouse are proposed for this development. As of this study, eight of the twelve apartment buildings as well as the clubhouse have been completed under a previous construction phase. For the remaining four residential buildings proposed along Rolling Brook Road, a building permit was issued by the County and is currently active. These proposed buildings were treated as Category B receptors in this report.

Responses to a memo detailing land uses with active building permits within the City of Salem were received from the director of the City’s Department of Community Development, Charles E. VanAllman, Jr., on July 28, 2020. The City identified building permits on file for construction of new

residences in the noise study area at the following addresses: 108 North Oaks (CNE I), 1717 Walden Circle (CNE K), 204 Northern Trail (CNE N). These locations were treated as Category B receptors in this report.

4 TRAFFIC NOISE PREDICTION

This section discusses the noise prediction model, the model validation process, traffic data used as input to the noise prediction model, and then presents a summary of the predicted noise levels.

4.1 Noise Prediction Model

HMMH used the latest version of the FHWA’s Traffic Noise Model (TNM Version 2.5) to compute existing and future Build case loudest-hour noise levels and develop the preliminary heights, lengths and locations for all potential noise barriers along the project corridor. TNM incorporates state-of-the-art sound emissions and sound propagation algorithms, based on well-established theory or on accepted international standards. The acoustical algorithms contained within the FHWA TNM have been validated with respect to carefully conducted noise measurement programs and show excellent agreement in most cases for sites with and without noise barriers.

Available aerial photography from ESRI ArcGIS, topographic information from Roanoke County and Salem City Open Data platforms, and VDOT-provided Microstation files were used to update the existing validated model developed for the *I-81 Corridor Improvement Study Preliminary Noise Analysis* in 2015. The modified model includes an updated receiver set and areas where new structures were built to provide a more accurate representation of existing conditions. The noise modeling also accounts for such factors as propagation over different types of ground (acoustically soft and hard ground), elevated roadway sections, significant shielding effects from local terrain and structures, distance from the road, traffic speed, and hourly traffic volumes including percentage of medium and heavy trucks. To fully characterize existing and future noise levels at all noise-sensitive land uses in the study area, over 480 noise prediction receivers (also called “receptors” and “sites”) were added to the modeling. TNM runs are available upon request.

Information on noise-sensitive residential land use in the study area (Activity Category B) includes the number of dwelling units, identified from existing mapping and publicly available parcel data from the City of Salem and Roanoke County.

4.2 Noise Model Validation

According to FHWA and VDOT policies, the accuracy of the noise prediction model must be verified on a project-by-project basis. The noise model validation process compares existing noise levels monitored in the field with predicted noise levels from the FHWA TNM using the traffic conditions during the monitoring period as input to the model. The purpose of the noise model validation is to evaluate the success of the model in representing the important acoustical characteristics of the study area. This is determined by examining the overall trend of the differences between measured and predicted noise levels at each measurement site. Individual site to site differences may vary significantly, depending on factors that may affect either the measured noise level or the predicted noise level at a given site. Examples of factors that affect noise levels are provided below:

- Factors affecting measured noise levels include: atmospheric conditions (upwind, neutral or downwind conditions), shielding by structures that are difficult to model, and/or the presence of “loud” vehicle pass-bys during the measurement.

- Factors affecting predicted noise levels include: the level of detail in modeling terrain features and locating receptors, as well as the degree to which ground zones, tree zones, and sparse rows of buildings are incorporated into the model.

FHWA and VDOT consider the noise model to be validated when measured noise levels are within +/- 3 dBA of predicted noise levels for existing conditions.

FHWA discourages the “calibration” of a noise model through the use of adjustment factors within the noise model to match measured and predicted levels. FHWA recognizes that many factors are present both in the measurement of noise and in the development of a model that can lead to variability. Differences between measured and predicted levels that are outside the accepted accuracy of the model are likely due to unusual circumstances during the measurements, or to insufficient detail or inaccurate assumptions in the model. Only after a thorough examination of the measurement conditions and the modeling assumptions has been completed, should the highway noise analyst consider the use of adjustment factors in the model. FHWA recognizes that in some cases, it may not be possible to identify a specific reason for not validating a specific measurement site. Any such cases are to be documented in the noise study report.

With guidance from VDOT, previously validated and approved traffic noise models developed during the *VDOT I-81 Corridor Improvement Study Preliminary Noise Analysis* conducted in 2015, were used to model the Existing and design year No-build and Build conditions. Models were updated as needed to include additional elements, such as newly built structures in the study area that did not exist previously. Table 3 presents a site-by-site comparison of measured noise levels and the corresponding TNM-computed noise levels from the preliminary noise study and the CNE location of the measurement sites, relative to this project. All the sites show differences less than 3 decibels, so the model had been appropriately validated.

Table 3 Computed vs. Measured Sound Levels at Measurement Sites (2015)

Site No.	CNE*	Monitored Leq (dBA)	TNM- Computed Leq (dBA)	Difference (dB) (computed <i>minus</i> monitored)
MR14	C	73.8	74.7	0.9
MR15	E	65.6	67.8	2.2
MR16	G	54.6	56.9	2.3
MR17	I	61.8	62.6	0.8
MR18	N	61.9	63.3	1.4
MR24	M	59.1	61.9	2.8
MR25	J	64.6	66.6	2.0
MR26	H	57.7	57.7	0.0
MR27	C	64.0	62.8	-1.2
MR28	A	55.7	58.6	2.9

*CNE location relative to this project.

Source: *VDOT I-81 Corridor Improvement Study, SIU#4 Tier 2 Environmental Assessment, Preliminary Noise Analysis, November 2015.*

4.3 Traffic Data for Noise Prediction

The traffic data used in the noise analysis must produce sound levels representative of the loudest hour of the day in the future design year, per FHWA and VDOT policy. Traffic data were supplied by VDOT for the 2019 existing and design year of 2043 for I-81, ramps, and major arterials (Wildwood Road, Academy Street, Thompson Memorial Drive, N. Electric Road). Average Daily Traffic (ADT), AM and PM peak hour volumes and truck mix were provided for existing conditions. ADT was provided for Design Year 2043, and the peak hour volumes were developed from the same growth factors used for the ADTs. Truck mix was assumed to be the same for existing and future conditions. The loudest hour was determined to be the PM Peak Hour for all sections of I-81, since volumes were consistently higher during the PM peak hour, and truck mix and speeds did not vary between the two peak hours. Appendix B provides the loudest-hour traffic data for the roadways used in the TNM for this project.

4.4 Presentation of Results

The study area includes exterior residential (Category B), exterior recreational (Category C), interior institutional (Category D), and exterior commercial (Category E) land uses.

Table 4 summarizes the range of predicted noise levels by CNE. The table includes a description of each CNE and its land use, the FHWA Activity Category, and the loudest-hour traffic noise levels, which are presented in terms of the A-weighted equivalent sound level, or L_{eq} , in dBA. Loudest-hour noise levels were computed for 2019 Existing conditions, as well as the design-year (2043) No-Build and Build alternatives. Exterior sound levels are shown for Activity Category B, C and E land uses. Predicted interior sound levels are shown for Category D institutional land uses. All of the noise-sensitive institutional facilities identified in the study area (Church of Christ of Westside and Fellowship Community Church), appear to have air conditioning and masonry construction. Therefore, per FHWA guidance, an outside-to-inside noise reduction value of 25 decibels is used to determine the interior sound levels from the exterior sound levels predicted by TNM. Appendix A provides a table that list the computed sound levels at all the modeled receptors included in the noise assessment.

Figure 2, presented in Section 6 provides a location map for the CNEs, noise-sensitive receptors, the location of the 66 dBA L_{eq} “contour” for the 2043 Build alternative, and the locations of potential noise barriers. Each receptor is shown in Figure 2 with a color-coded dot that indicates the status of each receptor according to its 2043 Build noise level, both with and without a noise barrier. The color code and corresponding receptor status are as follows:

- Light blue - impacted (without noise barrier) and 5 or 6 dBA of insertion loss (with noise barrier);
- Dark blue - impacted (without noise barrier) and 7 dBA or more of insertion loss (with noise barrier);
- Red - impacted (without noise barrier) and not benefited, i.e. less than 5 dBA of insertion loss (with noise barrier);
- Green - not impacted (without noise barrier) and benefited (with noise barrier); and
- Yellow - not impacted (without noise barrier) or benefited (with noise barrier).

Table 4 Ranges of Predicted Exterior & Interior Noise Levels for the Worst Hour

CNE	Land Use – Description	Activity Categories	Range of Predicted Exterior & Interior Noise Levels for the Worst Hour (dBA)		
			2019 Existing	2043 No-Build	2043 Build
A	Residential, Commercial – west side of I-81, between Fort Lewis Blvd. and Wildwood Rd.	B and E	56 - 74	56 – 75	57 - 75
B	Residential – east side of I-81, between Fort Lewis Blvd. and Wildwood Rd.	B	57 - 75	57 – 75	58 - 77
C	Residential, Commercial – single-family residential, Howard Johnson Hotel: west side of I-81, along Skyview Rd	B and E	60 - 77	61 – 78	61 - 78
D	Residential – east side of I-81, between Wildwood Rd and Turner Rd	B	57 - 71	58 – 73	59 - 74
E	Residential, Institutional – single-family residential and the Church of Christ of Westside: east side of I-81, between Turner Rd and property line of Salem High School	B and D	40 - 75	41 – 76	41 - 77
F	Institutional – Salem High School football field and track: east side of I-81	C	60 - 70	61 – 71	61 - 72
G	Residential – east side of I-81, between Goodwin Ave and Pendleton Dr	B	55 - 73	57 – 74	57 - 75
H	Residential, Institutional – single-family residential and the Fellowship Community Church: west side of I-81 on Goodwin Ave, Wildwood Rd, Waldheim Rd, and Red Ln	B, C and D	35 - 73	37 – 74	38 - 75
I	Residential – east of I-81, from Academy St to Stonegate Dr	B	51 - 76	52 – 77	53 - 77
J	Residential – west side of I-81, between Red Ln and Thompson Memorial Dr	B	54 - 72	55 – 73	56 - 74
K	Residential – east side of I-81, between Walnut Rd and Thompson Memorial Dr	B	57 - 72	59 – 73	59 - 74
L	Residential – east side of I-81, along Freeman Ln	B	69 - 69	70 – 70	71 - 71
M	Residential – west side of I-81, north of Thompson Memorial Dr along Deborah Ln	B	60 - 73	61 – 74	63 - 75
N	Residential – east side of I-81, between Thompson Memorial Dr and Kessler Mill Rd	B	45 - 67	46 – 68	46 - 71
O	Residential – west side of I-81, along Dalmation Ln	B	58 - 58	59 – 59	60 - 60
P	Commercial – Baymont by Wyndham Hotel and Fairfield Inn and Suites, east side of I-81 on Sheraton Dr	E	53 - 62	54 – 63	55 - 64
Q	Residential – single- and multi-family residential; east side of I-81, between North Electric Rd and Cove Rd	B	47 - 73	48 – 74	48 - 75
R	Residential – west side of I-81, along Louise Wells Drive	B	64 - 70	65 – 71	63 - 72

Source: HMMH, 2020

5 NOISE IMPACT ASSESSMENT

The potential noise impact of the I-81 Widening Project was assessed according to FHWA and VDOT noise assessment guidelines, described in detail in Section 2. In summary, noise impact would occur wherever Project noise levels are expected to approach within one decibel or exceed 67 dBA L_{eq} at noise-sensitive land uses in Activity Categories B (exterior residential) and C (exterior recreational), approach within one decibel or exceed 52 dBA L_{eq} at noise-sensitive land uses in Activity Category D (interior), and approach within one decibel or exceed 72 dBA L_{eq} at noise-sensitive land uses in Activity Category E (exterior commercial recreational) during the loudest hour of the day. Noise impact also would occur wherever Project noise levels cause a substantial increase over existing noise levels—an increase of 10 dB or more is considered substantial by VDOT. However, there are no impacts predicted due to substantial increases in existing noise levels for the Project.

Table 5 presents a summary of the predicted noise impact for the 2019 Existing and 2043 No-Build and Build alternatives. The impacts are summarized for the entire study area, separately by FHWA Activity Category. In the Existing case, 164 residential receptors and five recreational receptors are predicted to be exposed to noise levels that approach or exceed the NAC. Under the 2043 No-Build alternative, 211 residential receptors are predicted to be impacted and in the Build case, 253 residential receptors are predicted to be impacted. In the Existing case, five exterior recreational receptors are predicted to be impacted, and in the 2043 No-build and Build alternatives, that number is predicted to increase to seven. No interior institutional receptors are predicted to be impacted in any of the alternatives, and one hotel swimming pool located at the Howard Johnson Motel (Category E) is predicted to be impacted in the Build alternative.

Table 5 Noise Impact Summary

Alternative	Impact Type	Number of Impacted Units by Land Use and FHWA Activity Category ¹				
		Residential Exterior (B)	Recreational Exterior (C)	Institutional Interior (D)	Commercial Exterior (E)	Total
Existing	NAC	164	5	0	0	169
No-Build	NAC	211	7	0	0	218
Build	NAC	253	7	0	1	261

Source: HMMH, 2020

Notes:

1.) The FHWA Activity Category is shown in parentheses.

Table 6 presents a summary of the predicted noise impact for the 2019 Existing and 2043 No-build and Build alternatives by CNE. Note in the table that no impacts are predicted in CNEs O and P. No further analysis is required in those areas where no impact is predicted in the future Build alternative.

Figure 2 in Section 6 shows the locations of individual receptors where noise impacts are predicted to occur with the 2043 Build Alternative. Figure 2 also includes a noise impact contour for the Build Alternative without abatement in the residential and recreational areas (at the applicable Categories B and C NAC of 67 dBA, which is represented by 66 dBA L_{eq} for ground-floor receptors).

Table 6 Predicted Traffic Noise Impact by Common Noise Environment (CNE)

CNE	Land Use – Description	Activity Categories	Number of Residential and Recreational Receptors Impacted		
			2019 Existing	2043 No-Build	2043 Build
A	Residential, Commercial – west side of I-81, between Fort Lewis Blvd. and Wildwood Rd.	B and E	7	7	13
B	Residential – east side of I-81, between Fort Lewis Blvd. and Wildwood Rd.	B	8	8	17
C	Residential, Commercial – single-family residential, Howard Johnson Hotel: west side of I-81, along Skyview Rd	B and E	10	13	17
D	Residential – east side of I-81, between Wildwood Rd and Turner Rd	B	24	30	30
E	Residential, Institutional – single-family residential and the Church of Christ of Westside: east side of I-81, between Turner Rd and property line of Salem High School	B and D	22	23	23
F	Institutional – Salem High School football field and track: east side of I-81	C	5	7	7
G	Residential – east side of I-81, between Goodwin Ave and Pendleton Dr	B	8	11	13
H	Residential, Institutional – single-family residential and the Fellowship Community Church: west side of I-81 on Goodwin Ave, Wildwood Rd, Waldheim Rd, and Red Ln	B, C and D	8	10	12
I	Residential – east of I-81, from Academy St to Stonegate Dr	B	34	39	50
J	Residential – west side of I-81, between Red Ln and Thompson Memorial Dr	B	6	8	9
K	Residential – east side of I-81, between Walnut Rd and Thompson Memorial Dr	B	7	11	12
L	Residential – east side of I-81, along Freeman Ln	B	1	1	1
M	Residential – west side of I-81, north of Thompson Memorial Dr along Deborah Ln	B	6	8	8
N	Residential – east side of I-81, between Thompson Memorial Dr and Kessler Mill Rd	B	2	4	4
O	Residential – west side of I-81, along Dalmation Ln	B	0	0	0
P	Commercial – Baymont by Wyndham Hotel and Fairfield Inn and Suites, east side of I-81 on Sheraton Dr	E	0	0	0
Q	Residential – single- and multi-family residential; east side of I-81, between North Electric Rd and Cove Rd	B	19	36	43
R	Residential – west side of I-81, along Louise Wells Drive	B	2	2	2
Totals			169	218	261

Source: HMMH, 2020

6 NOISE ABATEMENT MEASURES

FHWA and VDOT policies require that noise abatement be considered for all receptors that are predicted to be impacted by traffic noise from the proposed project. FHWA has identified certain noise abatement measures that may be incorporated in projects to reduce traffic noise impact. In general, mitigation measures can include alternative measures (traffic management, the alteration of horizontal and vertical alignment, and low-noise pavement), in addition to the construction of noise barriers.

6.1 Alternative Noise Abatement Measures

VDOT guidelines recommend a variety of mitigation measures that should be considered in response to transportation-related noise impacts. While noise barriers and/or earth berms are generally the most effective form of noise mitigation, additional mitigation measures exist that have the potential to provide considerable noise reductions under certain circumstances.

Mitigation measures considered for this project include:

- Traffic management measures,
- Alteration of horizontal and vertical alignments,
- Acoustical insulation of public-use and non-profit facilities,
- Acquisition of buffer land,
- Construction of earth berms,
- Construction of noise barriers.

6.1.1 Traffic Management Measures

Traffic control measures, such as speed limit restrictions, truck traffic restrictions, and other traffic control measures that may be considered for the reduction of noise emission levels are not practical for this project. Reducing speeds would not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide adequate noise reduction. Typically, a 10 mph reduction in speed would result in only a two dB(A) decrease in noise level, which is not considered a sufficient level of attenuation to be considered feasible. Likewise, a two dB(A) change in noise is not perceptible to the human ear. Additionally, speed limit restrictions and truck traffic restrictions are not feasible for a project that involves an interstate facility.

6.1.2 Alteration of Horizontal and Vertical Alignments

A significant alteration of the horizontal alignment of I-81 would be necessary to make such a measure effective in reducing noise, since a doubling of distance to the highway is usually needed to effect a 5-decibel reduction. However, such shifts would have undesirable consequences, right-of-way acquisitions and relocations would be required. Also, shifting the horizontal alignment is not practical since there are impacted receptors on both sides of the corridor throughout the study area. Shifting the alignment away from receptors on one side of the road would bring it closer to receptors on the other side of the road. Further alteration of the vertical alignment would not be feasible since the project involves relatively minor modifications to an existing facility. Raising or

lowering of the I-81 vertical alignment would result in significant environmental impacts to the surrounding environment and costly engineering challenges.

6.1.3 Acoustical Insulation

Acoustical Insulation of public-use and non-profit facilities applies only to public and institutional use buildings. Since no public use or institutional structures are anticipated to have interior noise levels exceeding FHWA's interior NAC, this noise abatement option will not be applied.

6.1.4 Acquisition of Buffer Land

The purchase of property for the creation of a "buffer zone" to reduce noise impacts is only considered for predominantly unimproved properties because the amount of property required for this option to be effective would create significant additional impacts (e.g., in terms of residential displacements), which were determined to outweigh the benefits of land acquisition.

6.1.5 Construction of Earth Berms

Berms are considered a more attractive alternative to noise walls where there is sufficient land and fill available for them. However, berms do not appear feasible for the I-81 Widening project corridor because they would greatly increase the cost and the footprint of the project by substantially increasing the amount of right of way required to accommodate the berms. Since all of the study corridor is densely developed, many costly and disruptive residential displacements necessarily would result from acquiring the needed right of way.

Additionally, the Noise Policy Code of Virginia (HB 2577, as amended by HB 2025) states: *"Requires that whenever the Commonwealth Transportation Board or the Department plan for or undertake any highway construction or improvement project and such project includes or may include the requirement for the mitigation of traffic noise impacts, first consideration should be given to the use of noise reducing design and low noise pavement materials and techniques in lieu of construction of noise walls or sound barriers. Vegetative screening, such as the planting of appropriate conifers, in such a design would be utilized to act as a visual screen if visual screening is required."*

Consideration would be given to these measures during the final design stage, where feasible. The response to this requirement from project management is included Appendix C.

6.2 Noise Barriers

The only remaining abatement measure investigated was the construction of noise barriers. The feasibility of noise barriers was evaluated in locations where noise impact is predicted to occur in the Build condition. Where the construction of noise barriers was found to be physically practical, barrier noise reduction was estimated based on roadway, barrier, and receiver geometry as described below.

To be constructed, any noise barriers identified in this document must satisfy VDOT's feasibility and reasonableness criteria. Therefore, the noise barrier design parameters and cost identified in this document are preliminary and should not be considered final. A final decision on the feasibility and reasonableness of noise barriers would be made during the noise barrier analysis conducted during the final design phase of the project after the project design is developed and traffic is updated. Also, the need for an analysis of reflected sound and the potential use of sound absorbing materials

will be evaluated during this final design analysis. If a noise barrier is determined to be feasible and reasonable, the affected public would be given an opportunity to decide whether they are in favor of construction of the noise barrier. VDOT's formal policies for involving the public in noise abatement decisions are described in their Guidance Manual, in section 7.3.10.1 *Viewpoints of the benefited receptors*, section 12.3 *Affected Receptors/Community*, and section 12.4 *Voting Procedures*.

6.2.1 Feasibility and Reasonableness

FHWA and VDOT require that noise barriers be both "feasible" and "reasonable" to be recommended for construction. State DOTs have established individual feasibility and reasonableness criteria within federally mandated guidelines. VDOT's criteria are summarized here.

To be feasible, a barrier must be acoustically effective, that is it must reduce noise levels at noise sensitive locations by at least 5 decibels, thereby "benefiting" the property. VDOT requires that at least fifty percent (50%) of the impacted receptors receive 5 decibels or more of insertion loss from the proposed barrier for it to be feasible.

A second feasibility criterion is that it must be possible to design and construct the barrier. Factors that enter into constructability include safety, barrier height, topography, drainage, utilities, maintenance of the barrier, and access to adjacent properties. VDOT has a maximum allowable height of 30 feet above ground level for noise barriers.

Barrier reasonableness is based on three factors: cost-effectiveness, ability to achieve VDOT's insertion loss design goal, and views of the benefited receptors. To be "cost-effective," a barrier cannot require more than 1,600 square feet per benefited receptor. VDOT's maximum barrier height of 30 feet figures into the assessment of benefited receptors. Where multi-family housing includes balconies at elevations above that of a 30-foot high barrier, these receptors will not be assessed for barrier benefits and are thereby not included in the computation of the barrier's feasibility or reasonableness.

The second reasonableness criterion is VDOT's noise reduction design goal of 7 decibels. This goal must be achieved for at least one of the impacted receptors for the barrier to be considered reasonable.

The third reasonableness criterion relates to the views of the owners and residents of the potentially benefited properties. A majority of the benefited receptors must favor the barrier for it to be considered reasonable to construct. Community views would be surveyed during the final design phase of this roadway improvement project.

6.2.2 Summary of Potential Noise Barriers

Details of each of the evaluated barriers are given in Table 7 and described in narratives following the table. Each of the barriers is also shown in Figure 2 as a solid line. The color of the line indicates whether each barrier would be feasible and reasonable (red), not feasible (dark blue), or feasible and not reasonable (light blue). Appendix D presents the preliminary Warranted, Feasible and Reasonable Worksheets for each barrier.

Table 7 Summary of Potential Noise Barriers

Barrier ID	Noise Barrier Parameters						Number of Receptors				Surface Area/ Benefited Receptor (SF/BR) ¹	Barrier Status ²
	Noise Reduction (dBA)		Length (feet)	Height (feet)	Surface Area (sq feet)	Cost at \$42/sq ft	Impacted	Impacted & Benefited	Not Impacted & Benefited	Total Benefited		
	Range	Average										
Barrier A	5-15	7.4	2,148	30	64,375	\$2,703,750	13	4	6	10	6,438	NF
Barrier B	5-15	7.1	2,596	18-26	62,700	\$2,633,400	17	15	9	24	2,613	F & NR
Barrier C	5-16	9.6	2,104	30	63,078	\$2,649,276	17	14	1	15	4,205	F & NR
Barrier D-E-F-G-I	5-16	9.1	11,191	26	290,911	\$12,218,262	99	95	138	233	1,249	F & R
Barrier H	5-11	7.2	3,713	20	74,231	\$3,117,702	12	11	10	21	3,535	F & NR
Barrier I-K	5-11	7.4	3,462	16	55,360	\$2,325,120	36	31	25	56	989	F & R
Barrier J	5-10	6.4	2,481	18-21	49,774	\$2,090,508	9	9	17	26	1,914	F & NR
Barrier L-N	5-10	6.0	3,755	30	112,594	\$4,728,948	5	3	6	9	12,510	F & NR
Barrier M	5-12	7.6	1,683	30	50,528	\$353,696	8	6	0	6	8,421	F & NR
Barrier Q	5-11	6.0	2,409	30	72,211	\$3,032,862	15 (43) ³	14	19	33	2,188	F & NR
Barrier R	5-9	6.2	1,666	30	49,961	\$2,098,362	2	2	1	3	16,654	F & NR

Source: HMMH, 2020

Notes:

- 1.) Where SF/BR exceeds VDOT's maximum of 1600, a noise barrier would not be considered cost-reasonable.
- 2.) Barrier Status: F & R = Feasible and Reasonable; F & NR = Feasible and Not Reasonable; NF = Not Feasible.
- 3.) Number in parentheses indicates total impacts, including those above the line of intersection with a 30-ft barrier. Numbers of impacts and benefits for this barrier not in parentheses are below the line of intersection and considered in the feasibility and reasonableness evaluation.

The table of predicted sound levels for all receivers in Appendix A includes the computed noise levels with the evaluated barriers and the computed barrier insertion loss values. Whether each receiver is below the point of intersection is also indicated in the table. The potential noise barriers summarized in Table 7 and shown in the graphics of Figure 2 have not been intentionally placed outside of VDOT right of way. While the need for additional right-of-way to construct some barriers for this project is not anticipated, it also cannot be precluded in the future, given the limited information available for this preliminary analysis.

Barrier A would be located west of I-81 between Wildwood Road and Fort Lewis Boulevard on the southbound side of I-81. It is shown on Figure 2, Sheet 1. The barrier begins at the on-ramp from Wildwood Road along the edge of pavement and then shifts to the west, following the top of slope approximately 450' south of Fort Lewis Boulevard. Barrier A is 2,148 feet long and 30 feet high for a total surface area of 64,375 square feet. The barrier is designed to benefit the 13 impacted receptors within CNE A. The barrier would only benefit four impacted receptors and six non-impacted receptors and therefore, does not meet the acoustical feasibility goal of providing a minimum of 5 decibels of noise reduction at 50% or more impacted receptors.

Barrier B was designed to mitigate traffic noise impacts at residences within CNE B, and is shown in Figure 2, Sheet 1. The barrier would be located along the edge of pavement of I-81 northbound, beginning approximately 850 feet south of Fort Lewis Boulevard and extends along the off-ramp to Wildwood Road. The barrier would be a total of 2,596 feet long and vary in height between 18 and 26 feet, with a total surface area of 62,700 square feet. Of the 17 impacted receptors, 15 would be benefited, which meets VDOT's acoustical feasibility goal. An additional 9 non-impacted receptors would also be benefited from Barrier B. Barrier B provides noise reduction of at least 7 decibels at 12 benefited receptors; however, it has a square foot per benefited receptor value of 2,613. Since this value exceeds VDOT's allowable value of 1,600, Barrier B is considered not reasonable.

Barrier C would be located to the west of I-81 located along the edge of pavement of I-81 southbound to mitigate 17 impacts within CNE C. Shown on Figure 2, Sheets 2 & 3, the barrier would begin approximately 1,000 feet north of Weaver Road and terminate approximately just south of Weaver Road. The barrier is 2,104 feet long and 30 feet high for a total surface area of 63,078 square feet. Barrier C provides a 5 dBA or greater noise reduction at 14 impacted receptors and one non-impacted receptor, thereby achieving VDOT's acoustical feasibility goal. In addition, Barrier C provides at least a 7 dBA noise reduction at 13 benefited receptors. However, the square footage per benefited receptor value equals 4,205, which far exceeds VDOT's maximum value of 1,600. Therefore, Barrier C is not reasonable. Longer barriers to benefit impacted receptors in the southern end of CNE C were also evaluated, but those were found to be less reasonable than Barrier C.

Barrier D-E-F-G-I would be located to the east of I-81 between Wildwood Road and Red Lane, and is shown on Figure 2, Sheets 2-5. The barrier would begin along the edge of pavement of the on-ramp from Wildwood Road and extend along I-81 northbound to the Red Lane overpass. The barrier is designed to benefit 99 impacted receptors located within CNEs D, E, F, G, and the portion of CNE I south of Red Lane. Barrier D-E-F-G-I has a total length of 11,191 with a height of 26 feet. The barrier would benefit 95 impacted receptors and 138 non-impacted receptors. In addition, 180 benefited receptors would achieve a 7 dBA noise reduction, which includes 87 of the impacted receptors. With a total square footage of 290,911, the square foot per benefited receptor value is 1,249, which is below VDOT's maximum value of 1,600. Therefore, Barrier D-E-F-G-I would be feasible and reasonable.

Barrier H would be located west of I-81 along the edge of pavement of I-81 southbound, between Red Lane and Goodwin Avenue. The barrier is shown on Figure 2, Sheets 4 & 5. Barrier H has a length of 3,713 feet and a height of 20 feet for a total area of 74,231 square feet. The barrier would provide a 5 dBA or greater noise levels reduction at 11 of 12 impacted receptors as well as 10 non-impacted receptors, which meets VDOT's acoustical feasibility goal. Also, 15 benefited receptors receive noise reductions of 7 dBA or greater. However, Barrier H has a surface area per benefited receptor value of 3,535 square feet, which exceeds VDOT's maximum value of 1,600, making this barrier not reasonable. Additional barrier heights up to 30 feet were also analyzed, however, a barrier with a height of 20 feet is the most cost-reasonable with the lowest value of square feet per benefited receptor.

Barrier I-K would be located east of I-81 between Red Lane and Thompson Memorial Drive and is shown on Figure 2, Sheets 5-7. The barrier begins at the Red Lane overpass and extends along the edge of pavement of I-81 northbound and ends along the off-ramp approximately 550' south of Thompson Memorial Drive. Barrier I-K would be 3,462 feet long and 16 feet high for a total surface area of 55,360 square feet. The barrier was evaluated to mitigate impacts at 36 receptors within the portion of CNE I located north of Red Lane and CNE K. The barrier would benefit 31 of the 36 impacted receptors and 25 non-impacted receptors, and therefore meets VDOT's acoustical feasibility goal. Barrier I-K provides noise reduction of at least 7 dBA at 40 benefited receptors, and has a square foot per benefited receptor value of 989. Therefore, Barrier I-K is also reasonable. Additional barrier length was evaluated for the purpose of providing mitigation to the impacted sites at the ramp (sites K-007, K-008, K-012, and K-013), however, this full length barrier did not provide the minimum required 5 dBA noise reduction to these impacted sites.

Barrier J would be located to the west of I-81 between Thompson Memorial Drive and Red Lane. The barrier is shown on Figure 2, Sheet 6. Barrier J would begin approximately 1,450 feet south of Thompson Memorial Drive and extend along I-81 southbound to the Red Lane overpass. The barrier would be 2,481 feet long and a surface area of 49,774 square feet. This barrier would have an average height of 20.2 feet, with heights between 18 and 21 feet. This barrier would provide benefit to all nine impacted receptors within CNE J, meeting VDOT's acoustical feasibility goal. An additional 17 non-impacted receptors would also be benefited from Barrier J. Barrier J also provides noise reduction of at least 7 decibels at nine benefited receptors, however, has a square foot per benefited receptor value of 1,914. Since this value exceeds VDOT's allowable maximum value of 1,600, Barrier J is considered not reasonable. Additional barrier heights were also analyzed, however, the barrier presented provides the most benefit to impacted receptors, while also being the most cost-reasonable with the lowest value of square feet per benefited receptor.

Barrier L-N would be located east of I-81 along the edge of pavement of I-81 northbound, between Thompson Memorial Drive and Kessler Mill Road, and is shown on Figure 2, Sheets 7-9. Barrier L-N has a length of 3,755 feet and a height of 30 feet for a total area of 112,594 square feet. The barrier would provide a 5 dBA or greater noise levels reduction at 3 impacted receptors as well as 6 non-impacted receptors, which meets VDOT's acoustical feasibility goal. Also, two benefited receptors receive noise reductions of 7 dBA or greater. However, Barrier L-N has a surface area per benefited receptor value of 12,510 square feet, which far exceeds VDOT's maximum value of 1,600, making this barrier not reasonable. A longer barrier was evaluated to benefit two impacted receptors at the northern end of CNE N, but this barrier was less cost-effective than Barrier L-N.

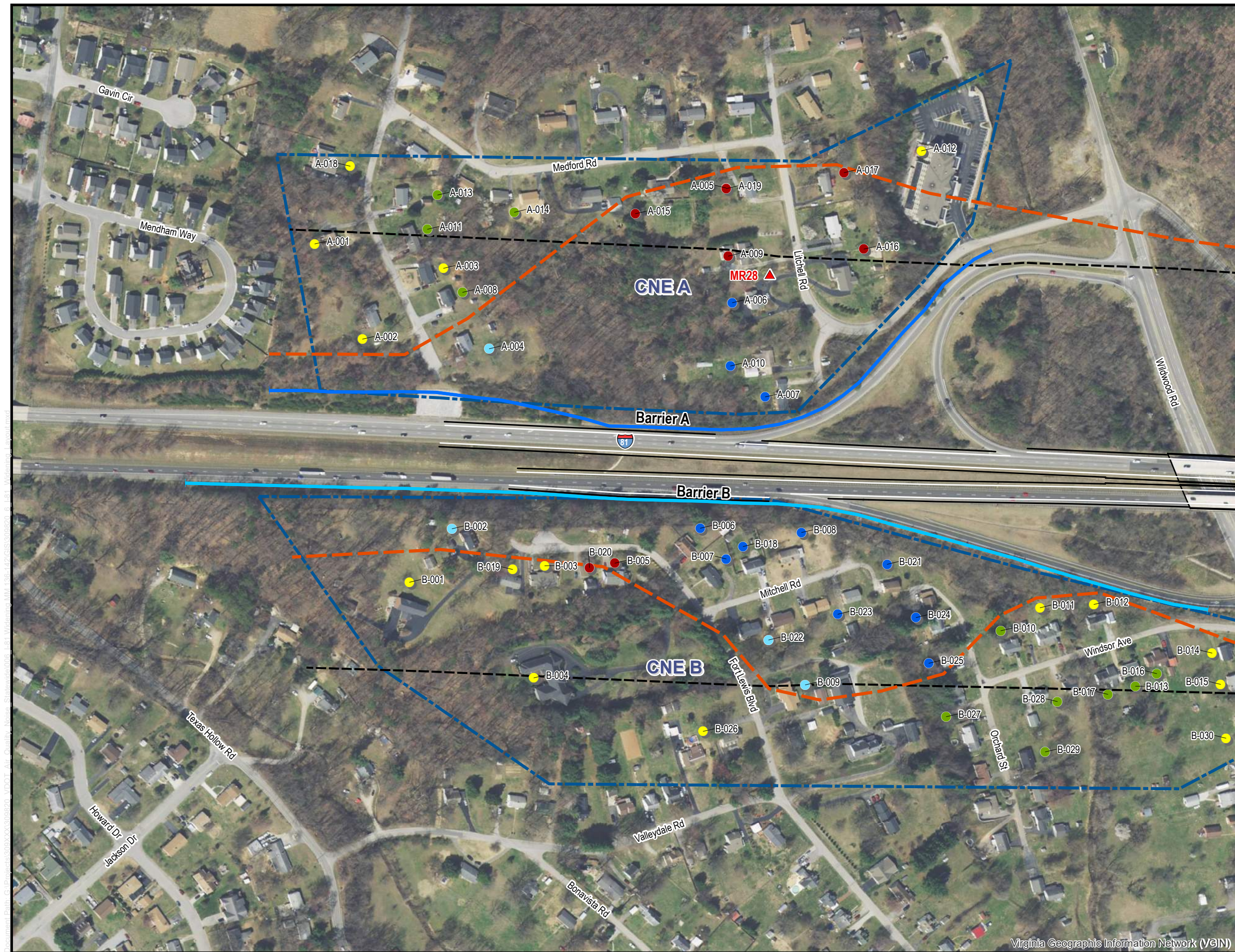
Barrier M is designed to benefit eight impacted residences within CNE M and would be located west of I-81, between Kessler Mill Road and Thompson Memorial Drive. The barrier would begin near the north end of Deborah Lane and continue along the edge of pavement of I-81 southbound and terminate just south of Thompson Memorial Drive along the off-ramp. The location is shown on Figure 2, Sheet 7. Barrier M has a length of 1,683 feet and a height of 30 feet for a total area of 50,528 square feet. The barrier would provide a 5 dBA or greater noise level reduction at 6 of 8 impacted receptors, meeting VDOT's acoustical feasibility goal. Also, 4 benefited receptors receive noise reductions of 7 dBA or greater. However, Barrier M has a surface area per benefited receptor value of 8,421 square feet, which exceeds VDOT's maximum value of 1,600, making this barrier not reasonable. Additional barrier length was evaluated to benefit impacted receptors at the north end of Deborah Drive, but these barriers were less cost-effective than Barrier M.

Barrier Q would be located along the edge of pavement of I-81 northbound, beginning along the on-ramp from North Electric Road and extending approximately 900 feet north of Cove Road and is shown in Figure 2, Sheet 10. Barrier Q would be 2,409 feet long and 30 feet high for a total area of 72,211 square feet. The barrier was designed to mitigate traffic noise impacts at multi-story, multi-family residences with patios and balconies within CNE Q. Out of the 43 impacted receptors in CNE Q, only 15 were considered for this barrier evaluation due to the remainder being located above the line of intersection with a 30 foot barrier. Of the 15 impacted receptors, 14 would be benefited, which meets VDOT's acoustical feasibility goal. An additional 19 non-impacted receptors would also be benefited from Barrier Q. Barrier Q provides noise reduction of at least 7 decibels at 9 benefited receptors, however, has a square foot per benefited receptor value of 2,188. Since this value exceeds VDOT's allowable value of 1,600, Barrier Q is considered not reasonable. Other barrier heights and lengths were evaluated, but Barrier Q is the most cost-effective.

Barrier R would be located along the edge of pavement of I-81 southbound, north of North Electric Road and is shown in Figure 2, Sheet 10. The barrier would be 1,666 feet long and 30 feet high. The barrier is designed to mitigate impacts at two residences within CNE R. Barrier R would provide at least 5 dBA noise reduction at both impacted receptors as well as at one non-impacted receptor. The barrier would also provide a 7 dBA noise reduction at one benefited receptor. With a total area of 49,961 square feet, the square footage per benefited receptor value equals 16,654, which far exceeds VDOT's maximum value of 1,600. Therefore, this barrier is feasible, but is not reasonable.

Figure 2
Location Map for Common
Noise Environments, Receptors,
Barriers and Build Contours

I-81 Widening Project
 City of Salem and Roanoke County, VA
 UPC 116203 Project Number: 0081-80-946



- Receptors**
- Impacted but Not Benefited
 - Impacted and 5 or 6 dBA Insertion Loss
 - Impacted and 7 dBA or more Insertion Loss
 - Not Benefited or Impacted
 - Benefited but Not Impacted
- Barriers**
- ▬ Feasible and Reasonable
 - ▬ Feasible and Not Reasonable
 - ▬ Not Feasible
- Other Symbols**
- ▲ # Measurement Site
 - ▬ CNE Boundary
 - ▬ 66 dBA Leq Contour
 - ▬ 500' Noise Study Area

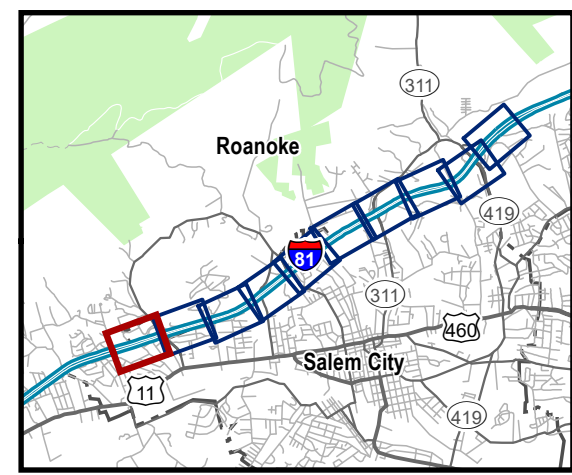
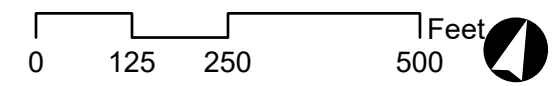
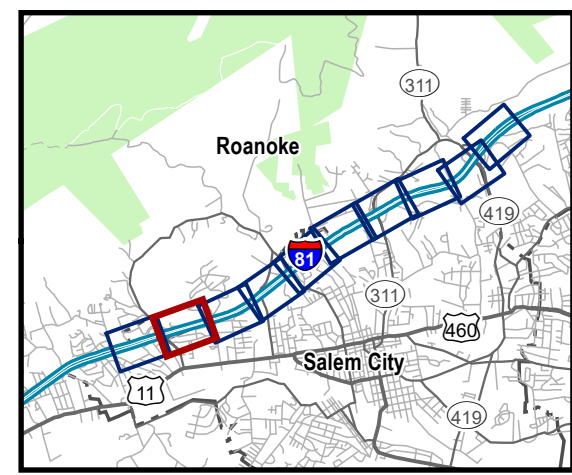
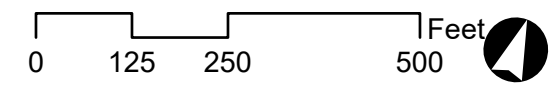


Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

I-81 Widening Project
 City of Salem and Roanoke County, VA
 UPC 116203 Project Number: 0081-80-946



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Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

I-81 Widening Project
 City of Salem and Roanoke County, VA
 UPC 116203 Project Number: 0081-80-946



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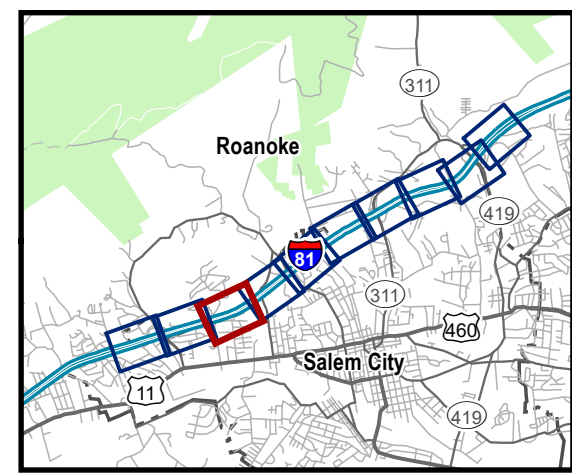
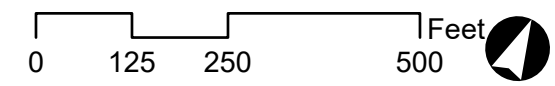
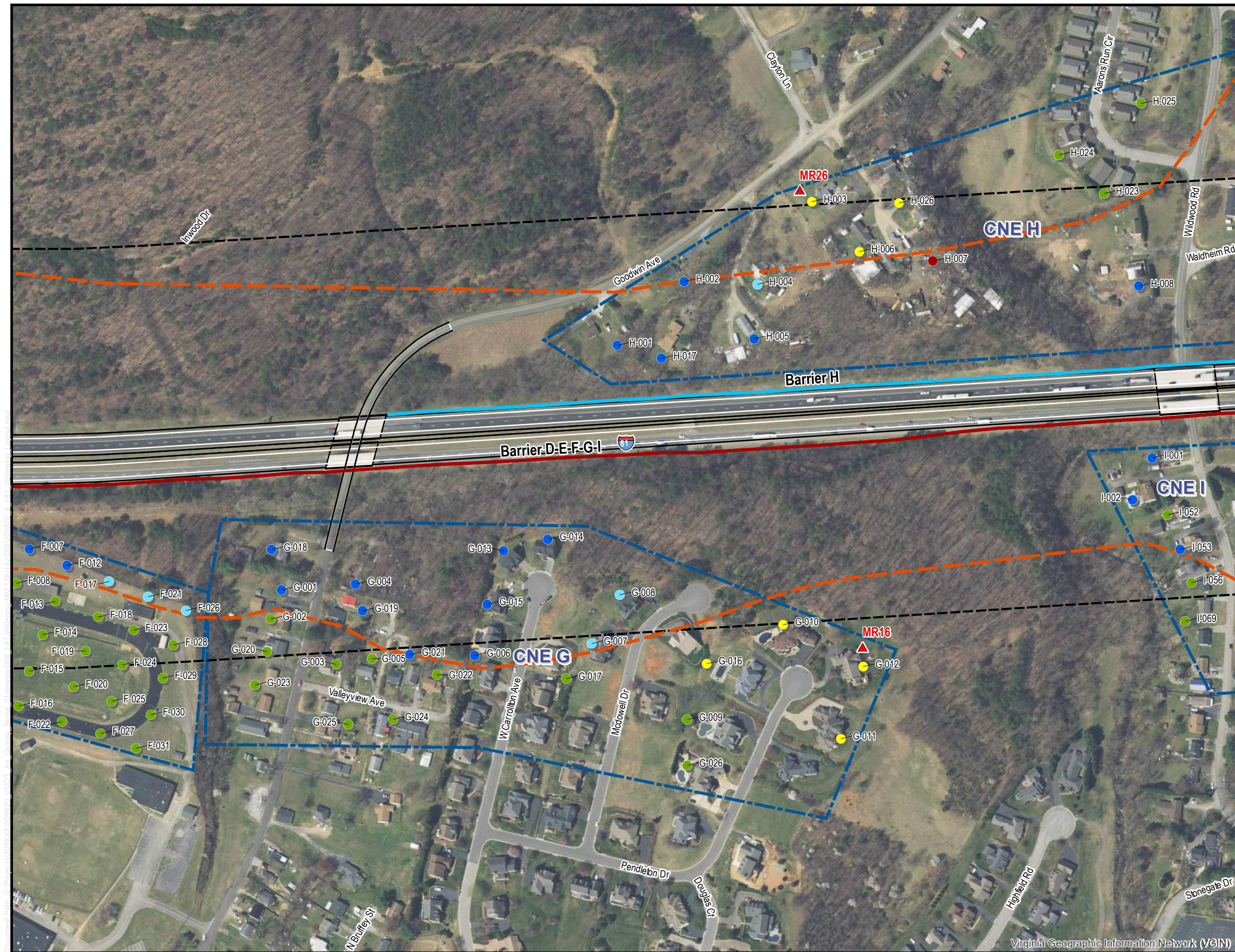
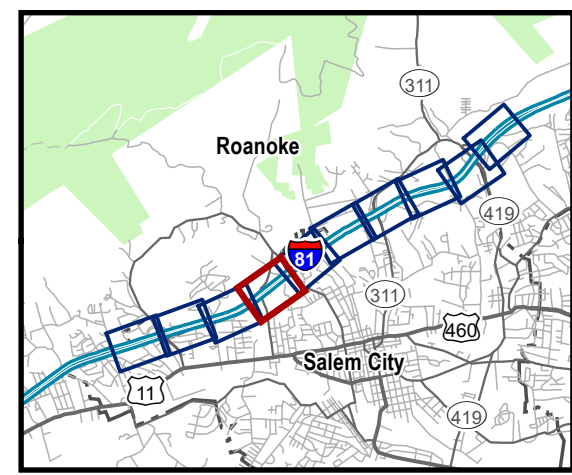
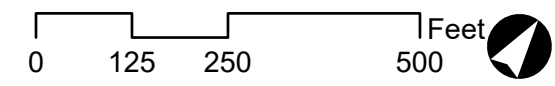


Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

I-81 Widening Project
City of Salem and Roanoke County, VA
 UPC 116203 Project Number: 0081-80-946



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- ▲ # Measurement Site
 - ▬ CNE Boundary
 - ▬ 66 dBA Leq Contour
 - ▬ 500' Noise Study Area



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Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

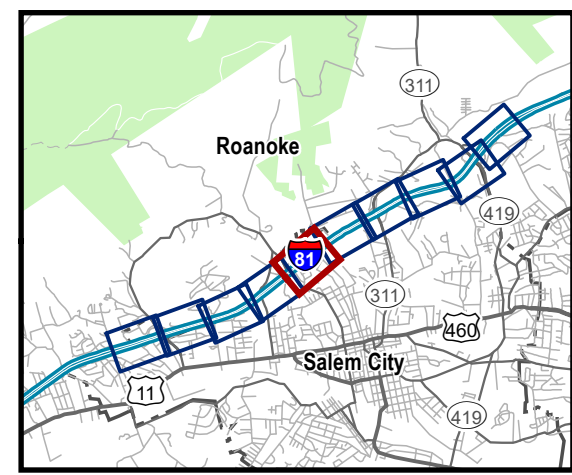
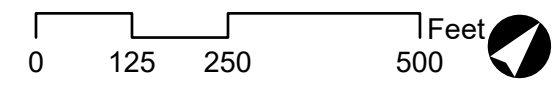
I-81 Widening Project
 City of Salem and Roanoke County, VA
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- ▲ # Measurement Site
- ▬ CNE Boundary
- ▬ 66 dBA Leq Contour
- ▬ 500' Noise Study Area



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Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

I-81 Widening Project
City of Salem and Roanoke County, VA
 UPC 116203 Project Number: 0081-80-946

Receptors

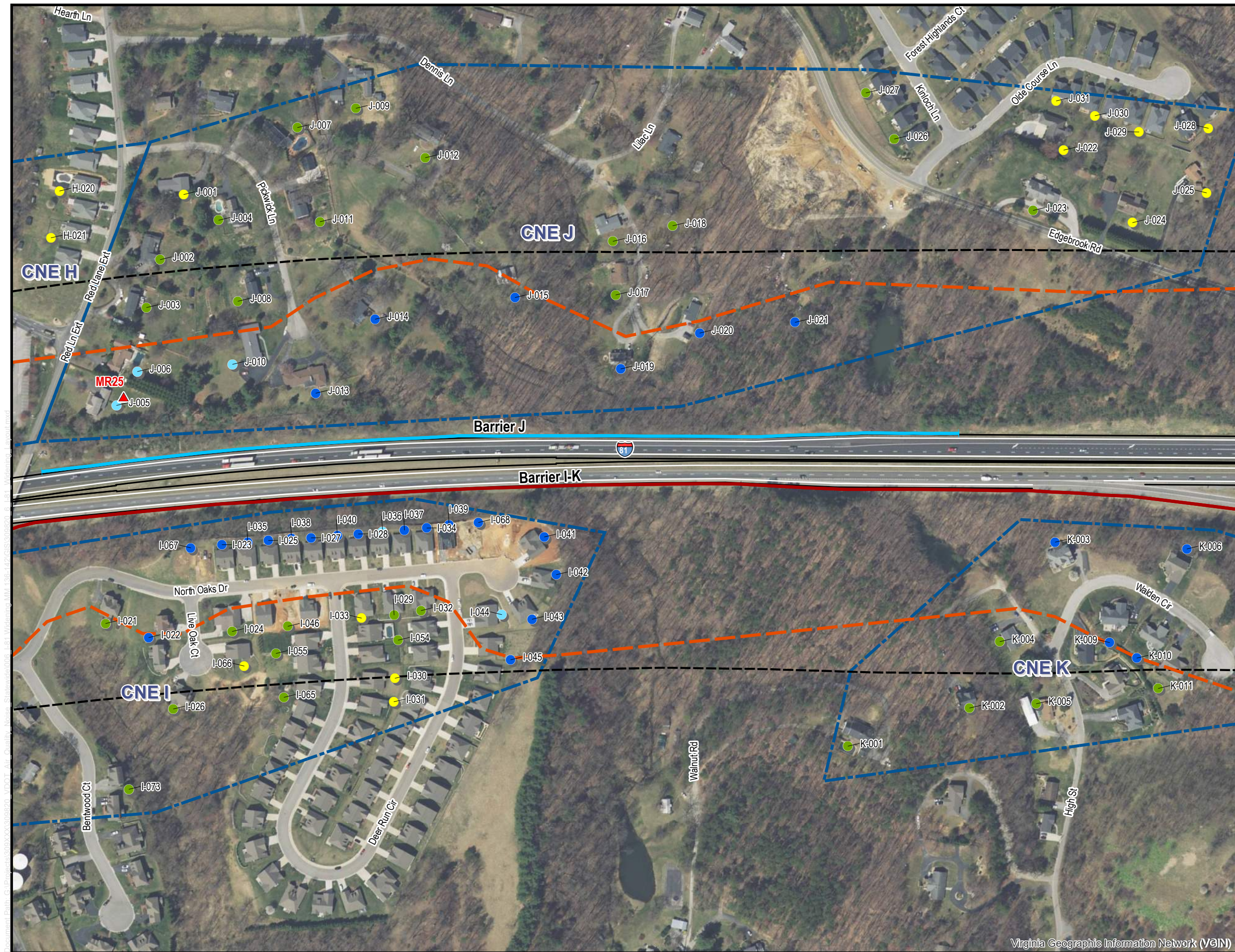
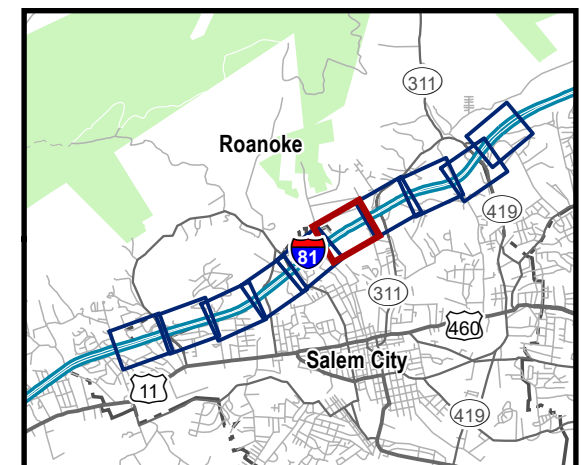
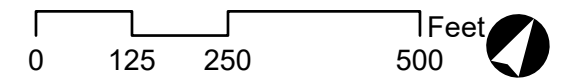
- Impacted but Not Benefited
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Not Benefited or Impacted
- Benefited but Not Impacted

Barriers

- ▬ Feasible and Reasonable
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- ▬ Not Feasible

▲ # Measurement Site

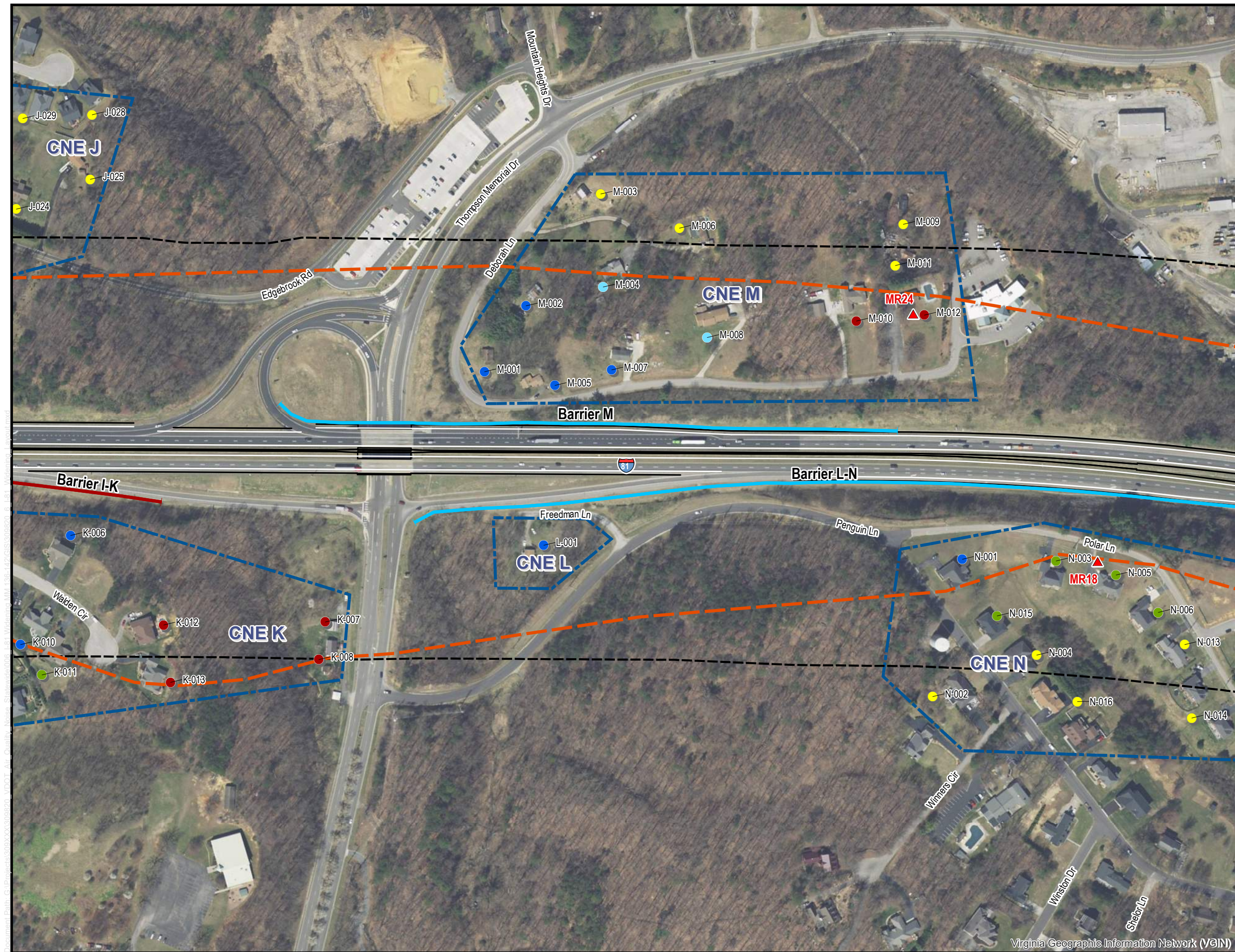
- ▬ CNE Boundary
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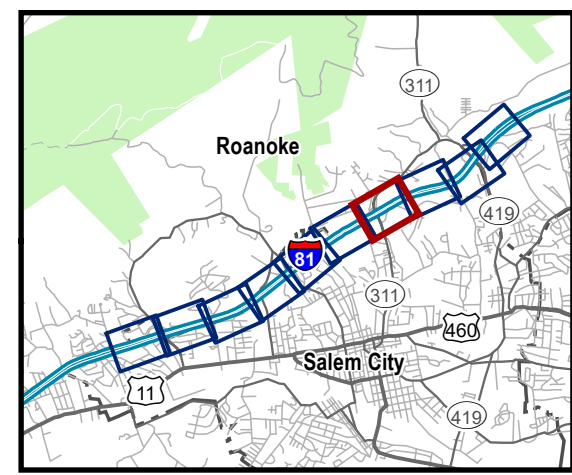
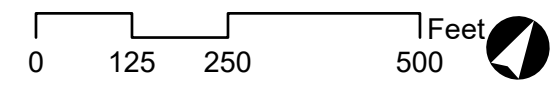
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Figure 2
Location Map for Common Noise Environments, Receptors, Barriers and Build Contours

I-81 Widening Project
 City of Salem and Roanoke County, VA
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Figure 2
Location Map for Common
Noise Environments, Receptors,
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I-81 Widening Project
 City of Salem and Roanoke County, VA
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Receptors

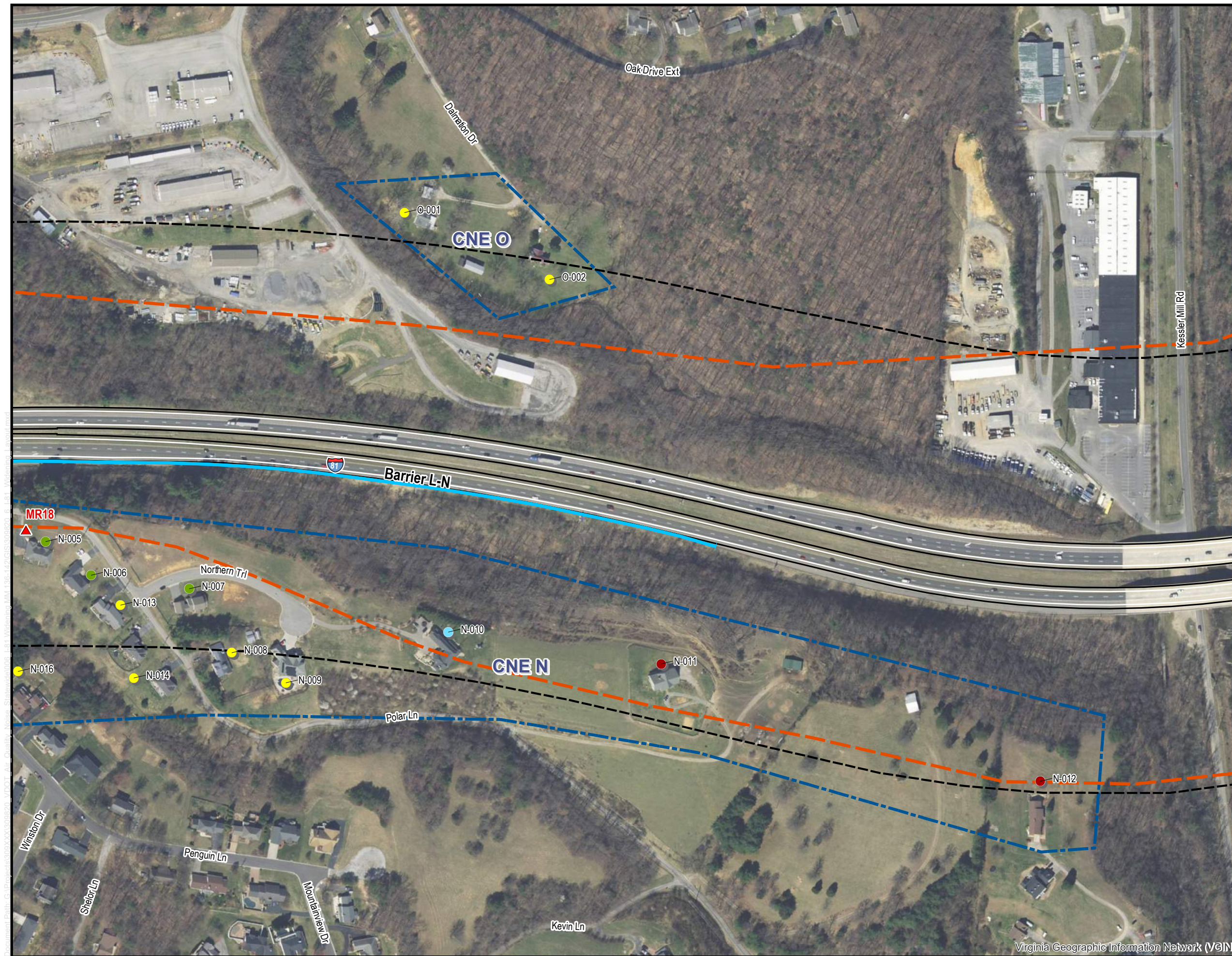
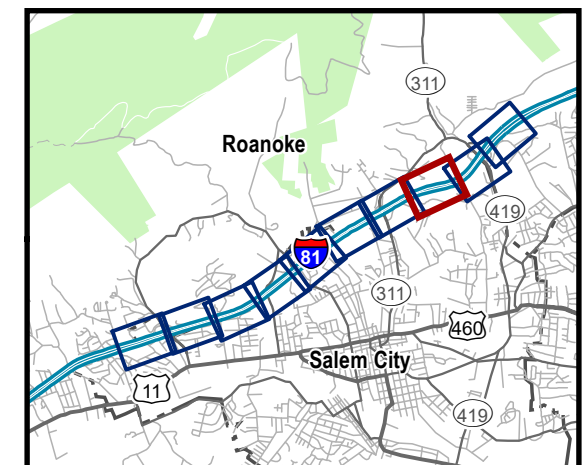
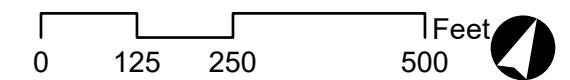
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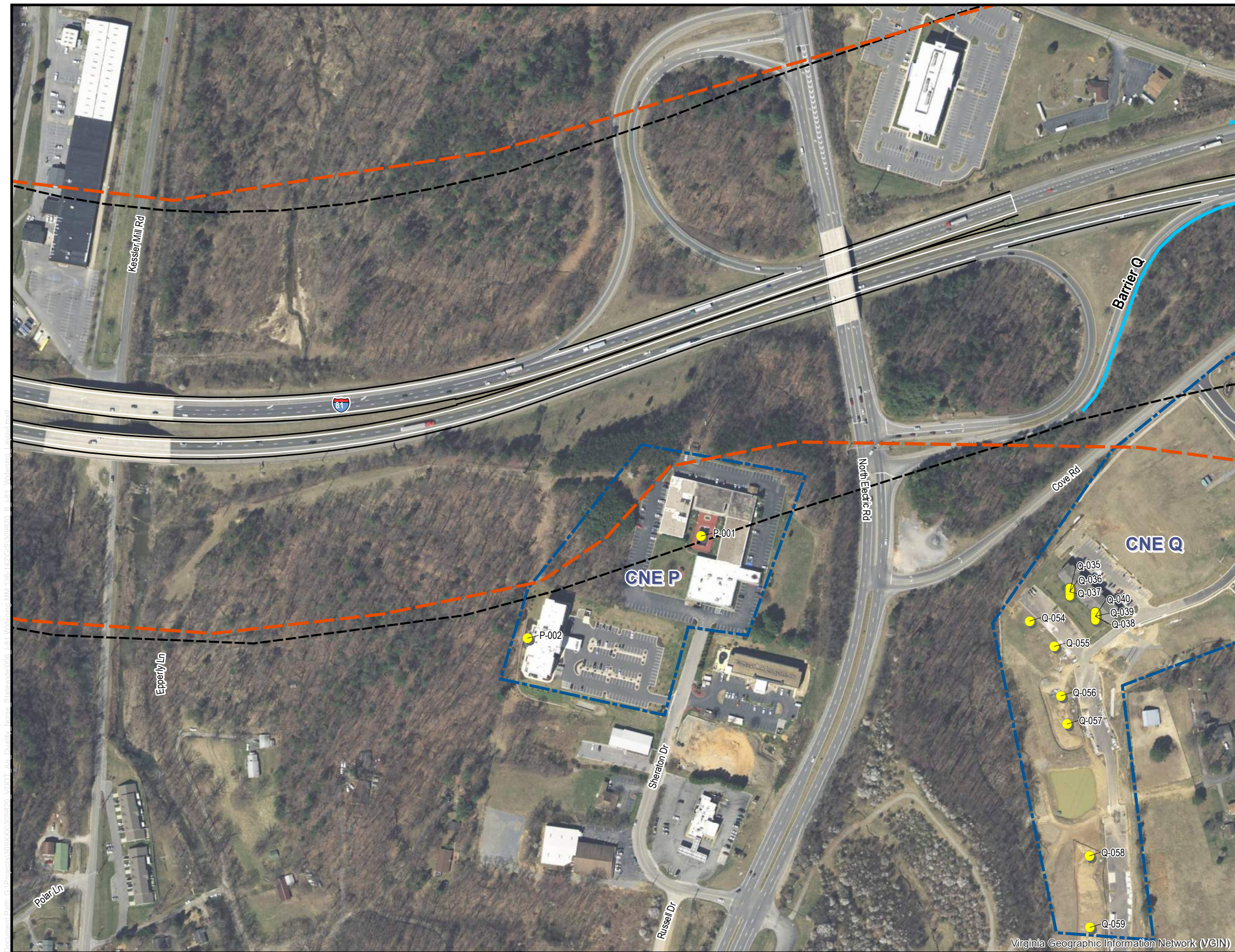
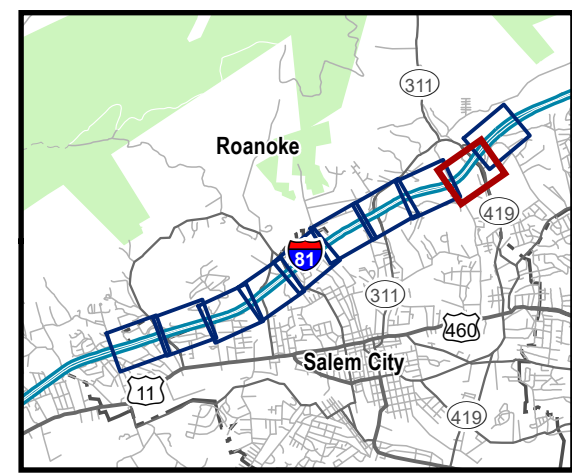
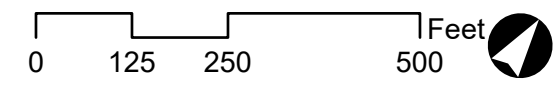


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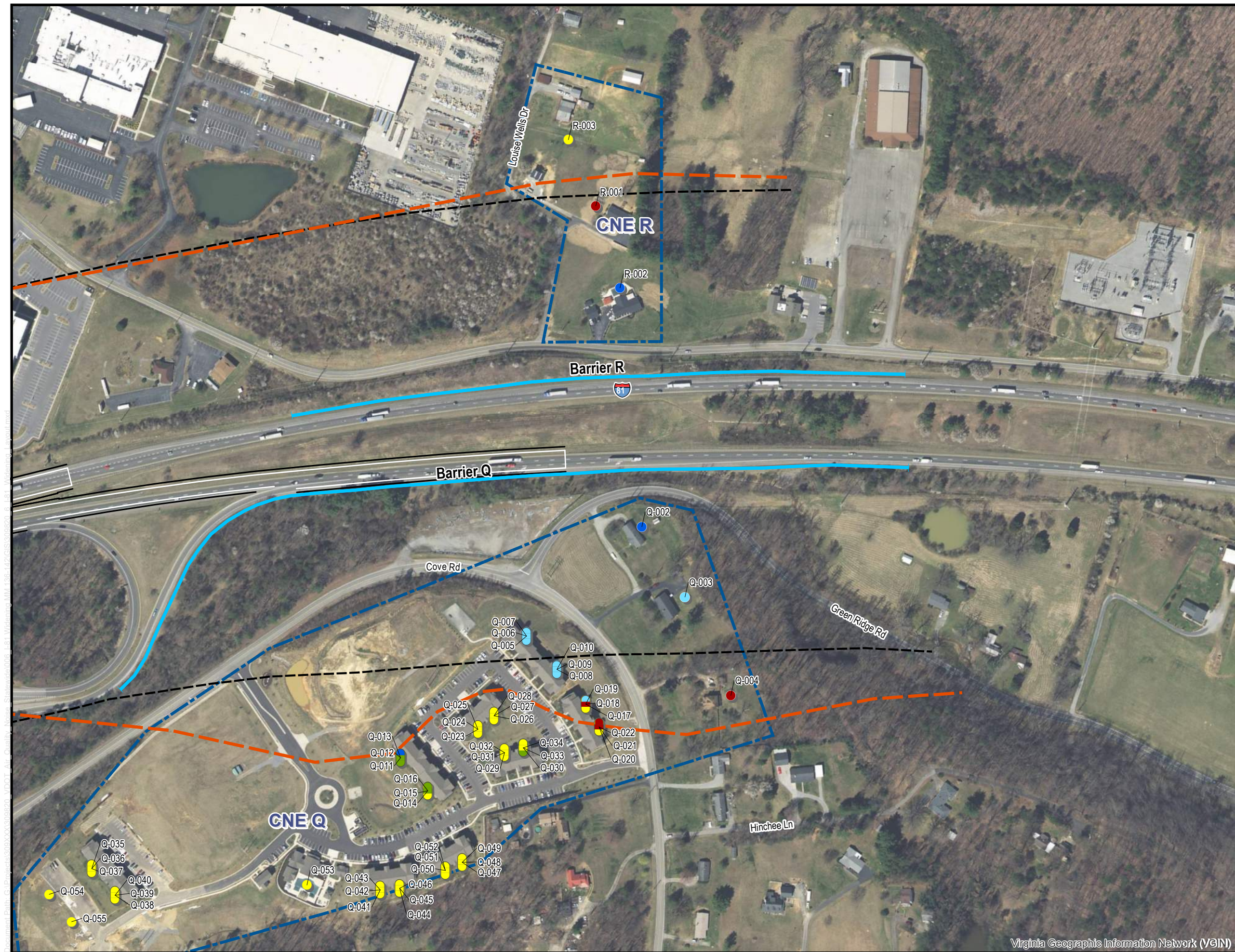
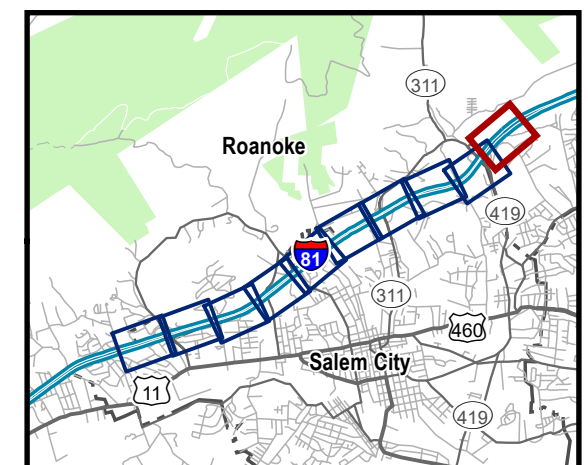
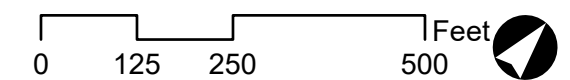
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7 CONSTRUCTION NOISE CONSIDERATION

Construction noise provisions are contained in Section 107.16(b)3 Noise of the 2020 VDOT Road and Bridge Specifications. The specifications have been reproduced below:

- The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise-sensitive activity is occurring. A noise-sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.
- The Department may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.
- The Department may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 P.M. and 6 A.M. If other hours are established by local ordinance, the local ordinance shall govern.
- Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.
- When feasible, the Contractor shall establish haul routes that direct his vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.
- These requirements shall not be applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

8 INFORMATION FOR LOCAL GOVERNMENT OFFICIALS

FHWA and VDOT policies require that VDOT provides certain information to local officials within whose jurisdiction the highway project is located, to minimize future traffic noise impacts of Type I projects on currently undeveloped lands. (Type I projects involve highway improvements with noise analysis.) This information must include information on noise-compatible land-use planning, noise impact zones in undeveloped land in the highway project corridor and federal participation in Type II projects (noise abatement only). This section of the report provides that information, as well as information about VDOT's noise abatement program.

8.1 Noise-Compatible Land-Use Planning

Section 9.0 of VDOT's noise policy outlines VDOT's approach to communication with local officials and provides information and resources on highway noise and noise-compatible land-use planning. VDOT's intention is to assist local officials in planning the uses of undeveloped land adjacent to highways to minimize the potential impacts of highway traffic noise. Figure 2 includes a noise contour that depicts the zone where noise impact would occur adjacent to the highway under the Build Alternative for exterior first-floor residential and recreational land uses.

Entering the Quiet Zone is a brochure that provides general information and examples to elected officials, planners, developers, and the general public about the problem of traffic noise and effective responses to it. A link to this brochure on FHWA's website is provided:

http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/qz00.cfm

A wide variety of administrative strategies may be used to minimize or eliminate potential highway noise impacts, thereby preventing the need or desire for costly noise abatement structures such as noise barriers in future years. There are five broad categories of such strategies:

- Zoning,
 - Other legal restrictions (subdivision control, building codes, health codes),
 - Municipal ownership or control of the land,
 - Financial incentives for compatible development, and
 - Educational and advisory services.
- The Audible Landscape: A Manual for Highway and Land Use is a very well-written and comprehensive guide addressing these noise-compatible land use planning strategies, with significant detailed information. This document is available through FHWA's Website, at http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/al00.cfm

8.2 VDOT's Noise Abatement Program

Information on VDOT's noise program is provided in "Highway Traffic Noise Impact Analysis Guidance Manual (Version 8)," updated February 20, 2018. This document is available from VDOT's

Noise Abatement Section, Virginia Department of Transportation, 1401 E. Broad St., Richmond, VA 23219.

9 REFERENCES

Federal Highway Administration, US Department of Transportation. July 13, 2010. *23 CFR Part 772, as amended 75 FR 39820, Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Washington, DC: http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/

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Federal Highway Administration, US Department of Transportation. January 1998. *FHWA Traffic Noise Model, Version 1.0 User's Guide. FHWA-PD-96-009*. Cambridge, MA: U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Acoustics Facility. http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/users_guide/index.cfm

Federal Highway Administration, US Department of Transportation. February 1998. *FHWA Traffic Noise Model, Version 1.0: Technical Manual, Report No. FHWA-PD-96-010 and DOT-VNTSC-FHWA-98-2*. Cambridge, MA: U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Acoustics Facility. http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/tech_manual/index.cfm

US Department of Transportation, John A. Volpe National Transportation Systems Center. July 2004. *TNM Version 2.5 Addendum to Validation of FHWA's TNM® (TNM) Phase 1 report*. Cambridge, MA. http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/model_validation/

Virginia Department of Transportation. February 20, 2018. *Highway Traffic Noise Impact Analysis Guidance Manual (Version 8)*. Richmond, VA. <http://www.virginiadot.org/projects/pr-noise-walls-about.asp>

Virginia Department of Transportation I-81 Corridor Improvement Study, SIU#4, Tier 2 Environmental Assessment, Preliminary Noise Analysis, November 2015

APPENDIX A PREDICTED TRAFFIC NOISE LEVELS

This appendix provides the predicted noise levels at all the receiver (receptor) locations shown in the study graphics for the 2019 Existing and design-year 2043 No-build and Build alternatives. The receptor sites are organized by CNE. Also provided are the name and location of each receiver site, the number of dwelling units or recreational units assigned, a description of the land use, the applicable Noise Abatement Criteria, and the predicted loudest-hour L_{eq} sound levels. Build alternative sound levels are shown both without and with the effects of potential noise abatement measures, wherever noise barriers were found to be feasible from an engineering standpoint. No-barrier sound levels shown in red indicate impact due to either NAC or substantial increase in existing noise levels. Rows with receptors that are above the line of intersection with a 30-ft barrier are shown shaded in light gray.

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
A-001	532 Fort Lewis Blvd	1	B	Res.	67	56	56	57	56	1
A-002	516 Fort Lewis Blvd	1	B	Res.	67	63	63	64	62	2
A-003	521 Fort Lewis Blvd	1	B	Res.	67	62	62	64	60	4
A-004	503 Fort Lewis Blvd	1	B	Res.	67	66	66	67	61	6
A-005	545 Litchell Rd	1	B	Res.	67	65	65	67	65	2
A-006	519 Litchell Rd	1	B	Res.	67	69	69	70	63	7
A-007	501 Litchell Rd	1	B	Res.	67	74	75	75	60	15
A-008	Po Box 316	1	B	Res.	67	63	64	65	60	5
A-009	Po Box 1604	1	B	Res.	67	66	67	68	64	4
A-010	505 Litchell Rd	1	B	Res.	67	73	73	74	61	12
A-011	531 Fort Lewis Blvd	1	B	Res.	67	59	59	61	56	5
A-012	Hampton Inn Salem, 450 Litchell Rd	1	E	Com.	72	60	60	62	58	4
A-013	541 Fort Lewis Blvd	2	B	Res.	67	57	57	59	53	6
A-014	2252 Medford Rd	2	B	Res.	67	60	60	63	57	6
A-015	2224 Medford Rd	2	B	Res.	67	65	65	66	63	3
A-016	518 Litchell Rd	2	B	Res.	67	68	68	69	68	2
A-017	544 Litchell Rd	2	B	Res.	67	65	65	66	65	1
A-018	536 Fort Lewis Blvd	1	B	Res.	67	56	57	58	55	3
A-019	545 Litchell Rd	1	B	Res.	67	65	65	67	65	2
B-001	368 Fort Lewis Blvd	1	B	Res.	67	62	63	63	60	3
B-002	368 Fort Lewis Blvd	1	B	Res.	67	72	72	72	67	5
B-003	360 Fort Lewis Blvd	1	B	Res.	67	63	63	65	63	2
B-004	326 Fort Lewis Blvd	1	B	Res.	67	59	59	60	59	1
B-005	348 Fort Lewis Blvd	1	B	Res.	67	66	66	67	63	4
B-006	335 Fort Lewis Blvd	1	B	Res.	67	75	75	77	64	13
B-007	Po Box 468	1	B	Res.	67	68	67	69	62	8
B-008	2207 Mitchell Rd	1	B	Res.	67	74	73	74	60	15
B-009	319 Fort Lewis Blvd	1	B	Res.	67	65	65	67	62	5
B-010	800 Pendleton Dr	1	B	Res.	67	62	61	64	57	8
B-011	2141 Windsor Ave	1	B	Res.	67	58	58	60	55	4
B-012	161 Chestnut Hill Trl	1	B	Res.	67	57	57	58	55	4
B-013	2122 Windsor Ave	1	B	Res.	67	63	62	64	59	5
B-014	1785 Millbridge Rd	1	B	Res.	67	64	63	65	64	2
B-015	Po Box 627	1	B	Res.	67	64	63	65	63	2

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
B-016	2118 Windsor Ave	1	B	Res.	67	63	62	65	60	5
B-017	2130 Windsor Ave	1	B	Res.	67	62	62	64	59	5
B-018	2211 Mitchell Rd	1	B	Res.	67	70	69	72	62	10
B-019	368 Fort Lewis Blvd	1	B	Res.	67	62	63	63	62	1
B-020	354 Fort Lewis Blvd	1	B	Res.	67	64	64	66	62	3
B-021	2206 Mitchell Rd	1	B	Res.	67	65	64	67	57	10
B-022	2214 Mitchell Rd	2	B	Res.	67	64	64	66	60	5
B-023	2210 Mitchell Rd	2	B	Res.	67	66	66	68	60	8
B-024	2206 Mitchell Rd	2	B	Res.	67	65	63	67	58	9
B-025	411 Orchard St	2	B	Res.	67	65	64	67	60	7
B-026	2213 Valleydale Rd	2	B	Res.	67	60	59	61	59	2
B-027	1611 Mason St	2	B	Res.	67	63	63	65	61	5
B-028	2140 Windsor Ave	2	B	Res.	67	61	61	63	58	5
B-029	320 Orchard St	1	B	Res.	67	61	61	63	58	5
B-030	140 Whitten St	2	B	Res.	67	62	62	64	62	2
C-001	1723 Skyview Rd	1	B	Res.	67	68	69	70	70	0
C-002	Howard Johnson Salem, 1671 Skyview Rd	1	E	Com.	72	68	69	71	71	0
C-003	1661 Skyview Rd	1	B	Res.	67	63	64	66	66	0
C-004	1474 Skyview Rd	2	B	Res.	67	68	69	69	57	13
C-005	1474 Skyview Rd	2	B	Res.	67	70	71	72	61	11
C-006	1428 Mount Gordon	1	B	Res.	67	60	61	61	54	7
C-007	1418 Mount Gordon	1	B	Res.	67	69	70	70	60	10
C-008	1418 Mount Gordon	1	B	Res.	67	70	71	72	61	11
C-009	1425 Mount Gordon	1	B	Res.	67	66	67	68	59	9
C-010	0 Skyview Rd	1	B	Res.	67	77	78	78	62	16
C-011	1435 Skyview Rd	1	B	Res.	67	73	74	75	62	13
C-012	1408 Skyview Rd	1	B	Res.	67	65	66	68	61	7
C-013	1406 Skyview Rd	1	B	Res.	67	64	65	67	62	5
C-014	1390 Skyview Rd	1	B	Res.	67	65	66	67	63	5
C-015	1379 Skyview Rd	1	B	Res.	67	63	64	65	NA	NA
C-016	1418 Mount Gordon	1	B	Res.	67	65	66	67	58	9
C-017	1408 Skyview Rd	1	B	Res.	67	64	65	67	59	8
D-001	2053 Kiska Rd	1	B	Res.	67	66	67	67	65	2
D-002	2021 Kiska Rd	1	B	Res.	67	62	63	63	62	1

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
D-003	1944 Kiska Rd	1	B	Res.	67	71	72	74	72	2
D-004	2015 Kiska Rd	1	B	Res.	67	61	62	62	61	1
D-005	2008 Kiska Rd	1	B	Res.	67	70	71	73	69	4
D-006	1944 Kiska Rd	1	B	Res.	67	67	68	70	63	7
D-007	1944 Kiska Rd	1	B	Res.	67	65	67	68	60	8
D-008	1928 Kiska Rd	1	B	Res.	67	65	66	67	58	8
D-009	1944 Kiska Rd	1	B	Res.	67	65	66	66	57	9
D-010	1900 Blanchard Ave	1	B	Res.	67	71	73	73	61	12
D-011	1641 Woodhill Ln	1	B	Res.	67	69	71	71	60	11
D-012	1895 Woodmere Ct	1	B	Res.	67	65	66	66	56	10
D-013	Po Box 3071	1	B	Res.	67	68	70	69	59	10
D-014	1863 Woodmere Ct	1	B	Res.	67	63	64	64	55	9
D-015	1862 Woodmere Ct	1	B	Res.	67	69	70	70	59	11
D-016	1846 Woodmere Ct	1	B	Res.	67	70	71	71	60	11
D-017	1847 Woodmere Ct	1	B	Res.	67	64	65	65	55	9
D-018	1838 Woodmere Ct	1	B	Res.	67	70	71	71	60	11
D-019	1839 Woodmere Ct	1	B	Res.	67	67	68	68	57	11
D-020	1825 Blanchard Ave	1	B	Res.	67	70	71	70	60	11
D-021	619 Turner Rd	1	B	Res.	67	67	68	67	57	10
D-022	552 Hudson Rd	1	B	Res.	67	63	64	64	55	9
D-023	613 Turner Rd	1	B	Res.	67	65	66	66	56	10
D-024	1827 Blanchard Ave	1	B	Res.	67	70	71	71	60	11
D-025	1910 Blanchard Ave	1	B	Res.	67	70	71	71	60	11
D-026	Po Box 3071	1	B	Res.	67	68	70	69	59	10
D-027	1870 Woodmere Ct	1	B	Res.	67	69	70	70	59	11
D-028	1854 Woodmere Ct	1	B	Res.	67	69	70	70	59	11
D-029	1830 Woodmere Ct	1	B	Res.	67	68	69	69	58	11
D-030	1887 Woodmere Ct	1	B	Res.	67	63	64	64	54	9
D-031	1871 Woodmere Ct	1	B	Res.	67	62	64	63	54	9
D-032	1855 Woodmere Ct	1	B	Res.	67	63	64	64	55	9
D-033	601 Sexton Ave	1	B	Res.	67	67	68	68	58	10
D-034	1956 Kiska Rd	1	B	Res.	67	65	66	68	61	7
D-035	2051 Kiska Rd	1	B	Res.	67	67	68	67	67	1
D-036	1944 Kiska Rd	1	B	Res.	67	69	70	71	66	5

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
D-037	1938 Kiska Rd	1	B	Res.	67	66	67	68	60	8
D-038	1932 Kiska Rd	1	B	Res.	67	66	67	68	59	8
D-039	2019 Kiska Rd	1	B	Res.	67	62	63	63	62	0
D-040	2003 Kiska Rd	2	B	Res.	67	58	59	60	59	1
D-041	Po Box 2705	2	B	Res.	67	58	59	60	59	1
D-042	1949 Kiska Rd	2	B	Res.	67	58	59	59	57	3
D-043	1937 Kiska Rd	2	B	Res.	67	58	59	60	56	4
D-044	1927 Kiska Rd	2	B	Res.	67	58	59	60	55	5
D-045	1921 Kiska Rd	2	B	Res.	67	59	61	61	55	6
D-046	1909 Kiska Rd	2	B	Res.	67	59	60	61	54	7
D-047	1944 Kiska Rd	2	B	Res.	67	64	65	65	56	9
D-048	2048 Burma Rd	2	B	Res.	67	64	65	65	64	1
D-049	2032 Burma Rd	2	B	Res.	67	61	62	63	63	0
D-050	2016 Burma Rd	2	B	Res.	67	59	60	60	60	0
D-051	609 S Broad St	2	B	Res.	67	57	58	59	58	1
D-052	1902 Burma Rd	1	B	Res.	67	60	62	62	55	7
D-053	1956 Burma Rd	2	B	Res.	67	57	58	59	58	1
D-054	1944 Burma Rd	2	B	Res.	67	60	61	61	58	3
D-055	1938 Burma Rd	2	B	Res.	67	59	60	61	56	4
D-056	1926 Burma Rd	2	B	Res.	67	60	61	61	56	5
D-057	1824 Lawndale Ave	2	B	Res.	67	60	61	61	55	6
D-058	1869 Kiska Rd	2	B	Res.	67	62	63	63	54	9
D-059	1851 Kiska Rd	2	B	Res.	67	60	61	61	53	9
D-060	3237 Cove Rd Rd Nw	1	B	Res.	67	60	61	61	53	8
D-061	1834 Kiska Rd	2	B	Res.	67	62	63	63	54	9
D-062	1828 Lawndale Ave	2	B	Res.	67	61	63	62	54	8
D-063	523 Turner Rd	1	B	Res.	67	62	64	63	54	9
D-064	511 Turner Rd	1	B	Res.	67	62	63	62	54	9
D-065	503 Turner Rd	2	B	Res.	67	61	62	62	54	8
E-001	1726 Starview Dr	1	B	Res.	67	72	73	72	60	12
E-002	624 Turner Rd	1	B	Res.	67	66	67	67	57	10
E-003	1707 Starview Dr	1	B	Res.	67	66	67	67	56	11
E-004	1724 Starview Rd	1	B	Res.	67	70	72	71	60	11
E-005	1700 Starview Dr	1	B	Res.	67	69	70	70	59	12

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
E-006	Church of Christ of Westside, 1705 Starview Dr	1	D	Int.	52	40	41	41	30	11
E-007	1637 Starview Dr	1	B	Res.	67	64	65	65	54	11
E-008	1620 Starview Dr	1	B	Res.	67	68	69	69	57	12
E-009	629 Poplar Ave	1	B	Res.	67	61	62	62	52	10
E-010	615 Poplar Ave	1	B	Res.	67	62	63	64	52	11
E-011	1610 Starview Dr	1	B	Res.	67	67	69	69	57	11
E-012	1547 Poplar Ave	1	B	Res.	67	66	68	68	56	12
E-013	1535 Poplar Ave	1	B	Res.	67	72	74	74	60	14
E-014	1519 Brushy Mtn Dr	1	B	Res.	67	65	66	66	56	10
E-015	1530 Poplar Ave	1	B	Res.	67	62	63	62	53	10
E-016	1527 Poplar Ave	1	B	Res.	67	74	76	76	60	16
E-017	1522 Poplar Ave	1	B	Res.	67	61	62	62	53	9
E-018	1523 Poplar Ave	1	B	Res.	67	75	76	77	61	16
E-019	1514 Poplar Ave	1	B	Res.	67	61	63	62	54	9
E-020	1519 Poplar Ave	1	B	Res.	67	75	76	77	62	14
E-021	208 Crystal Ct	1	B	Res.	67	61	62	62	54	8
E-022	1507 Poplar Ave	1	B	Res.	67	72	73	73	60	14
E-023	3152 W Treece Way	1	B	Res.	67	63	64	64	56	8
E-024	1503 Poplar Ave	1	B	Res.	67	67	68	67	57	10
E-025	1539 Poplar Ave	1	B	Res.	67	71	72	72	59	13
E-026	1303 Penley Blvd	1	B	Res.	67	72	73	74	60	14
E-027	1515 Poplar Ave	1	B	Res.	67	75	76	76	60	16
E-028	1511 Poplar Ave	1	B	Res.	67	72	73	74	60	14
E-029	1526 Poplar Ave	1	B	Res.	67	62	63	62	53	9
E-030	1534 Poplar Ave	1	B	Res.	67	64	65	65	54	11
E-031	1518 Poplar Ave	1	B	Res.	67	61	62	62	53	9
E-032	1510 Poplar Ave	1	B	Res.	67	61	62	62	53	8
E-033	1543 Poplar Ave	1	B	Res.	67	68	70	70	57	12
E-034	1625 Starview Dr	1	B	Res.	67	61	62	62	51	10
E-035	1637 Starview Dr	1	B	Res.	67	62	63	63	53	10
E-036	1636 Starview Dr	1	B	Res.	67	68	70	70	58	12
E-037	1710 Starview Dr	1	B	Res.	67	70	71	71	59	12
E-038	1714 Starview Dr	1	B	Res.	67	69	70	70	58	12
E-039	1501 Brushy Mtn Dr	2	B	Res.	67	62	64	64	55	9

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
E-040	1435 Brushy Mtn Dr	2	B	Res.	67	61	62	62	53	8
E-041	1423 Brushy Mtn Dr	2	B	Res.	67	59	60	60	54	6
E-042	1411 Brushy Mtn Dr	2	B	Res.	67	57	58	57	53	4
E-043	1403 Brushy Mtn Dr	1	B	Res.	67	57	59	58	52	6
E-044	Po Box 544	2	B	Res.	67	64	65	65	55	10
E-045	552 Hudson Rd	1	B	Res.	67	62	63	63	53	10
E-046	1512 Brushy Mountain Dr	2	B	Res.	67	60	61	61	51	10
E-047	1504 Brushy Mtn Dr	1	B	Res.	67	57	58	58	50	8
E-048	1526 Brushy Mountain Dr	2	B	Res.	67	63	64	65	53	12
E-049	1402 Brushy Mtn Dr	1	B	Res.	67	56	57	56	50	6
E-050	2361 Taylors Rd	2	B	Res.	67	57	58	57	50	7
E-051	1422 Brushy Mtn Dr	2	B	Res.	67	55	56	55	49	6
E-052	1410 Brushy Mtn Dr	2	B	Res.	67	54	55	55	50	5
E-053	1511 Carrollton Ave	3	B	Res.	67	58	59	59	50	9
E-054	1527 Carrollton Ave	2	B	Res.	67	60	61	61	50	11
E-055	1429 Carrollton Ave	3	B	Res.	67	55	56	56	49	7
E-056	1411 Carrollton Ave	3	B	Res.	67	55	56	56	50	6
F-001	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	55	7
F-002	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	70	71	71	60	12
F-003	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	65	67	66	57	9
F-004	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	63	65	64	56	8
F-005	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	56	7
F-006	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	55	6
F-007	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	70	71	72	60	11
F-008	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	64	65	65	57	7
F-009	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	63	64	64	57	7
F-010	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	56	6
F-011	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	56	6
F-012	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	67	68	68	60	8
F-013	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	63	64	64	57	6
F-014	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	57	6
F-015	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	63	62	57	6
F-016	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	56	5
F-017	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	66	67	66	60	6

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
F-018	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	63	64	64	58	6
F-019	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	58	5
F-020	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	57	5
F-021	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	65	67	67	62	6
F-022	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	60	61	61	56	5
F-023	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	58	6
F-024	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	58	5
F-025	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	57	5
F-026	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	66	67	67	61	5
F-027	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	60	61	61	57	5
F-028	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	63	64	64	58	5
F-029	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	62	63	63	58	5
F-030	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	61	62	62	57	5
F-031	Salem High School Sport Fields, 400 Spartan Drive	1	C	Rec.	67	60	61	61	56	5
G-001	713 Goodwin Ave	1	B	Res.	67	65	66	67	55	12
G-002	707 Goodwin Ave	1	B	Res.	67	63	65	65	54	11
G-003	3798 Luther Pl	1	B	Res.	67	62	63	64	53	11
G-004	722 Goodwin Ave	1	B	Res.	67	68	69	69	57	13
G-005	589 Valleyview Ave	1	B	Res.	67	63	65	65	54	11
G-006	806 W Carrollton Ave	2	B	Res.	67	65	66	67	55	12
G-007	808 Mcdowell Dr	1	B	Res.	67	64	65	66	61	5
G-008	810 Mcdowell Dr	1	B	Res.	67	68	69	70	64	5
G-009	222 2nd St Se #1104	1	B	Res.	67	58	60	60	55	5
G-010	26 Outerbridge Cir	1	B	Res.	67	62	64	65	63	2
G-011	804 Pendleton Dr	1	B	Res.	67	55	57	57	53	4
G-012	800 Pendleton Dr	1	B	Res.	67	60	61	61	59	3
G-013	812 W Carrollton Ave	1	B	Res.	67	73	74	74	63	11
G-014	814 W Carrollton Ave	1	B	Res.	67	73	74	75	66	9
G-015	810 W Carrollton Ave	1	B	Res.	67	68	69	70	58	11
G-016	500 Hillwood Ave	2	B	Res.	67	61	62	63	60	3
G-017	807 W Carrollton Ave	2	B	Res.	67	58	59	60	53	7
G-018	5230 Cherokee Hills Dr	1	B	Res.	67	67	68	68	56	13
G-019	708 Goodwin Ave	2	B	Res.	67	67	68	68	56	12
G-020	850 High St	1	B	Res.	67	62	63	64	53	11
G-021	1109 Valleyview Ave	1	B	Res.	67	63	64	66	54	12

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
G-022	1107 Valleyview Ave	1	B	Res.	67	63	64	65	53	12
G-023	665 Goodwin Ave	2	B	Res.	67	60	62	62	52	11
G-024	1108 Valleyview Ave	2	B	Res.	67	60	61	61	52	10
G-025	648 Goodwin Ave	2	B	Res.	67	59	60	60	51	10
G-026	811 Pendleton Dr	1	B	Res.	67	57	58	59	51	7
H-001	0 Goodwin Ave	1	B	Res.	67	68	69	70	62	8
H-002	1253 Goodwin Ave	1	B	Res.	67	63	65	66	59	7
H-003	1293 Goodwin Ave	1	B	Res.	67	59	60	61	58	3
H-004	1279 Goodwin Ave	1	B	Res.	67	65	66	68	63	5
H-005	1271 Goodwin Ave	1	B	Res.	67	73	74	75	66	9
H-006	1309 Goodwin Ave	1	B	Res.	67	59	61	62	60	2
H-007	1309 Goodwin Ave	1	B	Res.	67	66	67	68	66	2
H-008	1236 Wildwood Rd	1	B	Res.	67	67	68	69	61	8
H-009	1239 Wildwood Rd Rd	1	B	Res.	67	67	68	68	60	9
H-010	1308 Waldheim Rd	1	B	Res.	67	60	61	62	55	7
H-011	1325 Waldheim Rd	1	B	Res.	67	63	64	64	57	7
H-012	1332 Waldheim Rd	1	B	Res.	67	59	61	62	55	6
H-013	1343 Waldheim Rd	1	B	Res.	67	61	62	62	56	6
H-014	1361 Waldheim Rd	1	B	Res.	67	55	57	57	53	4
H-015	Fellowship Community Church, 1220 Red Ln	1	C	Rec.	67	60	61	61	60	2
H-016	Fellowship Community Church, 1220 Red Ln	1	D	Int.	52	35	37	38	36	1
H-017	1255 Goodwin Ave	1	B	Res.	67	71	73	74	63	11
H-018	1506 Links View Dr	1	B	Res.	67	64	65	66	60	6
H-019	1285 Waldheim Rd	1	B	Res.	67	65	67	67	58	9
H-020	1250 Red Ln	2	B	Res.	67	57	58	59	58	0
H-021	1240 Red Ln	2	B	Res.	67	58	59	60	60	0
H-022	1518 Links View Dr	2	B	Res.	67	67	68	68	63	5
H-023	1306 Aarons Run Cir	2	B	Res.	67	64	65	65	58	7
H-024	1314 Aarons Run Cir	2	B	Res.	67	62	64	64	57	7
H-025	1327 Aarons Run Cir	2	B	Res.	67	60	62	62	56	7
H-026	1309 Goodwin Ave	2	B	Res.	67	62	63	64	62	2
H-027	Fellowship Community Church, 1220 Red Ln	1	D	Int.	52	44	45	46	46	0
I-001	2213 Zana Rd	1	B	Res.	67	70	72	71	59	13
I-002	969 Academy St	1	B	Res.	67	68	69	69	56	13
I-003	956 Kenbridge Pl	1	B	Res.	67	71	72	72	59	13

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CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
I-004	955 Kenbridge Pl	1	B	Res.	67	72	73	74	60	15
I-005	952 Kenbridge Place	1	B	Res.	67	69	70	71	58	12
I-006	1046 Stonegate Dr	1	B	Res.	67	74	75	76	61	15
I-007	951 Kenbridge Pl	1	B	Res.	67	69	71	71	58	14
I-008	1050 Stonegate Dr	1	B	Res.	67	70	71	72	58	14
I-009	1042 Stonegate Dr	1	B	Res.	67	76	77	77	63	15
I-010	1039 Stonegate Dr	1	B	Res.	67	65	66	67	56	10
I-011	1038 Stonegate Dr	1	B	Res.	67	74	75	76	62	13
I-012	1031 Stonegate Dr	1	B	Res.	67	58	59	59	54	6
I-013	1030 Stonegate Dr	1	B	Res.	67	70	72	72	64	8
I-014	1015 Stonegate Dr	1	B	Res.	67	60	61	62	55	6
I-015	1020 Stonegate Dr	1	B	Res.	67	66	67	68	63	5
I-016	1617 Strawberry Mountain Drive	1	B	Res.	67	59	60	61	56	5
I-017	Po Box 849	1	B	Res.	67	63	65	66	56	10
I-018	Po Box 849	1	B	Res.	67	61	62	63	55	8
I-019	Po Box 849	1	B	Res.	67	59	60	60	54	6
I-020	103 North Oaks Dr	1	B	Res.	67	64	65	67	59	8
I-021	110 North Oaks Dr	2	B	Res.	67	63	64	65	56	8
I-022	300 Live Oak Ct	2	B	Res.	67	65	66	67	58	9
I-023	123 North Oaks Dr	1	B	Res.	67	72	73	74	67	7
I-024	124 North Oaks Dr	1	B	Res.	67	60	61	61	56	6
I-025	131 North Oaks Dr	1	B	Res.	67	72	73	74	66	8
I-026	308 Live Oak Ct	1	B	Res.	67	60	61	61	54	8
I-027	139 North Oaks Dr	1	B	Res.	67	73	75	76	68	8
I-028	147 North Oaks Dr	1	B	Res.	67	76	77	77	70	7
I-029	150 North Oaks Dr	1	B	Res.	67	63	64	65	60	5
I-030	409 Deer Run Cir	1	B	Res.	67	60	61	61	57	4
I-031	413 Deer Run Cir	1	B	Res.	67	58	59	59	55	4
I-032	154 North Oaks Dr	1	B	Res.	67	62	63	63	58	5
I-033	142 North Oaks Dr	1	B	Res.	67	64	65	65	60	4
I-034	159 North Oaks Dr	1	B	Res.	67	64	65	66	58	8
I-035	127 North Oaks Dr	1	B	Res.	67	72	73	74	67	7
I-036	151 North Oaks Dr	1	B	Res.	67	76	77	77	70	6
I-037	155 North Oaks Dr	1	B	Res.	67	74	75	76	69	8

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
I-038	135 North Oaks Dr	1	B	Res.	67	73	74	76	67	9
I-039	163 North Oaks Dr	1	B	Res.	67	65	66	68	59	9
I-040	143 North Oaks Dr	1	B	Res.	67	75	76	77	70	7
I-041	175 North Oaks Dr	1	B	Res.	67	74	75	76	67	9
I-042	179 North Oaks Dr	1	B	Res.	67	70	72	72	64	8
I-043	184 North Oaks Dr	1	B	Res.	67	67	68	68	61	7
I-044	496 Deer Run Cir	1	B	Res.	67	66	67	67	61	6
I-045	492 Deer Run Cir	2	B	Res.	67	64	65	66	59	7
I-046	134 North Oaks Dr	3	B	Res.	67	59	60	62	57	5
I-047	1024 Stonegate Dr	1	B	Res.	67	70	71	72	66	6
I-048	1350 Brake Rd	1	B	Res.	67	64	65	66	56	9
I-049	1056 Stonegate Dr	1	B	Res.	67	68	69	70	56	13
I-050	947 Kenbridge Pl	1	B	Res.	67	65	66	67	55	13
I-051	944 Kenbridge Place	1	B	Res.	67	67	67	68	57	11
I-052	967 Academy St	1	B	Res.	67	64	65	65	54	11
I-053	965 Academy St	1	B	Res.	67	64	65	66	54	12
I-054	491 Deer Run Cir	4	B	Res.	67	63	64	64	59	5
I-055	402 Deer Run Cir	2	B	Res.	67	57	58	59	54	5
I-056	809 W Carrollton Ave	2	B	Res.	67	63	64	65	53	12
I-057	938 Kenbridge Pl	2	B	Res.	67	65	65	66	57	9
I-058	1066 Stonegate Dr	2	B	Res.	67	63	64	65	53	12
I-059	941 Kenbridge Pl	2	B	Res.	67	66	67	68	55	13
I-060	133 Bartley Dr	2	B	Res.	67	64	65	66	56	10
I-061	107 Bartley Dr	2	B	Res.	67	59	60	60	53	7
I-062	1009 Stonegate Dr	1	B	Res.	67	58	59	60	54	5
I-063	1010 Stonegate Dr	2	B	Res.	67	56	58	58	53	5
I-064	1002 Red Ln	4	B	Res.	67	62	64	64	61	3
I-065	408 Deer Run Cir	2	B	Res.	67	56	58	58	53	5
I-066	303 Live Oak Ct	1	B	Res.	67	51	52	53	49	4
I-067	4134 Lake Dr Sw	2	B	Res.	67	73	74	74	64	10
I-068	171 North Oaks Dr	2	B	Res.	67	72	73	75	65	11
I-069	947 Academy St	2	B	Res.	67	62	63	64	52	12
I-070	930 Kenbridge Pl	1	B	Res.	67	64	63	63	58	5
I-071	132 Bartley Dr	1	B	Res.	67	58	60	61	51	10
I-072	108 Bartley Dr	2	B	Res.	67	56	57	58	51	7
I-073	209 Bentwood Ct	2	B	Res.	67	57	58	58	51	7

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
J-001	1271 Pickwick Ln	1	B	Res.	67	58	59	60	56	4
J-002	1246 Red Ln Ext	1	B	Res.	67	59	61	62	57	5
J-003	1238 Red Ln Ext	1	B	Res.	67	61	62	64	58	5
J-004	1241 Pickwick Ln	1	B	Res.	67	59	60	61	56	5
J-005	8062 Windward Key Dr	1	B	Res.	67	71	72	73	69	5
J-006	1222 Red Ln Ext	1	B	Res.	67	67	68	70	65	5
J-007	1250 Pickwick Ln	1	B	Res.	67	57	59	60	55	5
J-008	1225 Pickwick Ln	1	B	Res.	67	62	63	64	59	5
J-009	1346 Dennis Ln	1	B	Res.	67	57	58	60	54	5
J-010	1211 Pickwick Ln	1	B	Res.	67	67	68	69	64	6
J-011	1234 Pickwick Ln	1	B	Res.	67	60	62	63	57	6
J-012	1358 Dennis Ln	1	B	Res.	67	59	60	62	56	6
J-013	1200 Pickwick Ln	1	B	Res.	67	72	73	74	67	8
J-014	759 Robin Rd	1	B	Res.	67	66	67	68	61	7
J-015	0 Dennis Ln	1	B	Res.	67	67	68	69	61	8
J-016	1290 Dennis Ln	1	B	Res.	67	61	62	63	55	9
J-017	1276 Dennis Ln	1	B	Res.	67	63	65	65	55	10
J-018	1295 Dennis Ln	1	B	Res.	67	61	62	63	53	10
J-019	1269 Dennis Ln	1	B	Res.	67	65	66	67	57	10
J-020	1295 Dennis Ln	1	B	Res.	67	64	65	66	57	10
J-021	1494 Edgebrook Rd	1	B	Res.	67	65	67	68	58	10
J-022	1475 Edgebrook Rd	1	B	Res.	67	58	59	60	58	2
J-023	1469 Edgebrook Rd	1	B	Res.	67	60	61	63	59	5
J-024	1441 Edgebrook Rd	1	B	Res.	67	61	62	64	62	2
J-025	1437 Edgebrook Rd	1	B	Res.	67	62	63	64	63	1
J-026	1502 Kinloch Ln	2	B	Res.	67	57	58	59	54	5
J-027	1520 Kinloch Ln	3	B	Res.	67	56	58	58	53	5
J-028	1561 Olde Course Ln	2	B	Res.	67	60	61	62	62	0
J-029	1549 Olde Course Ln	2	B	Res.	67	58	59	60	59	1
J-030	1537 Olde Course Ln	2	B	Res.	67	56	57	58	57	1
J-031	1533 Olde Course Ln	1	B	Res.	67	54	55	56	55	2
K-001	1000 Walnut Rd	1	B	Res.	67	62	63	64	54	10
K-002	1581 High St Ext	1	B	Res.	67	62	64	64	56	8
K-003	1705 Walden Cir	1	B	Res.	67	71	72	72	63	10

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
K-004	1551 High St Ext	1	B	Res.	67	62	63	64	56	9
K-005	65 Mcdivitt Rd	1	B	Res.	67	57	59	59	52	8
K-006	1711 Walden Cir	2	B	Res.	67	72	73	74	65	9
K-007	1231 Thompson Memorial Dr	1	B	Res.	67	66	67	68	68	0
K-008	1231 Thompson Memorial Dr	2	B	Res.	67	65	66	66	66	0
K-009	1704 Walden Cir	2	B	Res.	67	67	68	69	59	9
K-010	1710 Walden Cir	2	B	Res.	67	65	66	67	58	8
K-011	1714 Walden Cir	2	B	Res.	67	61	62	62	55	7
K-012	1719 Walden Cir	1	B	Res.	67	69	70	71	70	1
K-013	1721 Walden Cir	1	B	Res.	67	64	65	66	66	1
L-001	1231 Thompson Memorial Dr	1	B	Res.	67	69	70	71	61	10
M-001	1468 Deborah Ln	1	B	Res.	67	68	69	69	61	8
M-002	1444 Deborah Ln	1	B	Res.	67	67	69	70	63	7
M-003	1428 Deborah Ln	1	B	Res.	67	62	63	64	61	3
M-004	1436 Deborah Ln	1	B	Res.	67	65	66	67	61	5
M-005	1436 Deborah Ln	1	B	Res.	67	72	73	75	63	12
M-006	0 Thompson Memorial Dr	1	B	Res.	67	62	63	64	60	4
M-007	1534 Deborah Ln	1	B	Res.	67	73	74	75	66	9
M-008	1544 Deborah Ln	1	B	Res.	67	67	68	69	65	5
M-009	1460 Thompson Memorial Dr	1	B	Res.	67	60	61	63	61	2
M-010	1588 Deborah Ln	1	B	Res.	67	66	67	68	67	1
M-011	1460 Thompson Memorial Dr	1	B	Res.	67	62	63	64	62	2
M-012	1594 Deborah Ln	1	B	Res.	67	65	66	67	66	2
N-001	341 Penguin Ln	1	B	Res.	67	67	68	69	61	8
N-002	350 Penguin Ln	1	B	Res.	67	55	56	57	53	4
N-003	304 Polar Ln	1	B	Res.	67	62	63	64	58	6
N-004	349 Penguin Ln	1	B	Res.	67	56	57	58	54	4
N-005	308 Polar Ln	1	B	Res.	67	61	62	64	59	5
N-006	312 Polar Ln	1	B	Res.	67	58	59	61	55	5
N-007	200 Northern Trl	2	B	Res.	67	59	60	62	57	5
N-008	351 Polar Ln	1	B	Res.	67	55	56	58	55	3
N-009	208 Northern Trl	1	B	Res.	67	54	55	56	54	3
N-010	225 Northern Trl	1	B	Res.	67	65	66	68	64	5
N-011	999 Polar Ln	1	B	Res.	67	67	68	71	69	1

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
N-012	1125 Polar Ln	1	B	Res.	67	65	66	67	67	0
N-013	316 Polar Ln	1	B	Res.	67	57	58	59	55	4
N-014	324 Polar Ln	2	B	Res.	67	45	46	46	42	4
N-015	345 Penguin Ln	1	B	Res.	67	58	59	60	55	5
N-016	357 Penguin Ln	2	B	Res.	67	53	55	55	53	2
O-001	1559 Dalmation Ln	1	B	Res.	67	58	59	60	NA	NA
O-002	1577 Dalmation Ln	1	B	Res.	67	58	59	60	NA	NA
P-001	Belmont Inn Suites, 179 Sheraton Dr	1	E	Com.	72	53	54	55	55	0
P-002	Fairfield Inn & Suites, 931 South Ave	1	E	Com.	72	62	63	64	64	0
Q-002	6263 Cove Rd	1	B	Res.	67	73	74	75	64	11
Q-003	6247 Cove Rd	1	B	Res.	67	69	70	71	65	6
Q-004	6231 Cove Rd	1	B	Res.	67	67	68	69	65	4
Q-005	The Retreat Apts-Bldg 2, FI 1, 6520 Downhill Dr	4	B	Res.	67	65	66	67	61	6
Q-006	The Retreat Apts-Bldg 2, FI 2, 6520 Downhill Dr	4	B	Res.	67	66	67	68	62	6
Q-007	The Retreat Apts-Bldg 2, FI 3, 6520 Downhill Dr	4	B	Res.	67	68	69	69	63	6
Q-008	The Retreat Apts-Bldg 2, FI 1, 6520 Downhill Dr	4	B	Res.	67	64	65	66	62	5
Q-009	The Retreat Apts-Bldg 2, FI 2, 6520 Downhill Dr	4	B	Res.	67	66	67	68	62	5
Q-010	The Retreat Apts-Bldg 2, FI 3, 6520 Downhill Dr	4	B	Res.	67	67	68	68	63	5
Q-011	The Retreat Apts-Bldg 5, FI 1, 6520 Downhill Dr	4	B	Res.	67	61	62	61	56	6
Q-012	The Retreat Apts-Bldg 5, FI 2, 6520 Downhill Dr	4	B	Res.	67	63	64	64	57	7
Q-013	The Retreat Apts-Bldg 5, FI 3, 6520 Downhill Dr	4	B	Res.	67	65	66	66	59	7
Q-014	The Retreat Apts-Bldg 5, FI 1, 6520 Downhill Dr	4	B	Res.	67	58	59	60	56	4
Q-015	The Retreat Apts-Bldg 5, FI 2, 6520 Downhill Dr	4	B	Res.	67	61	62	63	57	6
Q-016	The Retreat Apts-Bldg 5, FI 3, 6520 Downhill Dr	4	B	Res.	67	62	63	64	58	6
Q-017	The Retreat Apts-Bldg 1, FI 1, 6520 Downhill Dr	3	B	Res.	67	63	64	65	61	4
Q-018	The Retreat Apts-Bldg 1, FI 2, 6520 Downhill Dr	3	B	Res.	67	65	66	67	62	4
Q-019	The Retreat Apts-Bldg 1, FI 3, 6520 Downhill Dr	3	B	Res.	67	65	67	67	63	5
Q-020	The Retreat Apts-Bldg 1, FI 1, 6520 Downhill Dr	3	B	Res.	67	62	63	64	61	3
Q-021	The Retreat Apts-Bldg 1, FI 2, 6520 Downhill Dr	3	B	Res.	67	64	65	66	62	4
Q-022	The Retreat Apts-Bldg 1, FI 3, 6520 Downhill Dr	3	B	Res.	67	65	66	67	63	4
Q-023	The Retreat Apts-Bldg 4, FI 1, 6520 Downhill Dr	3	B	Res.	67	55	56	56	55	1
Q-024	The Retreat Apts-Bldg 4, FI 2, 6520 Downhill Dr	3	B	Res.	67	56	57	57	56	1
Q-025	The Retreat Apts-Bldg 4, FI 3, 6520 Downhill Dr	3	B	Res.	67	59	60	61	60	1
Q-026	The Retreat Apts-Bldg 4, FI 1, 6520 Downhill Dr	3	B	Res.	67	57	58	56	55	1
Q-027	The Retreat Apts-Bldg 4, FI 2, 6520 Downhill Dr	3	B	Res.	67	56	57	57	56	1

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
Q-028	The Retreat Apts-Bldg 4, FI 3, 6520 Downhill Dr	3	B	Res.	67	62	63	61	60	1
Q-029	The Retreat Apts-Bldg 3, FI 1, 6520 Downhill Dr	3	B	Res.	67	60	61	59	55	4
Q-030	The Retreat Apts-Bldg 3, FI 1, 6520 Downhill Dr	3	B	Res.	67	59	60	59	54	5
Q-031	The Retreat Apts-Bldg 3, FI 2, 6520 Downhill Dr	3	B	Res.	67	61	62	60	57	3
Q-032	The Retreat Apts-Bldg 3, FI 3, 6520 Downhill Dr	3	B	Res.	67	63	64	63	61	2
Q-033	The Retreat Apts-Bldg 3, FI 2, 6520 Downhill Dr	3	B	Res.	67	60	61	61	57	4
Q-034	The Retreat Apts-Bldg 3, FI 3, 6520 Downhill Dr	3	B	Res.	67	63	64	64	62	2
Q-035	The Retreat Apts-Bldg 8, FI 1, 6520 Downhill Dr	4	B	Res.	67	47	48	48	47	1
Q-036	The Retreat Apts-Bldg 8, FI 2, 6520 Downhill Dr	4	B	Res.	67	49	50	50	49	0
Q-037	The Retreat Apts-Bldg 8, FI 3, 6520 Downhill Dr	4	B	Res.	67	52	53	53	52	1
Q-038	The Retreat Apts-Bldg 8, FI 1, 6520 Downhill Dr	4	B	Res.	67	47	48	48	47	1
Q-039	The Retreat Apts-Bldg 8, FI 2, 6520 Downhill Dr	4	B	Res.	67	49	50	50	49	0
Q-040	The Retreat Apts-Bldg 8, FI 3, 6520 Downhill Dr	4	B	Res.	67	52	53	53	52	1
Q-041	The Retreat Apts-Bldg 7, FI 1, 6520 Downhill Dr	3	B	Res.	67	51	52	51	50	1
Q-042	The Retreat Apts-Bldg 7, FI 2, 6520 Downhill Dr	3	B	Res.	67	52	53	51	51	1
Q-043	The Retreat Apts-Bldg 7, FI 3, 6520 Downhill Dr	3	B	Res.	67	55	56	54	53	1
Q-044	The Retreat Apts-Bldg 7, FI 1, 6520 Downhill Dr	3	B	Res.	67	52	53	53	52	1
Q-045	The Retreat Apts-Bldg 7, FI 2, 6520 Downhill Dr	3	B	Res.	67	53	54	54	53	0
Q-046	The Retreat Apts-Bldg 7, FI 3, 6520 Downhill Dr	3	B	Res.	67	54	55	56	55	1
Q-047	The Retreat Apts-Bldg 6, FI 1, 6520 Downhill Dr	3	B	Res.	67	56	57	58	58	0
Q-048	The Retreat Apts-Bldg 6, FI 2, 6520 Downhill Dr	3	B	Res.	67	57	58	59	58	0
Q-049	The Retreat Apts-Bldg 6, FI 3, 6520 Downhill Dr	3	B	Res.	67	58	59	60	59	0
Q-050	The Retreat Apts-Bldg 6, FI 1, 6520 Downhill Dr	3	B	Res.	67	54	55	56	56	0
Q-051	The Retreat Apts-Bldg 6, FI 2, 6520 Downhill Dr	3	B	Res.	67	55	56	57	57	0
Q-052	The Retreat Apts-Bldg 6, FI 3, 6520 Downhill Dr	3	B	Res.	67	56	57	58	57	1
Q-053	The Retreat Apts-Clubhouse, FI 1, 6520 Downhill Dr	1	B	Res.	67	59	60	50	49	1
Q-054	The Retreat Apts-Bldg 9, FI 1, 6520 Downhill Dr	9	B	Res.	67	50	51	49	49	0
Q-055	The Retreat Apts-Bldg 9, FI 1, 6520 Downhill Dr	9	B	Res.	67	51	52	49	48	1
Q-056	The Retreat Apts-Bldg 10, FI 1, 6520 Downhill Dr	12	B	Res.	67	51	51	49	48	1
Q-057	The Retreat Apts-Bldg 10, FI 1, 6520 Downhill Dr	12	B	Res.	67	49	50	49	48	1
Q-058	The Retreat Apts-Bldg 11, FI 1, 6520 Downhill Dr	24	B	Res.	67	48	49	48	48	1
Q-059	The Retreat Apts-Bldg 12, FI 1, 6520 Downhill Dr	24	B	Res.	67	48	49	48	47	1
R-001	1847 Louise Wells Dr	1	B	Res.	67	67	68	68	64	4
R-002	1882 Loch Haven Dr	1	B	Res.	67	70	71	72	65	7

Table A-1: Predicted Existing (2019) and Design Year (2043) No-Build and Build Conditions due to Traffic on I-81

CNE-Site No.	Address	Recp. Units	Cat.*	Land Use*	NAC Imp. Crit.	Loudest-Hour Leq (dBA)**				
						Existing	No-Build	Build		
								No-Barrier	With-Barrier	IL
R-003	1847 Louise Wells Dr	1	B	Res.	67	64	65	63	59	4

* Cat. Refers to FHWA Activity Category. Res.= Residential, Rec.= Recreational, Mon.= Noise Monitoring Site, Com.= Commercial, Int.=Interior Institutional
 ** Red numbers indicate noise impact due to NAC or Substantial Increase in existing noise levels. Some subtractions may appear to be incorrect due to rounding of decibels. 0 or NA indicates receptors not behind barriers, or set back and not impacted where benefits were not determined. Shaded Rows are receptors above the point of intersection and not counted as benefited.
 Source: HMMH, 2020

APPENDIX B TRAFFIC DATA USED IN NOISE ANALYSIS

This appendix provides the loudest-hour roadway traffic volumes and speeds used in the noise modeling for the 2019 Existing conditions, as well as the 2043 No-build and Build alternatives. The mainline data are listed first, followed by ramp data and local street data. The blue areas are the final traffic volumes and speeds that were used in the TNM modeling. The other numbers are those in the spreadsheet used to develop the final traffic from the information provided. The traffic data for 2043 No-build and Build conditions are the same, except for the I-81 mainline, for which the No-build speed is 65 mph, and the Build alternative speed is 70 mph. These are the same speeds as used in the 2015 I-81 Corridor Improvement Study Preliminary Noise Analysis.

MAINLINE I-81 DATA

		S. of Wildwood (112) Int. I-81 Exit 132-137		Wildwood (112) to 311 I-81 Exit 137-140		Rt. 311 to Rt. 419 I-81 Exit 140-141		North of Rt. 419 I-81 Exit 141-143			
		NB	SB	NB	SB	NB	SB	NB	SB		
Existing 2019 ADT		27296.00	23149.00	31659.00	31765.00	33436.00	33587.00	36787.00	36368.00		
Ex. PM Pk Hr		2235.00	2303.00	2596.00	2869.00	2703.00	2762.00	3068.00	3074.00		
Peak Hr. % MT		0.03	0.01	0.02	0.01	0.02	0.01	0.02	0.02		
Peak Hr. % HT		0.19	0.15	0.18	0.13	0.19	0.16	0.15	0.15		
Peak Hr. % Total Trk		0.22	0.17	0.20	0.14	0.21	0.17	0.17	0.17		
<i>MT/HT ratio</i>		0.15	0.10	0.13	0.07	0.11	0.09	0.10	0.11	Existing Speed	
Exist. I-81 PM Pk Hr. Autos		1737	1916	2079	2456	2135	2284	2550	2561	65	
volumes for TNM MT		65	34	60	29	57	39	46	49	65	
HT		434	353	456	384	511	439	472	464	65	
2043 ADT		31882	27038	41537	41676	43066	43260	47382	46842		
Scale factor		1	1	1	1	1	1	1	1		
Scaled 2043 PM Pk		2611	2690	3406	3764	3481	3557	3952	3959		
Peak Hr. % MT		0	0	0	0	0	0	0	0		
Peak Hr. % HT		0	0	0	0	0	0	0	0		
Peak Hr. % Total Trk		0	0	0	0	0	0	0	0		
<i>MT/HT ratio</i>		0	0	0	0	0	0	0	0	No-build Speed	Build Speed
2043 I-81 PM Pk Hr. Autos		2028	2238	2728	3222	2750	2942	3284	3298	65	70
volumes for TNM MT		76	40	79	38	73	50	59	63	65	70
HT		507	412	599	504	658	566	609	598	65	70

RAMP DATA

Ramp 1 - Exit 137: I-81 NB Exit Ramp to Route 112 (Wildwood Road)

	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2590.00	Autos	213	252	50
DY 2043 ADT	3061.00	MT	0	0	0
Existing PM Pk Hr	213.00	HT	0	0	0
DY 2043 PM Pk Hr	251.73				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.00				

Ramp 2 - Exit 137: I-81 NB Entrance Ramp from Route 112 (Wildwood Road)

	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	7232.00	Autos	635	751	50
DY 2043 ADT	8548.00	MT	3	3	50
Existing PM Pk Hr	645.00	HT	7	8	50
DY 2043 PM Pk Hr	762.37				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.02				
Class 4-7	0.01				
Class 8-13	0.01				

Ramp 3 - Exit 137: I-81 SB Exit Ramp to Route 112 (Wildwood Road)

	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	6729.00	Autos	669	791	30
DY 2043 ADT	7954.00	MT	3	3	30
Existing PM Pk Hr	679.00	HT	7	9	30
DY 2043 PM Pk Hr	802.61				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.02				
Class 4-7	0.01				
Class 8-13	0.01				

Ramp 4 - Exit 137: I-81 SB Entrance Ramp from Route 112 (Wildwood Road)

	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2349.00	Autos	189	224	30
DY 2043 ADT	2777.00	MT	0	0	0
Existing PM Pk Hr	191.00	HT	2	2	30
DY 2043 PM Pk Hr	225.80				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.01				
Class 4-7	0.00				
Class 8-13	0.01				

RAMP DATA

Ramp 5 - Exit 140: I-81 NB Exit Ramp to Route 311 (Thompson Memorial Drive)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2608.00	Autos	241	322	40
DY 2043 ADT	3489.00	MT	2	2	40
Existing PM Pk Hr	243.00	HT	1	1	40
DY 2043 PM Pk Hr	325.09				
MT % in Pk Hr	0.01				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.01				
Class 4-7	0.01				
Class 8-13	0.00				

Ramp 6 - Exit 140: I-81 NB Entrance Ramp from Route 311 (Thompson Memorial Drive)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	4303.00	Autos	478	640	40
DY 2043 ADT	5757.00	MT	1	1	40
Existing PM Pk Hr	480.00	HT	1	1	40
DY 2043 PM Pk Hr	642.19				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.00				
Class 4-7	0.00				
Class 8-13	0.00				

Ramp 7 - Exit 140: I-81 SB Exit Ramp to Route 311 (Thompson Memorial Drive)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	4291.00	Autos	442	591	25
DY 2043 ADT	5741.00	MT	0	0	0
Existing PM Pk Hr	442.00	HT	0	0	0
DY 2043 PM Pk Hr	591.36				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.00				
Class 4-7	0.00				
Class 8-13	0.00				

Ramp 8 - Exit 140: I-81 SB Entrance Ramp from Route 311 (Thompson Memorial Drive)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2412.00	Autos	268	359	25
DY 2043 ADT	3227.00	MT	1	1	25
Existing PM Pk Hr	271.00	HT	2	3	25
DY 2043 PM Pk Hr	362.57				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.01				
Class 4-7	0.00				
Class 8-13	0.01				

RAMP DATA

Ramp 9 - Exit 141: I-81 NB Exit Ramp to Route 419 (Electric Road)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2725.00	Autos	266	356	30
DY 2043 ADT	3645.00	MT	3	4	30
Existing PM Pk Hr	270.00	HT	1	1	30
DY 2043 PM Pk Hr	361.16				
MT % in Pk Hr	0.01				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.02				
Class 4-7	0.02				
Class 8-13	0.00				

Ramp 10 - Exit 141: I-81 NB Entrance Ramp from Route 419 (Electric Road)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	6214.00	Autos	608	814	30
DY 2043 ADT	8314.00	MT	1	2	30
Existing PM Pk Hr	612.00	HT	2	3	30
DY 2043 PM Pk Hr	818.82				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.00				
Total Trks Pk Hr	0.01				
Class 4-7	0.00				
Class 8-13	0.00				

Ramp 11 - Exit 141: I-81 SB Exit Ramp to Route 419 (Electric Road)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	6262.00	Autos	584	782	30
DY 2043 ADT	8380.00	MT	2	3	30
Existing PM Pk Hr	590.00	HT	4	5	30
DY 2043 PM Pk Hr	789.56				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.01				
Class 4-7	0.01				
Class 8-13	0.00				

Ramp 12 - Exit 141: I-81 SB Entrance Ramp from Route 419 (Electric Road)					
	Total Traffic		Exist. VPH	2043 VPH	Speed
Existing 2017 ADT	2907.00	Autos	274	366	30
DY 2043 ADT	3882.00	MT	1	1	30
Existing PM Pk Hr	277.00	HT	2	3	30
DY 2043 PM Pk Hr	369.91				
MT % in Pk Hr	0.00				
HT % in Pk Hr	0.01				
Total Trks Pk Hr	0.01				
Class 4-7	0.00				
Class 8-13	0.01				

LOCAL CROSS-STREET DATA

Route 112 Wildwood Road Interchange - south of I-81 (From NCL Salem to I81)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	20360.00	Autos	816	978	35	
DY 2043 ADT	24406.00	MT	10	12	35	
Existing PM Pk Hr NB	828.00	HT	2	3	35	
DY 2043 PM Pk Hr NB	992.54					
Existing PM Pk Hr SB	973.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	1166.36	Autos	958	1149	35	
MT % in Pk Hr	0.01	MT	12	14	35	
HT % in Pk Hr	0.00	HT	3	3	35	
Total Trks Pk Hr	0.02					

Route 112 Wildwood Road Interchange - north of I-81 (from I-81 to FR 70)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	908.00	Autos	62	69	35	
DY 2043 ADT	1017.00	MT	1	1	35	
Existing PM Pk Hr NB	63.00	HT	0	0	35	
DY 2043 PM Pk Hr NB	70.56					
Existing PM Pk Hr SB	38.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	42.56	Autos	37	42	35	
MT % in Pk Hr	0.02	MT	1	1	35	
HT % in Pk Hr	0.01	HT	0	0	35	
Total Trks Pk Hr	0.02					

Academy Street/Wildwood Rd at I-81 (from W. Carrolton Ave to Route 619 (Wildwood Road))						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	1950.00	Autos	112	128	35	
DY 2043 ADT	2225.00	MT	1	1	35	
Existing PM Pk Hr NB	113.00	HT	0	0	35	
DY 2043 PM Pk Hr NB	128.94					
Existing PM Pk Hr SB	73.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	83.29	Autos	73	83	35	
MT % in Pk Hr	0.01	MT	0	0	35	
HT % in Pk Hr	0.00	HT	0	0	35	
Total Trks Pk Hr	0.01					

Thompson Mem. Dr. Route 311 south of I-81 (from Rose Ln to NCL Salem)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	13707.00	Autos	865	968	45	
DY 2043 ADT	15352.00	MT	6	7	45	
Existing PM Pk Hr NB	875.00	HT	4	5	45	
DY 2043 PM Pk Hr NB	980.01					
Existing PM Pk Hr SB	705.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	789.61	Autos	697	780	45	
MT % in Pk Hr	0.01	MT	5	6	45	
HT % in Pk Hr	0.01	HT	4	4	45	
Total Trks Pk Hr	0.01					

LOCAL CROSS-STREET DATA

Thompson Mem. Dr. Route 311 north of I-81 (NCL Salem to Route 419)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	5934.00	Autos	345	386	45	
DY 2043 ADT	6646.00	MT	2	3	45	
Existing PM Pk Hr NB	349.00	HT	2	2	45	
DY 2043 PM Pk Hr NB	390.88					
Existing PM Pk Hr SB	254.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	284.48	Autos	251	281	45	
MT % in Pk Hr	0.01	MT	2	2	45	
HT % in Pk Hr	0.01	HT	1	1	45	
Total Trks Pk Hr	0.01					

N. Electric Rd. Route 419 south of I-81 (from NCL Salem to I-81)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	12773.00	Autos	810	908	45	
DY 2043 ADT	14306.00	MT	3	4	45	
Existing PM Pk Hr NB	827.00	HT	13	15	45	
DY 2043 PM Pk Hr NB	926.26					
Existing PM Pk Hr SB	684.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	766.09	Autos	670	751	45	
MT % in Pk Hr	0.00	MT	3	3	45	
HT % in Pk Hr	0.02	HT	11	12	45	
Total Trks Pk Hr	0.02					

N. Electric Rd. Route 419 north of I-81 (from I-81 to Route 311)						
	Total Traffic	Northbound	Exist. VPH	2043 VPH	Speed	
Existing 2019 ADT	9353.00	Autos	659	738	45	
DY 2043 ADT	10475.00	MT	3	3	45	
Existing PM Pk Hr NB	672.00	HT	11	12	45	
DY 2043 PM Pk Hr NB	752.61					
Existing PM Pk Hr SB	406.00	Southbound	Exist. VPH	2043 VPH	Speed	
DY 2043 PM Pk Hr SB	454.70	Autos	398	446	45	
MT % in Pk Hr	0.00	MT	2	2	45	
HT % in Pk Hr	0.02	HT	6	7	45	
Total Trks Pk Hr	0.02					

APPENDIX C RESPONSE FROM VDOT PROJECT MANAGEMENT ON ALTERNATIVE NOISE ABATEMENT MEASURES

This appendix includes a memo and survey sent to the VDOT project managers about the potential for use of alternative noise abatement measures, pursuant to Virginia House Bill 2577.

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HMMH

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MEMORANDUM

To: Craig Moore, P.E., Project Manager, Environmental Contact, VDOT
cc: LJ Muchenje, P.E., Noise Abatement Section, VDOT
From: Christopher Menge, Noise Abatement Engineer
Subject: UPC 116203, I-81 Widening MM 136-142, noise study
Virginia HB 2577 form
Reference: HMMH No. 309820.006
Date: July 21, 2020



The 2009 General Assembly passed Chapter 120 (HB 2577, as amended by HB 2025), which amends the Code of Virginia by adding in Article 15 of Chapter 1 of Title 33.1 a section numbered 33.1-223.2:21, relating to highway noise abatement.

House Bill 2577 States: Requires that whenever the CTB or the Department plan for or undertake any highway construction or improvement project and such project includes or may include the requirement for the mitigation of traffic noise impacts, consideration *should* be given to the use of noise reducing design and low noise pavement materials and techniques in lieu of construction of noise walls or sound barriers. Landscaping in such a design would be utilized to act as a visual screen if visual screening is required.

In an effort to honor the intent of HB 2577 we are asking for your input (per [Chapter VI of Materials Division's Manual of Instruction](#) and [Section 2B-3 Determination of Roadway Design](#) of the VDOT Road Design manual (pages 2B-5 and 2B-6)). As part of the Noise Technical Report and technical files, we are seeking your professional opinion by providing comments for the project noted above. Please distribute this memorandum to the appropriate District staff and combine all responses into one response.

Should you have any questions, please contact me at (781) 223-8944, Jim Ponticello at (804) 371-6769 or LJ Muchenje at (804) 371-6768. Thank you for your time and consideration regarding this request.

Comment: Is noise reducing design feasible in lieu of construction of noise walls or sound barriers? For example, the roadway alignment can be shifted away from noise sensitive receptors or the roadway can be placed in deep cut (Location & Design to address)

Response: Noise reducing design is unfeasible as existing I-81 horizontal and vertical alignment governs location of scoped project improvements. Larger variations, either horizontal or vertical, will further project impacts to adjacent properties theoretically increasing receptor sensitivities.

Comment: Can the project support the use of low noise pavement in lieu of construction of noise walls or sound barriers? (Materials Division to address)

Response: The Virginia Department of Transportation is not authorized by the Federal Highway Administration to use "quiet pavement" at this time as a form of noise mitigation. The design team is unsure of the status of the pilot program.

From previous experience of the design team, 'quiet pavement' has produced certain challenges that may affect the viability of its use on UPC 116203. The porous nature of the pavement provides voids that allows runoff to penetrate the surface and when introduced in areas where freeze/thaw is common, increased pavement maintenance efforts may result. Roadway debris (sand, dirt, etc.) can 'clog' the voids that can reduce the noise reduction effectiveness of the pavement structure. Experience has also found that porous pavement structures typically come with an associated cost premium.

Comment: Can landscaping be utilized to act as a visual screen if visual screening is required? (Location & Design to address)

Response: Note 1 on all plan sheets reference potential to restore removed vegetation. While not exactly the same, this note may need adjusting depending on landscaping approach. Our initial thought is that screening is very location specific. Existing topography may present locations where landscaping is more feasible than others.

Note: Please provide the name of each responder.

APPENDIX D WARRANTED, FEASIBLE AND REASONABLE WORKSHEETS

This appendix provides the required Warranted, Feasible and Reasonable Worksheets for all the warranted noise barriers.

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier A
Community Name and/or CNE#	A
Noise Abatement Category(s)	B and E
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 13 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 4 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 31% |
| d. | Is the percentage 50 or greater? | No |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	64,375 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	4
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	
d. Total number of benefited receptors.	4
e. Surface Area per benefited receptor unit. (ft ² /BR)	16,094 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	2,148 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,703,750
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	No
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier B
Community Name and/or CNE#	B
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 17 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 15 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 88% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	62,700 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	15
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	9
d. Total number of benefited receptors.	24
e. Surface Area per benefited receptor unit. (ft ² /BR)	2,613 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	2,596 ft
b. Height range of the proposed noise barrier. (ft)	18-26
c. Average height of the proposed noise barrier. (ft)	24 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,633,400
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	Roanoke County
District:	Salem
Barrier System ID:	Barrier C
Community Name and/or CNE#	C
Noise Abatement Category(s)	B and E
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 17 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 14 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 82% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	63,078 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	14
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	1
d. Total number of benefited receptors.	15
e. Surface Area per benefited receptor unit. (ft ² /BR)	4,205 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	2,104 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,649,276
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	31-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier D-E-F-G-I
Community Name and/or CNE#	D, E, F, G, I
Noise Abatement Category(s)	B, C, and D
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 99 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 95 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 96% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	290,911 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	95
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	138
d. Total number of benefited receptors.	233
e. Surface Area per benefited receptor unit. (ft ² /BR)	1,249 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	11,191 ft
b. Height range of the proposed noise barrier. (ft)	26 ft
c. Average height of the proposed noise barrier. (ft)	26 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$12,218,262
f. Barrier Material	Absorptive

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier H
Community Name and/or CNE#	H
Noise Abatement Category(s)	B, C, and D
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 12 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 11 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 92% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	74,231 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	11
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	10
d. Total number of benefited receptors.	21
e. Surface Area per benefited receptor unit. (ft ² /BR)	3,535 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	3,713 ft
b. Height range of the proposed noise barrier. (ft)	20 ft
c. Average height of the proposed noise barrier. (ft)	20 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$3,117,702
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	7-Aug-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier I-K
Community Name and/or CNE#	I, K
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

1	Community Documentation (if applicable)	
a.	Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued).	NA
b.	Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	NA
c.	Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate."	NA
2	Criteria requiring consideration of noise abatement	
a.	Project causes design year noise levels to approach or exceed the Noise Abatement Criteria?	Yes
b.	Project causes a substantial noise increase of 10 dB(A) or more?	No

Feasibility

1	Impacted receptor units	
a.	Number of impacted receptor units:	36
b.	Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL):	31
c.	Percentage of impacted receptor units receiving 5 dB(A) or more IL	86%
d.	Is the percentage 50 or greater?	Yes
2	Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues?	NA
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	NA
4	Will placement of the noise barrier conflict with existing utility locations?	NA

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	55,360 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	31
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	25
d. Total number of benefited receptors.	56
e. Surface Area per benefited receptor unit. (ft ² /BR)	989 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	Yes
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	3,462 ft
b. Height range of the proposed noise barrier. (ft)	16 ft
c. Average height of the proposed noise barrier. (ft)	16 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,325,120
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	Yes

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	6-Aug-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	Roanoke County/City of Salem
District:	Salem
Barrier System ID:	Barrier J
Community Name and/or CNE#	J
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|------|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 9 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 9 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 100% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	49,774 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	9
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	17
d. Total number of benefited receptors.	26
e. Surface Area per benefited receptor unit. (ft ² /BR)	1,914 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	2,481 ft
b. Height range of the proposed noise barrier. (ft)	18-21 ft
c. Average height of the proposed noise barrier. (ft)	20 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,090,508
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	City of Salem
District:	Salem
Barrier System ID:	Barrier L-N
Community Name and/or CNE#	L and N
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 5 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 3 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 60% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	112,594 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	3
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6
d. Total number of benefited receptors.	9
e. Surface Area per benefited receptor unit. (ft ² /BR)	12,510 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	3,755 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$4,728,948
f. Barrier Material	Absorptive

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	Roanoke County
District:	Salem
Barrier System ID:	Barrier M
Community Name and/or CNE#	M
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 8 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 6 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 75% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	50,528 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	0
d. Total number of benefited receptors.	6
e. Surface Area per benefited receptor unit. (ft ² /BR)	8,421 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	1,683 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,122,176
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	Roanoke County
District:	Salem
Barrier System ID:	Barrier Q
Community Name and/or CNE#	Q
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|-----|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 15 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 14 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 93% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	72,211 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	14
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	19
d. Total number of benefited receptors.	33
e. Surface Area per benefited receptor unit. (ft ² /BR)	2,188 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	22,409 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$3,032,862
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

**VDOT Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet**

Note: Not all questions apply depending on the design phase which may cause differing answers between preliminary and final design phase. Answers to the questions may change depending on the design phase of the project.

Date:	29-Jul-20
Project No. and UPC:	VDOT Project No. 0081-80-946 UPC 116203
County:	Roanoke County
District:	Salem
Barrier System ID:	Barrier R
Community Name and/or CNE#	R
Noise Abatement Category(s)	B
Design phase:	Preliminary design

Warranted

- | | | |
|----|--|-----|
| 1 | Community Documentation (if applicable) | |
| a. | Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). | NA |
| b. | Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): | NA |
| c. | Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." | NA |
| 2 | Criteria requiring consideration of noise abatement | |
| a. | Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? | Yes |
| b. | Project causes a substantial noise increase of 10 dB(A) or more? | No |

Feasibility

- | | | |
|----|---|------|
| 1 | Impacted receptor units | |
| a. | Number of impacted receptor units: | 2 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 2 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 100% |
| d. | Is the percentage 50 or greater? | Yes |
| 2 | Will placement of the noise barrier cause engineering or safety conflicts, e.g drainage issues or site distance issues? | NA |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | NA |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | NA |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²)	49,960 SF
b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	2
c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	1
d. Total number of benefited receptors.	3
e. Surface Area per benefited receptor unit. (ft ² /BR)	16,653 SF/BR
f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2 Additional Noise Barrier Details

a. Length of the proposed noise barrier. (ft)	1,666 ft
b. Height range of the proposed noise barrier. (ft)	30 ft
c. Average height of the proposed noise barrier. (ft)	30 ft
d. Cost per square foot. (\$/ft ²)	\$42/SF
e. Total Barrier Cost (\$)	\$2,098,320
f. Barrier Material	NA

3 Community Desires Related to the Barrier

Do at least 50 percent of the benefited receptor unit owner(s) and renters desire the noise barrier? If yes, continue to "decision" block. If no, the barrier can be considered not to be reasonable. Proceed to "decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier."

Decision

Is the Noise Barrier(s) WARRANTED?	Yes
Is the Noise Barrier(s) FEASIBLE?	Yes
Is the Noise Barrier(s) REASONABLE?	No

Additional Reasons for Decision:

APPENDIX E LIST OF PREPARERS

This appendix lists the preparers of this report.

Preparers with HMMH are as follows:

- Christopher Menge – noise analysis, documentation, Project Manager
- Tara Cruz – noise modeling, noise analysis, barrier analysis, documentation
- Emma Butterfield – noise modeling, graphics
- Henry Echeverria – noise modeling

TNM Certification of HMMH's Project Manager, Christopher Menge, is on file in VDOT's offices.