

Noise Analysis Technical Report

Laskin Road (US 58) Improvements

Phillip Avenue to Saltmeadow Bay Drive
Virginia Beach, Virginia

VDOT UPC 12546
Project Number 0058-134-F02

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Prepared for:
Virginia Department of Transportation
1401 East Broad St.
Richmond, VA 23219

Prepared by:



HMMH
77 South Bedford Street
Burlington, MA 01803
781.229.0707

EXECUTIVE SUMMARY

This report describes the details of a noise impact assessment and preliminary noise abatement evaluation performed for the Laskin Road (US 58) Improvements project in Virginia Beach, Virginia. In addition, the study included a detailed noise abatement design study for a section of the project to serve as the final design noise analysis. 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 July 14, 2015.

Laskin Road (US Route 58) is an east-west urban arterial located in the eastern portion of the City of Virginia Beach. The project study area begins just east of Phillip Avenue and extends east approximately 3.0 miles to 250 feet east of Saltmeadow Bay Drive. The road's mainline is currently a four-lane divided roadway. Throughout most of the corridor, two-way service roads are located on both the north and south sides of Laskin Road. The proposed project would eliminate all service roads and add travel lanes to the mainline of Laskin Road where necessary. Existing right-of-way used by the service roads would accommodate most of the mainline widening. The bridge over Linkhorn Bay would be replaced. The project would also improve First Colonial Road (VA Route 615) from Interstate 264 to Laurel Lane.

The section of this study from Republic Road to Red Robin Road, which includes the Laskin Road Bridge Replacement Project and the improvements to First Colonial Road was evaluated as a Final Design Noise Analysis. This section of the project is under design and has been broken out as a separate phase to accelerate the improvements to a majority of the corridor, including the structurally deficient bridge and approaches, which pose a high risk to public safety. VDOT and FHWA have reached concurrence on this parallel study approach. One noise barrier identified as Feasible and Reasonable between Republic Road and Red Robin Road has been approved by the benefited property owners and residents, and is recommended for construction.

The Final Design Noise Analysis of the Laskin Road Bridge Replacement Project and improvements to First Colonial Road were conducted concurrently with the Preliminary Noise Analysis of the Laskin Road Improvements Project extending from Phillip Avenue to Saltmeadow Bay Drive as part of a NEPA re-evaluation. The noise barriers evaluated in the eastern segment of the project between Red Robin Drive and Saltmeadow Bay Drive are preliminary and will be re-evaluated in the final design phase.

Noise-sensitive land use in the project study area consists of single- and multi-family residences, a golf course, churches, a school and outdoor seating at commercial establishments. Figure 1, presented in Section 1 of the report, provides a map of the study area, shows the proposed roadway improvements and the Common Noise Environments, which border the noise-sensitive areas.

The study involved monitoring of existing noise conditions and modeling of existing (2016) and design year (2039) noise conditions in the study area with the FHWA-approved computerized Traffic Noise Model. Modeling accounted for the existing terrain and buildings, and for existing and proposed roadways with projected loudest-hour traffic. Noise impact was assessed for the 2039 Build alternative 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 |
| 2016 Existing | NAC | 26 | 5 | 0 | 0 | 31 |
| 2039 Build | NAC | 50 | 4 | 0 | 0 | 54 |

¹ The FHWA Activity Category is shown in parentheses
Source: HMMH, 2016.

The proposed Project is not related to the interstate system, nor does it result in a “constructive use” of a Section 4(f) property. Consequently, this preliminary noise study does not include an analysis of traffic noise levels for the design-year No-build alternative, consistent with VDOT’s traffic noise policy.

Noise abatement must be considered where noise impact is predicted. Noise abatement is evaluated to determine if it is warranted, feasible and reasonable. The table below presents a summary of noise barriers evaluated for the project. The table provides each barrier’s location, number of benefited receptors, length, height range, surface area, total cost, surface area per benefited receptor, and whether the barrier is considered feasible and/or reasonable. Figure 2, presented in Section 4 of this report, shows the locations of the barriers on a study area map. Barriers F and G1 were found to be both reasonable and feasible in this study. Barriers E1 and G2 were found to be feasible but not reasonable, and Barriers E2 and L were found to be not feasible.

Barrier F, which would benefit the Linkhorn Bay Condominiums and Cavalier Golf Course, was evaluated in a Noise Abatement Design Study as part of this project, since the section of the project near Linkhorn Bay/Great Neck Creek is under design. The report for that study is attached to this report as Appendix G. The property owners and residents benefited by Barrier F have been surveyed, and they overwhelmingly approved of the barrier. Therefore, Barrier F will be carried forward for construction.

Summary of Noise Barriers

| Barrier No. | Barrier Location | Number of Benefited Receptors | Barrier Length (feet) | Barrier Height (feet) | Surface Area (sq ft) | Total Cost at \$48.50/sq ft | Barrier Surface Area/ Benefited Receptor | Status ¹ |
|-------------|--------------------------|-------------------------------|-----------------------|-----------------------|----------------------|-----------------------------|--|---------------------|
| E1 | Laskin Rd, CNE E | 1 | 91 | 14 | 1269 | \$61,547 | 1269 | F & NR |
| E2 | Laskin Rd, CNE E | 0 | 87 | 30 | 2,598 | \$126,003 | NA | NF |
| F | Laskin Rd, CNE F | 37 | 1,211 | 10 – 18 | 17,659 | \$856,462 | 477 | F & R |
| G1 | Laskin Rd, CNE G | 11 | 316 | 10 | 3,169 | \$153,697 | 288 | F & R |
| G2 | Laskin Rd, CNE G | 1 | 160 | 14 | 2,238 | \$108,543 | 2,238 | F & NR |
| L | First Colonial Rd, CNE L | 3 | 268 | 10 | 2,679 | \$129,932 | 893 | NF |

¹ Barrier Status: F & R – Feasible and Reasonable; F & NR – Feasible and Not Reasonable; NF – Not Feasible

Barrier L was also located in the section of the study area under design. While the barrier initially appeared to be feasible and reasonable from an acoustical standpoint, the engineering evaluation of the barrier's location showed that prohibitive utility relocation costs rendered the barrier not feasible.

A preliminary noise evaluation was performed for the other barriers, and a more detailed review will be completed during final design. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may also 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 VDOT; VDOT’s Highway Traffic Noise Impact Analysis Guidance Manual was updated most recently on July 14, 2015.

The purpose of this Technical Report is to identify and assess the impact to noise-sensitive land use within the study area. This report documents the noise analysis conducted for the existing (2016) and future (2039) noise conditions in the areas adjacent to the Laskin Road Improvements corridor to support the environmental documentation. In addition, the study included a detailed noise abatement design study for a significant section of the project under design. The proposed Laskin Road Improvements Project is not related to the interstate system, nor does it result in a “constructive use” of a Section 4(f) property. Consequently, this preliminary noise study does not include an analysis of traffic noise levels for the design-year No-build alternative, consistent with VDOT’s Guidance Manual.

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 the list of preparers, Appendix B tabulates the traffic data used in the noise modeling, Appendix C presents predicted noise levels, Appendix D presents all noise measurement data, Appendix E provides a response from the VDOT project management on alternative noise abatement measures, Appendix F presents VDOT’s Warranted, Feasible and Reasonable barrier worksheets, Appendix G presents the Noise Abatement Design Study report for one barrier in the section of the project under design, Appendix H presents the details and correspondence related to the feasibility determination of another barrier in the section under design, and Appendix I presents the details of the public preference survey for a potential barrier in the design section.

1.2 Project Description

Laskin Road (US Route 58) is an east-west urban arterial located in the eastern portion of the City of Virginia Beach, Virginia. The project study area begins just east of Phillip Avenue and extends east approximately 3.0 miles to 250 feet east of Saltmeadow Bay Drive. The road’s mainline is currently a four-lane divided roadway. Throughout most of the corridor, two-way service roads are located on both the north and south sides of Laskin Road to serve adjacent land uses. The proposed project would eliminate all service roads and add travel lanes to the mainline of Laskin Road where necessary. Existing right-of-way used by the service roads would accommodate most of the mainline widening. Existing intersections would be improved as necessary and the bridge over Linkhorn Bay would be replaced. The project would also improve First Colonial Road (VA Route 615) from Interstate 264 to Laurel Lane.

The section of this study from Republic Road to Red Robin Road, which includes the Laskin Road Bridge Replacement Project and the improvements to First Colonial Road was evaluated as a Final Design Noise Analysis. This section of the project is under design and has been broken out as a separate phase to accelerate the improvements to a majority of the corridor, including the structurally deficient bridge and approaches, which pose a high risk to public safety. VDOT and FHWA have reached concurrence on this parallel study approach.

Figure 1 is an overview graphic of the study area showing the proposed roadway improvements, noise measurement sites and Common Noise Environment areas. More detailed graphics showing the existing roadway and proposed improvements, terrain contours, affected properties with receptor locations, and potential noise barriers are provided in Section 4.

1.3 Study Area Description and Land Use

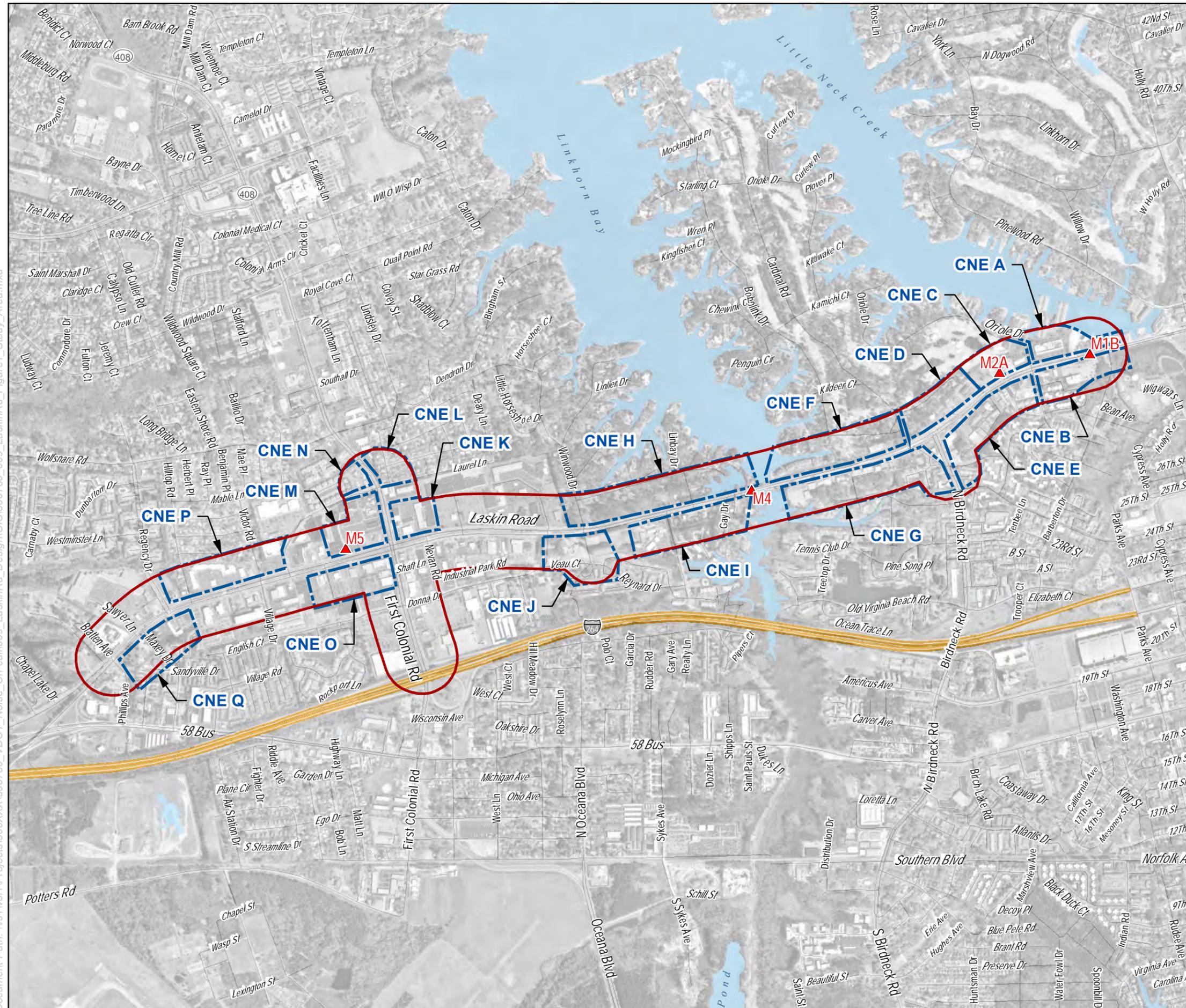
Noise sensitive land uses in the project study area include single-family and multi-family residences along sections of Laskin Road and First Colonial Road. In addition, there are several churches, a school, a golf course, and many commercial areas, some of which include restaurants with outdoor seating. Section 4.4.1 in the report provides detailed descriptions of the noise-sensitive land uses in each of the Common Noise Environments (CNEs).

Figure 1
Study Area and
Measurement Location Map

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

- M# Measurement Site
- CNE Boundary



Document Path: \\fs1\vol11\Projects\306\XXX\306780_VDOT_Noise_On-call\009_LaskinRd_Design\GIS\306780_009_LaskinRd_Figure1_Study_Area.mxd

2 NOISE ABATEMENT CRITERIA AND DESIGN GOALS

2.1 Regulations and Guidelines

The potential noise impact of the Laskin Road Improvements Project was assessed in accordance with FHWA and VDOT noise assessment regulations and guidelines. The FHWA regulations are set forth in 23 CFR Part 772¹. On July 13, 2010, FHWA published revised noise regulations that became effective on July 13, 2011. FHWA has also published a guidance document to support the new regulations.² 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 July 14, 2015.³

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 2-1). 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, land uses evaluated for noise impact included residential areas (Activity Category B), recreational areas (Category C), institutional interior spaces (Category D) and exterior commercial including outdoor restaurant seating (Category E). 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 land use, noise impact is assumed to occur when predicted exterior noise levels due to the Project approach or exceed 72 dBA in terms of $L_{eq}(h)$ during the loudest hour of the day. 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.

¹ 23 CFR Part 772, as amended 75 FR 39820, July 13, 2010; Effective date July 13, 2011 – "Procedures for Abatement of Highway Traffic Noise and Construction Noise," Federal Highway Administration, U.S. Department of Transportation. http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/

² "Highway Traffic Noise: Analysis and Abatement Guidance," Federal Highway Administration, U.S. DOT, June 2010, revised January 2011.

http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

³ "Highway Traffic Noise Impact Analysis Guidance Manual (Version 7)," Virginia Department of Transportation, updated July 14, 2015. <http://www.virginiadot.org/projects/pr-noise-walls-about.asp>

Table 2-1 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, amphitheaters, 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 the design-year (2039) 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 was conducted along the Laskin Road Project corridor, consistent with FHWA and VDOT recommended procedures to document existing ambient noise levels in noise-sensitive locations in the study corridor, and to provide a means for validation of the TNM noise prediction model.

Noise monitoring was conducted at five short-term (15 minutes in duration) sites on September 26, 2016. Measurement sites were generally located in areas with the highest noise exposures, adjacent to first-row properties. Traffic classification counts on the roadways nearest each measurement site were conducted simultaneously with each noise measurement. The short-term measurements characterized existing noise levels in the study area but were not necessarily conducted during the loudest hour of the day. They included contributions from sources other than traffic, such as aircraft. Figure 1, the study area graphic, and also Figure 2, presented later in the report, show the locations of the noise measurement sites within the project study area. The monitoring locations are numbered with the prefix "M."

Short-term noise monitoring is not a process to determine design-year noise impacts or barrier locations. Short-term noise monitoring provides a level of consistency between what is present in real-world situations and how that is represented in the computer noise model. Short-term monitoring does not need to occur within every Common Noise Environment (CNE) to validate the computer noise model.

Short-term noise measurements were conducted using a VDOT-owned Larson-Davis 824 (ANSI Type I, "Precision") integrating sound level meter. VDOT's noise measurement instruments are calibrated annually at a certification laboratory, with calibrations traceable to the National Institute of Standards and Technology. During the monitoring program, the sound level meters were calibrated in the field using a handheld acoustic calibrator at the beginning and end of each measurement period.

The short-term data collection procedure involved measurement of five-second L_{eq} s over a period of 15 minutes. Continuous logging of events was conducted during the monitoring, so that five-second periods that included events not representative of the ambient noise environment or not traffic-related could be excluded later. By comparing the two totals, the significance of non-traffic events (such as aircraft operations) to the overall noise level can be determined for the measurement period.

The measured noise levels appear in Table 3-1 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. Table 3-1 provides the site address, as well as the date, start time, and duration of each measurement. Measured noise levels are presented both in terms of the "Total L_{eq} ", which includes noise level contributions from every five-second period, and the "Traffic-only L_{eq} ", which excludes those periods that contained noise events unrelated to roadway traffic.

As shown in Table 3-1, the Total L_{eq} ranged from a low of 63 dBA at the Laskin Road Shopping Plaza (Site M5) to a high of 83 dBA along Laskin Road west of Oriole Drive (Site M2A). Except for

Site M2A, values of the Traffic-only L_{eq} were very similar to the measured Total L_{eq} s at each of the measurement sites, which is an indication that roadway traffic was the dominant source of noise in spite of the presence of other sporadic and occasional noise events due to human-related activity.

Other sources of noise in the existing environment included, but were not limited to aircraft overflights including military aircraft, sirens, lawn equipment, biogenic sounds (birds and insects), wind in the trees, and other human-related activity. Appendix D provides details of the data acquired during the noise measurement program, including noise monitor output, site sketches, photographs, noise level data with site summary results, and traffic counts with hourly totals.

Table 3-1 Summary of Noise Measurement Data

| Site No. | Address/Location | Date | Time Start (hh:mm:ss) | Duration (minutes) | Monitored Total L_{eq} (dBA) | Monitored Traffic-Only L_{eq} (dBA) |
|----------|--|-----------|-----------------------|--------------------|--------------------------------|---------------------------------------|
| M1B | Laskin Road south of Little Neck Creek | 16-Sep-15 | 14:33:00 | 15 | 69.9 | 69.1 |
| M2A | Laskin Road west of Oriole Dr. | 16-Sep-15 | 14:02:00 | 15 | 83.0 | 65.0 |
| M4 | Laskin Road west of bridge over Great Neck Creek | 16-Sep-15 | 13:33:00 | 15 | 69.4 | 69.1 |
| M5 | Laskin Road Shopping Plaza | 16-Sep-15 | 13:01:00 | 15 | 62.9 | 62.9 |

Source: VDOT, 2015

3.2 Predicted Existing Noise Levels

For calculation of loudest-hour noise levels throughout the study area in the TNM noise-prediction computer model, many additional receiver locations were added to the measurement sites 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 NEPA approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after this date.

The City of Virginia Beach maintains an online database of all building permits that is accessible to the public. The databases of all active residential and commercial permits from the past three years were accessed and downloaded on 8/26/16. These were then filtered to exclude all addresses outside of the study area, and to include only permits that would add or remove noise-sensitive properties to or from the city’s current parcel data. One new noise-sensitive property, a Chipotle restaurant with an outdoor seating area approved 6/11/2015, was identified from this process (Site M-006). Three demolitions and one other new construction were also identified through the process. However, these cases all involved previously developed parcels retaining their land use, and did not necessitate any deviation from the current parcel data.

4 NOISE PREDICTION

4.1 Noise Prediction Model

All traffic noise computations for this study were conducted using the latest version of the FHWA TNM version 2.5. TNM incorporates state-of-the-art sound emissions and sound propagation algorithms, based on well-established theory or on accepted international standards.⁴ 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.⁵

Available project engineering plans, aerial photography, topographic contours and building information are used to create a three-dimensional model in the TNM of the geometry of the existing and expected future roadway configurations and the surrounding terrain and buildings. 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 500 noise prediction receivers (also called “receptors” and “sites”) were added to the measurement sites in 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 field verification.

⁴ “FHWA Traffic Noise Model, Version 1.0: Technical Manual,” Report No. FHWA-PD-96-010 and DOT-VNTSC-FHWA-98-2, U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, February 1998.
http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/tech_manual/index.cfm

⁵ “TNM Version 2.5 Addendum to Validation of FHWA's TNM® (TNM) Phase 1 report,” US Department of Transportation, John A. Volpe National Transportation Systems Center, July 2004.
http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/model_validation/

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 better 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.

Table 4-1 presents a site-by-site comparison of measured noise levels and the corresponding TNM-computed noise levels. At all sites, the differences between measured and predicted noise levels fall within three decibels, which is the accepted level of accuracy in the noise model. At Site M1B within CNE B, the monitored traffic Leq was 69.1 dBA, while the corresponding TNM-calculated noise level was 68.4 dBA. At Site M2A within CNE C, the monitored traffic Leq was 65.0 dBA, while the corresponding TNM-calculated noise level was 65.9 dBA. At Site M4 within CNE I, the monitored traffic Leq was 69.1 dBA, while the corresponding TNM-calculated noise level was 67.2 dBA. At Site M5 within CNE M, the monitored Leq was 62.9 dBA, while the TNM-calculated noise level was 65.6 dBA. The Project-wide average difference between calculated noise levels and monitored noise levels was +0.2 decibels (over all four sites), which shows excellent agreement between monitored and modeled sound levels, and suggests confidence in the modeling assumptions.

Table 4-1 Noise Model Validation Results

| Site No. | CNE | Address / Location / Land Use | Monitored traffic-only L_{eq} (dBA) | TNM Computed L_{eq} (dBA) | Difference (dB) (computed minus monitored) |
|-----------------------------------|-----|--|---------------------------------------|-----------------------------|--|
| M1B | C | Laskin Road south of Little Neck Creek | 69.1 | 68.4 | -0.7 |
| M2A | B | Laskin Road west of Oriole Dr. | 65.0 | 65.9 | 0.9 |
| M4 | I | Laskin Road west of bridge over Great Neck Creek | 69.1 | 67.2 | -1.9 |
| M5 | M | Laskin Road Shopping Plaza | 62.9 | 65.6 | 2.7 |
| Average difference: | | | | | 0.2 |
| Standard deviation of difference: | | | | | 2.0 |

Source: HMMH, 2016

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 2016 existing and 2039 design years for all roadways, and were presented as hourly volumes in VDOT’s Environmental Traffic Data (ENTRADA) spreadsheets. HMMH conducted a determination of the loudest hour of the day consistent with VDOT’s current methodology. The loudest-hour evaluation began by using TNM to compute the overall traffic noise level at a reference distance of 200 feet from Laskin Road and First Colonial Road for each hour of the day. The TNM run of the complete study area was then used with all receptors to refine the selection of the loudest hour between the two most likely hours: the hour starting at 5:00 PM and the hour starting at 3:00 PM. For the vast majority of receptors in the study area, and also all noise-sensitive receptors along Laskin Road, the loudest hour of the day was found to be the hour starting at 5:00 PM. Therefore, the traffic for that hour was used for all roadways in the analysis. Appendix B provides the memorandum on the details of the loudest-hour determination provided to VDOT, and also the final loudest-hour traffic data for the roadways used in the TNM for this project.

4.4 Presentation of Results

The study area includes mostly residential land use and development, as well as some recreational, institutional and exterior commercial land use.

4.4.1 Common Noise Environment (CNE) Descriptions

Descriptions of the CNEs are provided below. CNE boundaries are shown in Figures 1 and 2 for areas with noise-sensitive land use. Areas that do not have noise-sensitive land uses are not identified with CNE boundaries; such land use is Activity Category E, F, or G, that is commercial with no exterior activity areas, industrial, or undeveloped, respectively.

CNE A is located north of Laskin Road at the eastern end of the study area just east of Saltmeadow Bay Drive. Commercial property is directly adjacent to Laskin Road, but behind it is the Cove Point multi-family residential and recreational property.

CNE B is on the south side of Laskin Road opposite CNE A, and east of Oriole Drive. Commercial property abuts Laskin Road and includes the Calliente Cantina restaurant with outdoor seating. Behind the commercial property are the Woodberry Forest Apartments, including a pool.

CNE C is located north of Laskin Road and west of Oriole Drive. Commercial and vacant land is located directly adjacent to Laskin Road, but fairway and green sections of the Cavalier Golf & Yacht Club Golf Course are located behind that property, about 325 feet from Laskin Road.

CNE D is located north of Laskin Road, west of CNE C and east of Cardinal Road. Commercial land use is located directly adjacent to Laskin Road for most of the CNE, but a single-family residence is at the western end. Single-family residences are also all along Tanager Trail directly behind the commercial property. The CNE also includes a small section of the Cavalier Golf Course set well back from Laskin Road.

CNE E is south of Laskin Road between Oriole Drive and Birdneck Road. One building of the Coquina Condominiums and its swimming pool are adjacent to Laskin Road, but the rest of the buildings are set back behind commercial property. Linkhorn Crest Townhomes near Oriole Drive and homes along Chinquapin Lane and near Birdneck Road are also set well back from Laskin Road.

CNE F is located north of Laskin Road, east of Linkhorn Bay/Great Neck Creek and west of CNE D. Adjacent to Laskin Road, the CNE includes the five-story Linkhorn Bay Condominiums and its recreation areas, a green and tee of the Cavalier Golf Course, and commercial property. Set back from the road are single-family homes and a more of the golf course.

CNE G is south of Laskin road between Linkhorn Bay/Great Neck Creek and Cardinal/Birdneck Roads. A number of residential properties are located adjacent to Laskin Road in the CNE, including Lafonda Condominiums, Birdneck Acres apartments, and Linkhorn Place Apartments. In addition, Virginia Beach Community Chapel with outdoor patio and commercial properties are also located adjacent to Laskin Road. Set back from Laskin Road are many single-family homes, and more buildings associated with the multi-family complexes.

CNE H is located north of Laskin Road, and west of Linkhorn Bay/Great Neck Creek to just west of Winwood Drive. The land use consists of single-family homes and lots along Laskin Road, Carolyn Drive and Winwood Drive.

CNE I is south of Laskin Road, west of Linkhorn Bay/Great Neck Creek and extending past Fermac Drive to include the Virginia Beach Public Schools Laskin Road Annex. The school annex has no apparent outdoor recreation areas. Other land uses adjacent to Laskin Road include commercial property and the First Church of Christ Scientist building. Single- and multi-family dwellings are set back behind the other properties, as is the Children's Learning Paradise school, which includes a playground.

CNE J is located south of Laskin Road, west of CNE I, and includes properties either side of Winwood Drive. Adjacent to Laskin Road are undeveloped land associated with the Virginia Beach Public Schools Laskin Road Annex, the Good Shepherd Lutheran Church and the Friends Meeting place of worship. Set back from Laskin Road in CNE J are the Courtyards of Chanticleer townhomes and apartments.

CNE K includes the Hilltop North Shopping Center located at the northeast corner of the intersection of Laskin Road and First Colonial Road. There are three areas with outdoor seating in the CNE, including one adjacent to the Baker's Crust store.

CNE L is located east of First Colonial Drive and north of Laurel Lane. The area includes single-family homes along Laurel Lane and Plymouth Lane.

CNE M includes the Marketplace at Hilltop shopping center north of Laskin Road, west of First Colonial Road and south of Republic Road. Outdoor seating areas associated with several restaurants are the noise-sensitive land uses in the CNE. They include Chipotle near Laskin Road, Dairy Queen near First Colonial Road, and Panera Bread, Moe's Southwest Grill and Burton's Grill set back from all roads.

CNE N is located west of First Colonial Road and north of Republic Road, and includes the multi-family complex on Chantilly Court along Republic Road. The patio and balcony outdoor use areas of these three-story units face Chantilly Court, away from Republic Road.

CNE O is located in the southwest quadrant of the intersection of Laskin Road and First Colonial Road. The St. Nicholas Greek Orthodox Church building and outdoor playground are located along First Colonial Road, and outdoor seating of the Sonic Drive-In is located near Laskin Road.

CNE P is located north of Laskin Road between Republic Road and Regency Drive. The land use adjacent to project roads includes outdoor tables at the Whole Foods Market near Republic Road, outdoor tables and benches near the storefronts of La Promenade shopping mall, and single-family homes on Hilltop Road. Set back from Laskin Road behind the closer land uses are single-family homes along Karen Lane and Victor Road.

CNE Q is south of Laskin Road from opposite the Hilltop Road intersection to Phillip Avenue. Commercial land use with no noise-sensitive activities are adjacent to Laskin Road, but the Eastwind Apartments and associated pool and playground are set back behind the commercial property.

4.4.2 Predicted Noise Levels

To fully characterize existing and future noise levels at all noise-sensitive land uses in the study area, 524 additional noise prediction receptors (also called "receivers" and "sites") were modeled in the TNM in addition to the four measurement sites. Each of these receptors represented exterior noise-sensitive land use or the interiors of institutional land uses such as schools, places of worship and assisted-living facilities.

All noise levels predicted were the A-weighted equivalent sound level, or L_{eq} , in dBA. Loudest-hour noise levels were predicted for the Existing 2016 and the design-year 2039 Build alternatives.

Table 4-2 presents ranges of the predicted sound levels at the receptors in each CNE for each alternative. 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 use. Most of the noise-sensitive institutional facilities identified in the study area have air conditioning and masonry construction. Therefore, 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. However, the First Church of Christ Scientist in CNE I and the Friends Meeting building in CNE J appear to be wood frame construction. Therefore, an outside-to-inside noise reduction value of 20 decibels is applied for these places of worship. *Table 6: Building Noise Reduction Factors* in the FHWA guidance document referenced in footnote 2 in Section 2 provides these suggested outside-to-inside noise reduction values, assuming closed windows and single glazing. Appendix C provides a table that lists the predicted sound levels at all of the receptors for each alternative. Each receptor is given an identifier with the CNE ID followed by a number. The receptor IDs are also shown in Figure 2.

Table 4-2 Ranges of Predicted Exterior and Interior Noise Levels

| CNE | Land Use – Description | Range of Predicted Exterior & Interior Noise Levels for the Worst Hour (dBA) | | |
|-----|---|--|---------------|------------|
| | | Activity Category | 2016 Existing | 2039 Build |
| A | Cove Point residential and recreational set back north of Laskin Rd and east of Oriole Dr. | B, C | 47 - 53 | 48 - 54 |
| B | Woodberry Forest Apartments and pool set back south of Laskin Rd and east of Oriole Dr. | B, C | 43 - 69 | 44 - 70 |
| C | Cavalier Golf Course set back north of Laskin Road, west of Oriole Dr. | C | 50 - 55 | 51 - 55 |
| D | Residences, mostly set back north of Laskin Rd and east of Cardinal Rd. | B, C | 53 - 65 | 52 - 64 |
| E | Coquina Condos and pool south of and adjacent to Laskin Rd, east of Birdneck Rd. Other residential properties are set back. | B, C | 45 - 68 | 45 - 69 |
| F | Linkhorn Bay Condos and pool and Cavalier Golf Course north of and adjacent to Laskin Rd, east of Great Neck Creek | B, C | 40 - 68 | 40 - 70 |
| G | Lafonda, Birdneck Acres, and Linkhorn Place multi-family complexes and Virginia Beach Community Chapel south of and adjacent to Laskin Rd, east of Great Neck Creek | B, C, D | 38 - 69 | 39 - 70 |
| H | Residences north of and adjacent to Laskin Rd, west of Great Neck Creek | B | 51 - 66 | 52 - 67 |
| I | Christ Scientist Church and Virginia Beach School buildings south of and adjacent to Laskin Rd, west of Great Neck Creek. Residences are set back | B, C, D, E | 29 - 64 | 29 - 63 |
| J | Lutheran and Friends Meeting church buildings south of and adjacent to Laskin Rd. Residences are set back | B, C, D | 26 - 58 | 26 - 60 |
| K | Outdoor seating in Hilltop North Shopping Center, north of Laskin Rd, east of First Colonial Rd. | E | 51 - 58 | 51 - 58 |
| L | Residential east of and adjacent to First Colonial Rd, north of Laurel Ln. | B | 52 - 69 | 53 - 70 |
| M | Outdoor seating in Marketplace at Hilltop shopping center, north of Laskin Rd, west of First Colonial Rd | E | 53 - 66 | 54 - 68 |
| N | Chantilly Court multi-family residential, north of and adjacent to Republic Rd, west of First Colonial Rd. | B | 53 - 59 | 53 - 60 |
| O | St. Nicholas church and restaurant seating, adjacent to and west of First Colonial Rd and south of Laskin Rd. | C, D, E | 38 - 66 | 39 - 67 |
| P | Residential along Hilltop Rd, outdoor seating at Whole Foods and La Promenade shopping mall, north of Laskin Rd, west of Republic Rd. | B, E | 46 - 67 | 47 - 68 |
| Q | Eastwind Apartments and pool set back south of Laskin Rd, east of Phillip Ave. | B, C | 41 - 57 | 42 - 57 |

Source: HMMH, 2016

Figure 2 shows the location and predicted noise impact and barrier benefit status for all receptors in the Build Alternative in graphical form. For the receptors in Figure 2 depicting impact, predicted 2039 Build noise levels would approach or exceed the NAC for the associated land use category. The NAC is 67 dBA L_{eq} at all residential and recreational receptors, and 72 dBA L_{eq} at commercial land uses. These receptor locations are shown with either a light blue, dark blue, or red dot indicating impact with 5 or 6 dBA insertion loss, impact with 7 dBA or more of insertion loss, and impact with less than 5 dBA of insertion loss from a noise barrier, respectively. Receptors represented by green dots are not predicted to be impacted by project noise but would be benefited and receive at least 5 decibels of insertion loss from a barrier. The yellow dots indicate sites that would be neither impacted by highway traffic noise nor benefited by potential noise mitigation. Some of the receptor dots have more than one section, representing upper- and lower-floor receptors at the same location on a building. There are up to four receiver heights computed with TNM at some of the building locations, such as the Linkhorn Bay Condominiums in CNE F. The graphical dots show the four heights in four sections. Traffic noise levels are generally higher at the upper floors of multi-story buildings than at the lower floors, due to reduced noise shielding by terrain and other buildings, and less noise-reduction benefit from the proximity of soft ground near the sound propagation path. and Section 7 discusses the details of the barriers.

Overall, predicted exterior noise levels range from 40 to 69 dBA L_{eq} at the receptors for the Existing case. Predicted 2039 Build Alternative exterior L_{eq} s are slightly higher than the Existing levels, and range from 41 to 70 dBA. On average for all receptors, sound levels are predicted to increase from Existing to Build conditions by approximately one decibel. This increase is primarily due to the roadway improvements and population growth, which result in 27 percent higher future traffic volumes in the loudest-hour periods. However, at some receptors, sound levels are predicted to increase by more than one decibel, and at others, sound levels are actually projected to decrease slightly, in spite of the increased traffic volumes. The sites with larger increases are generally in areas where the roadway is being widened in the direction of the receptors, so there will be less distance to the nearest roadways with traffic. The areas where decreases are predicted result from the proposed changes in roadway geometry and expected elimination of some frontage road pavement adjacent to the Laskin Road main travel lanes.

A table in Appendix C presents the predicted sound levels for all receptors under all project alternatives.

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

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

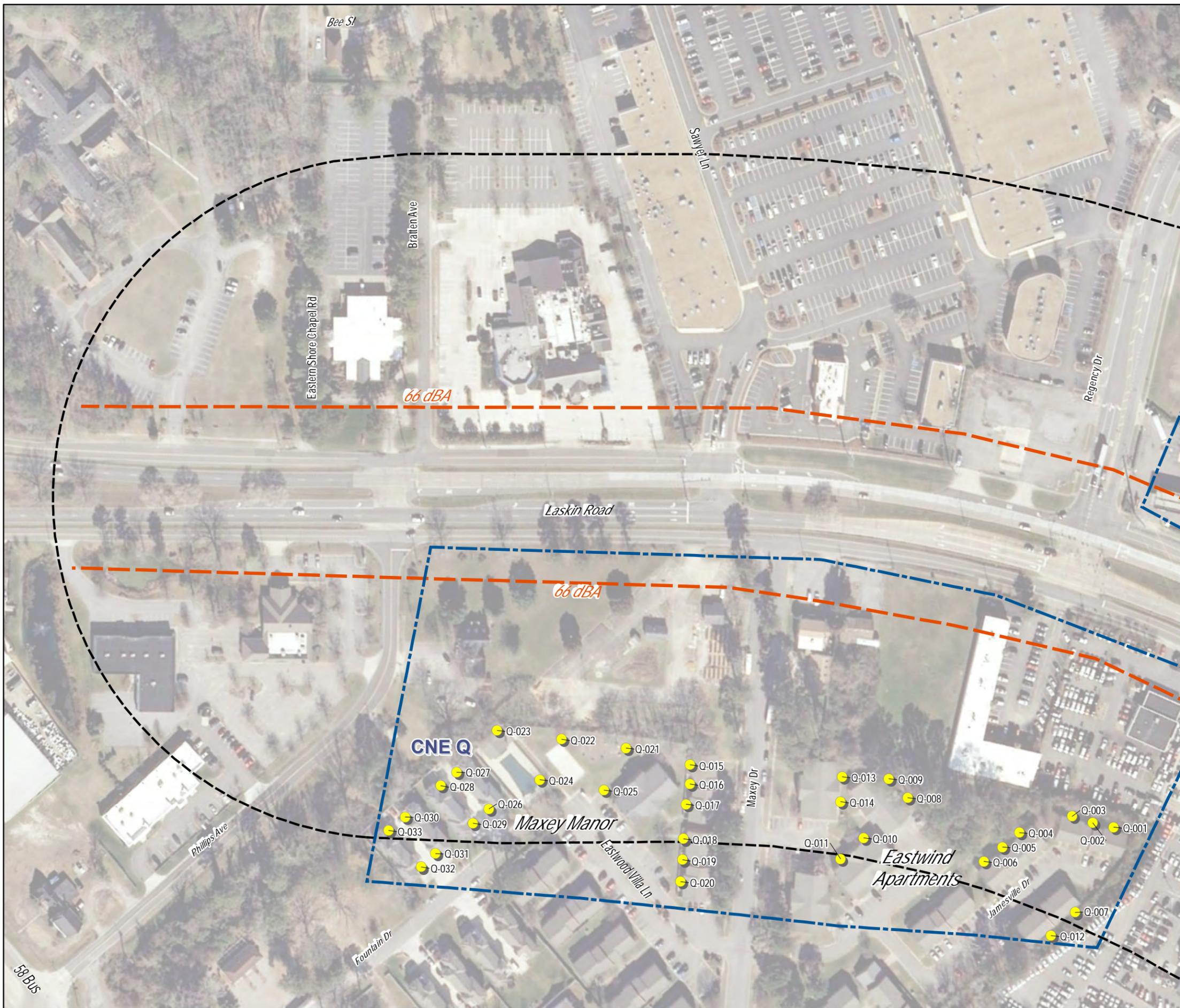
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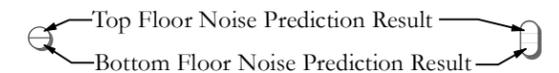
Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined



Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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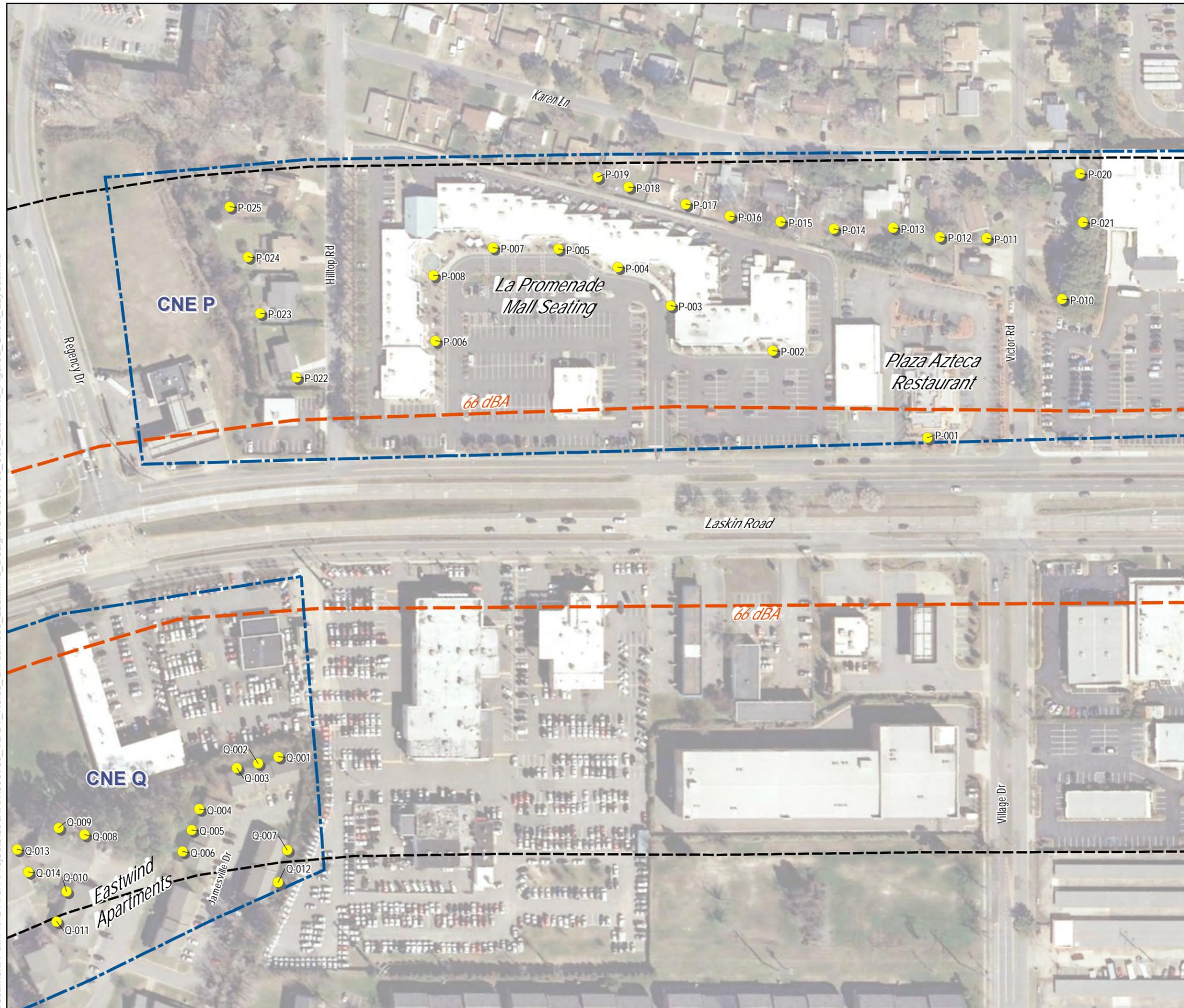


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

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- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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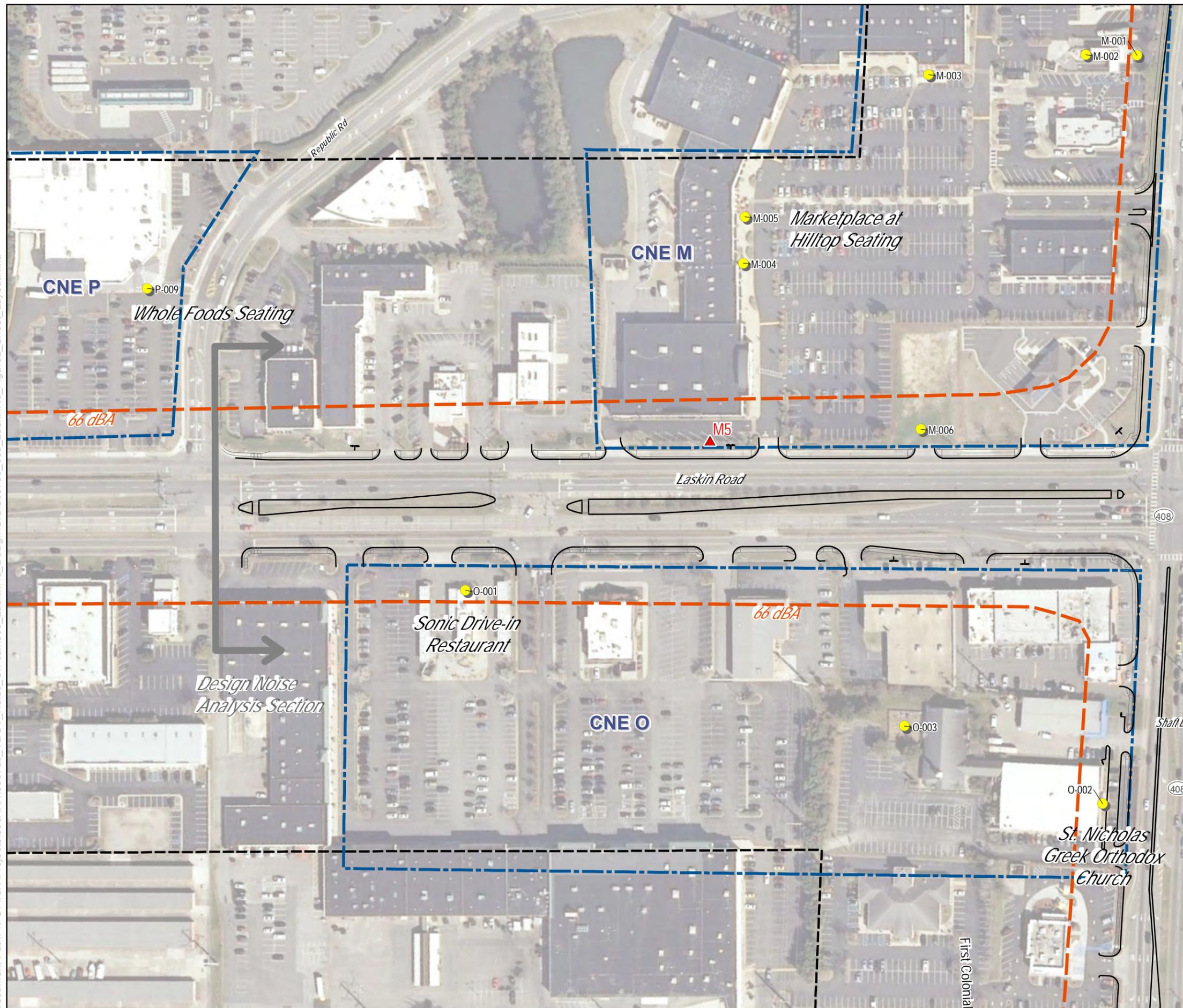


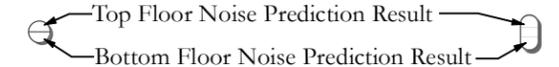
Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

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- Not Benefited or Impacted
- Not impacted, benefit not determined



Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
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- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

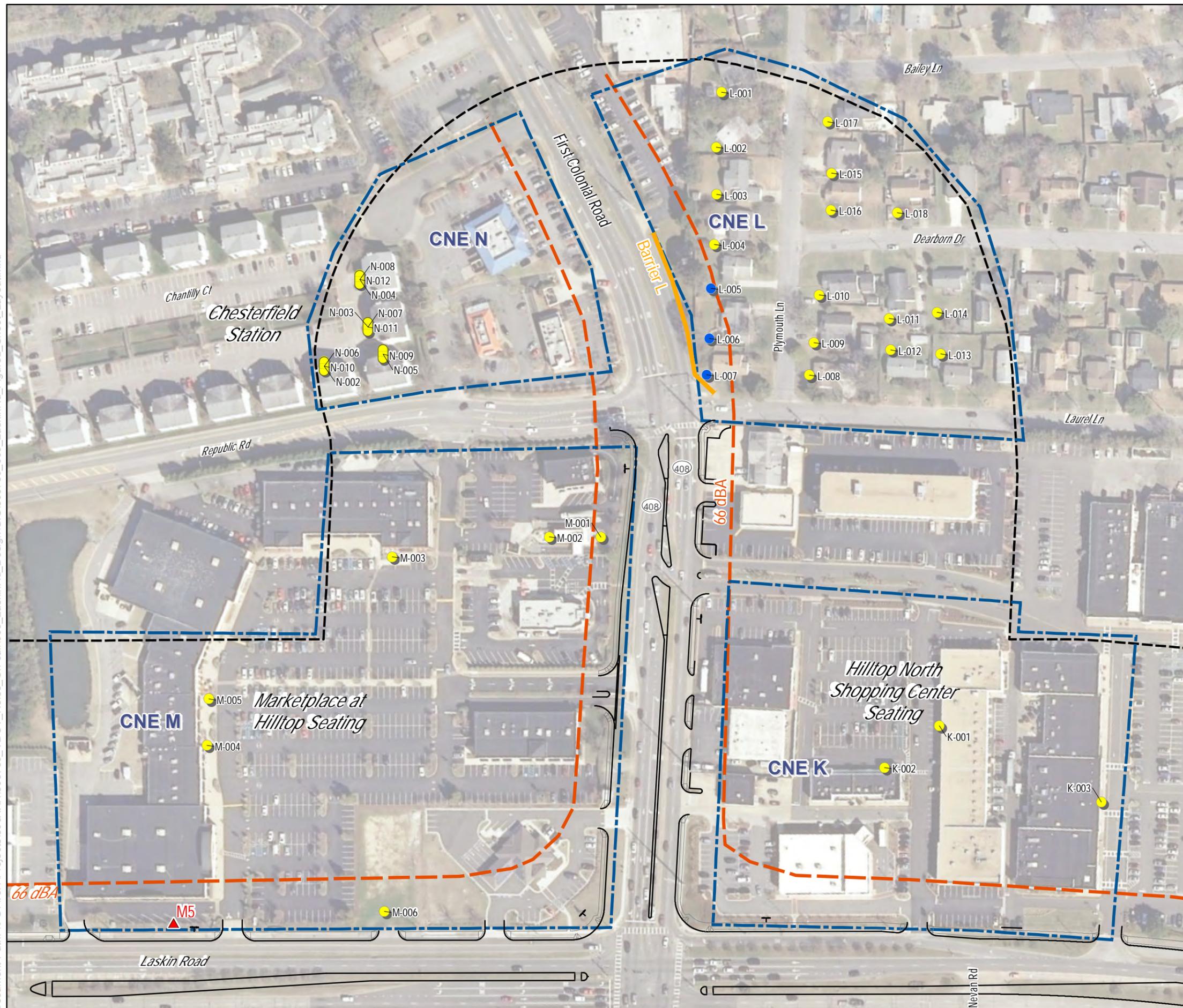
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Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

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- Impacted and 7 dBA or more Insertion Loss
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- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

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- Not Benefited or Impacted
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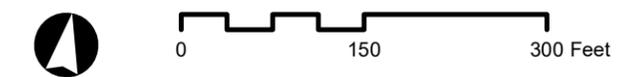
- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- M# Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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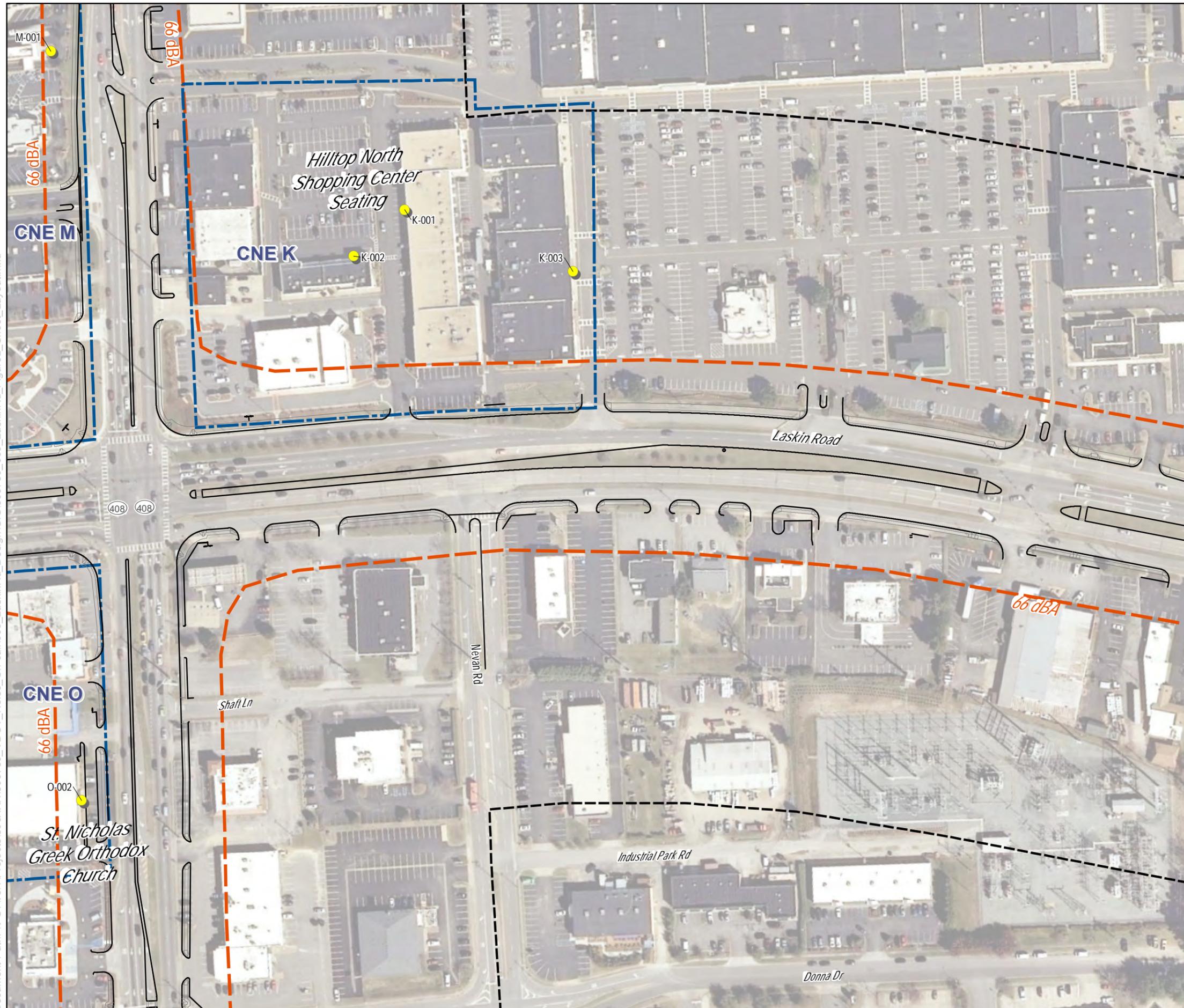


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

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- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

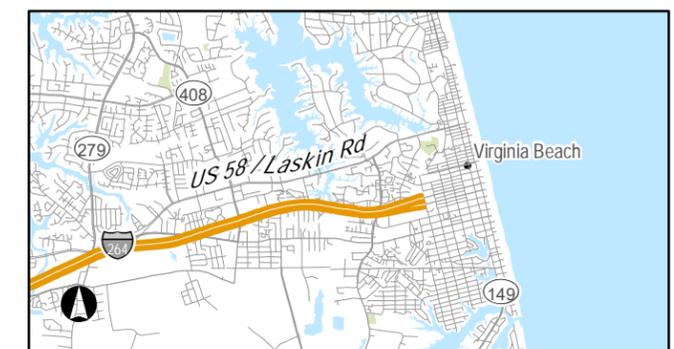
Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- M# Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
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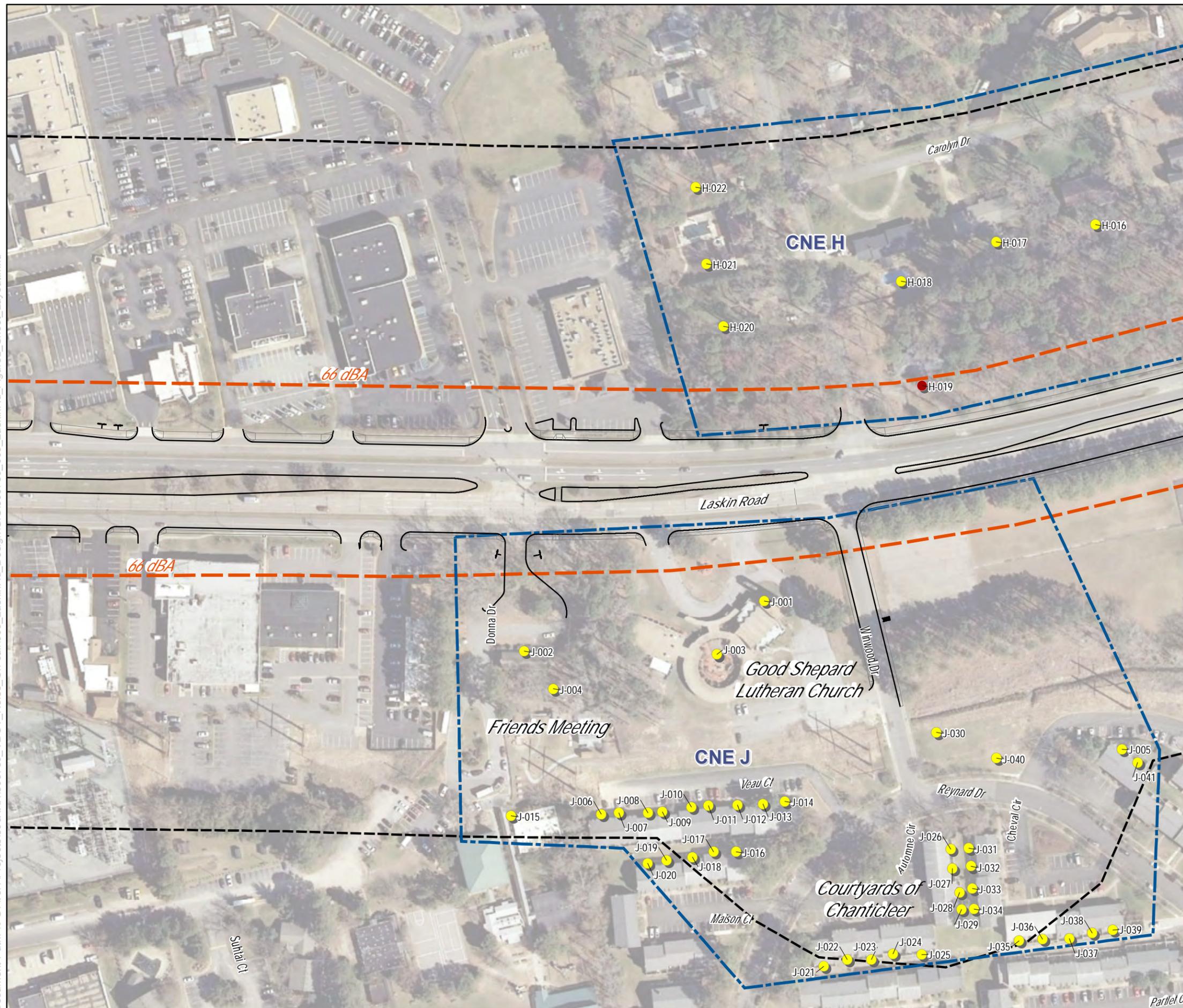
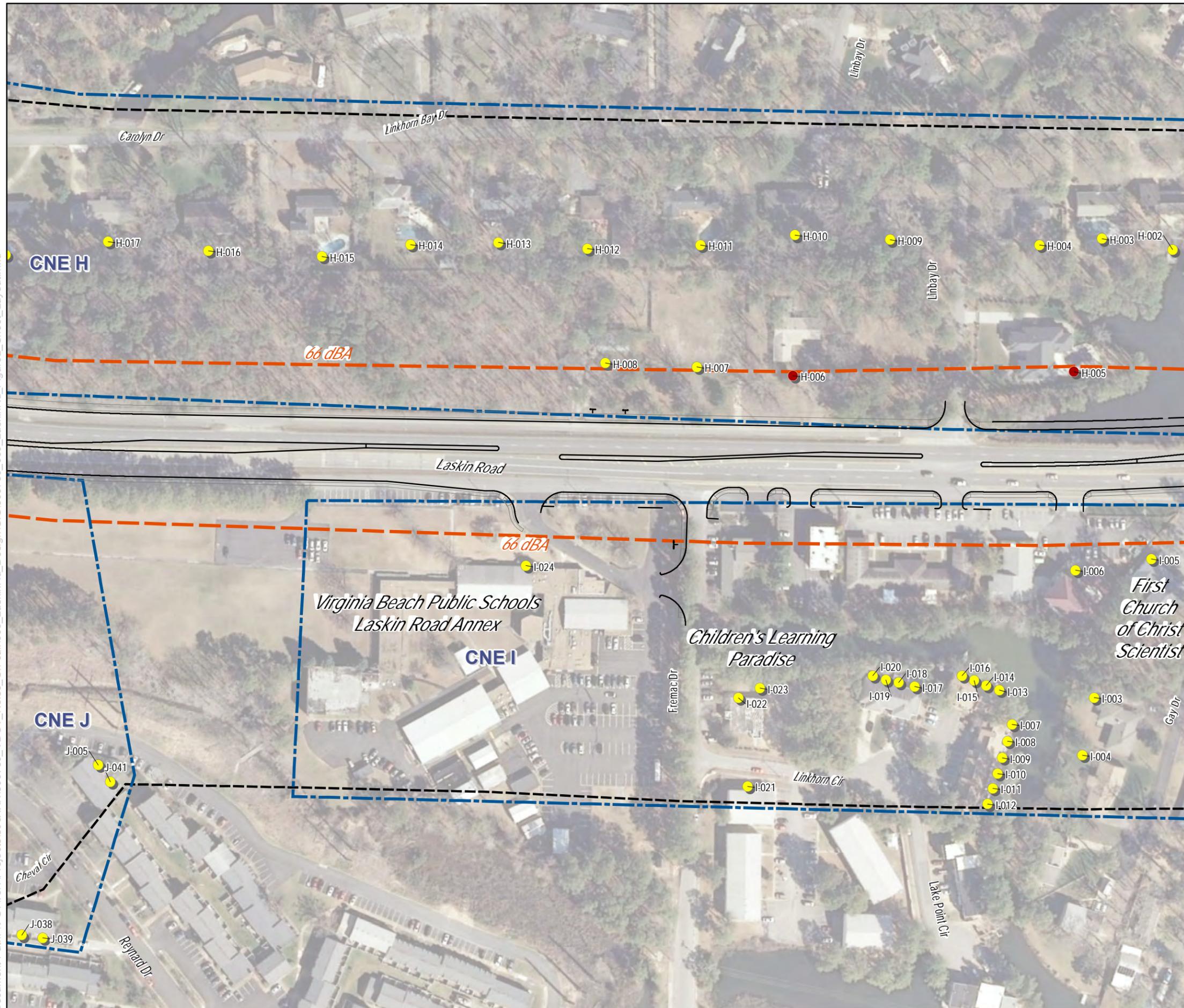


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

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Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
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- M# Measurement Site
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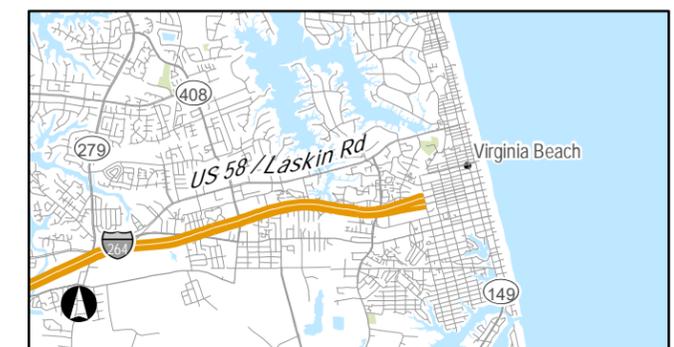
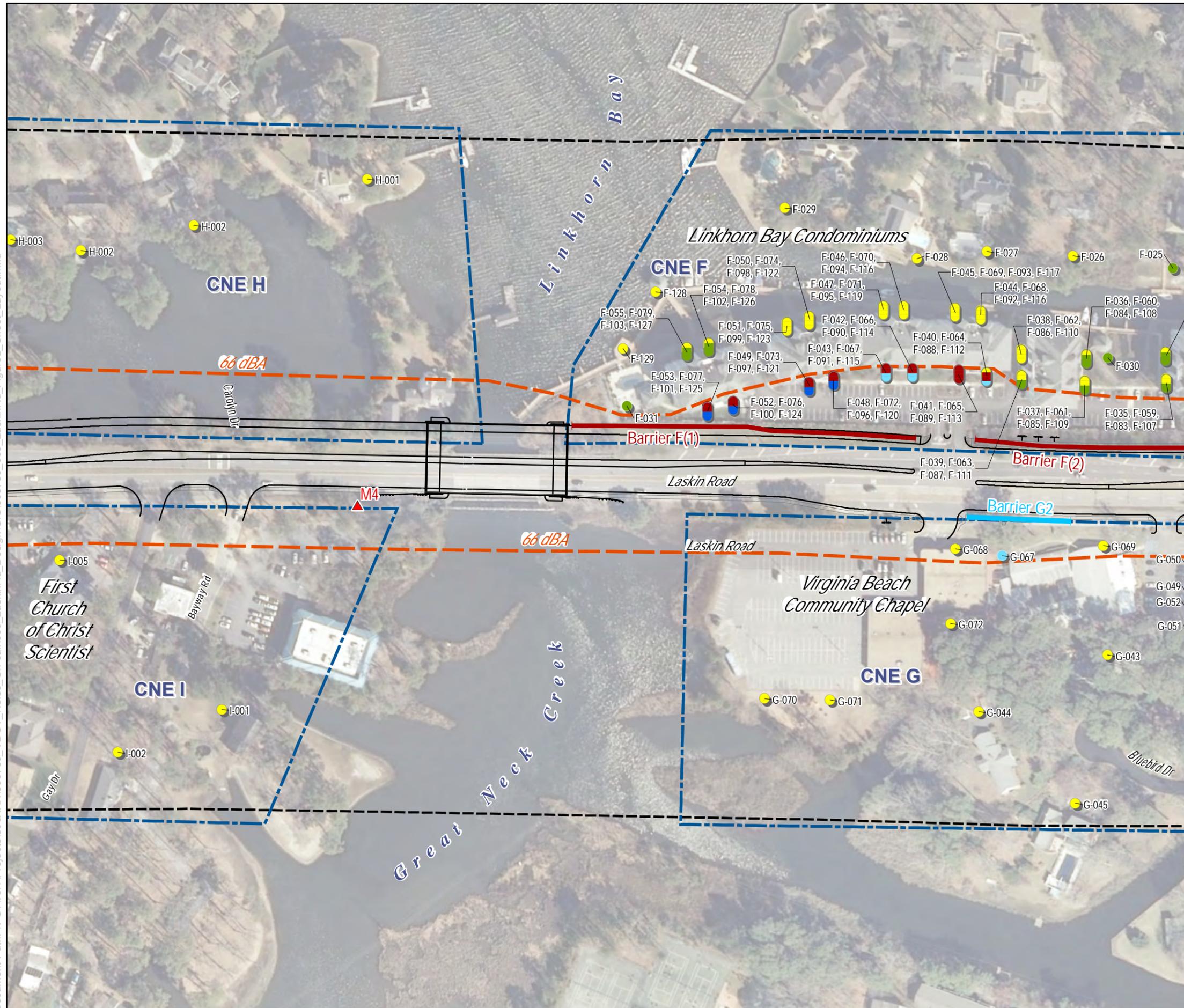


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

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Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- ▬ Feasible and Reasonable
- ▬ Feasible and Not Reasonable
- ▬ Not Feasible
- ▲ M# Measurement Site
- ▭ CNE Boundary
- ▭ 66 dBA Noise Contour
- ▭ 500' Noise Study Area

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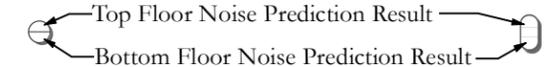
Figure 2
Location Map for Common Noise
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Laskin Road (US 58)
Improvements Project
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VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

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- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined



Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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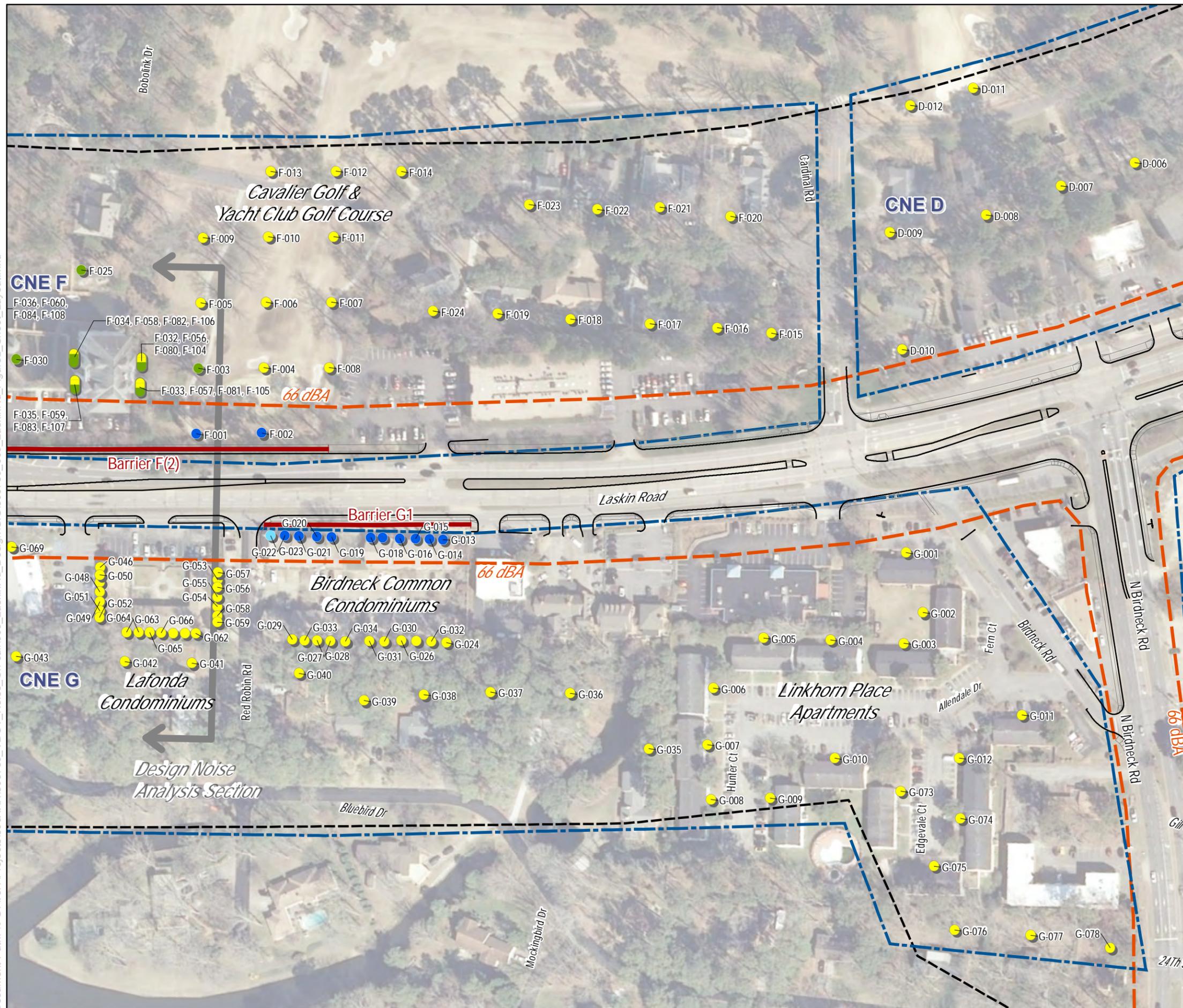


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- M# Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

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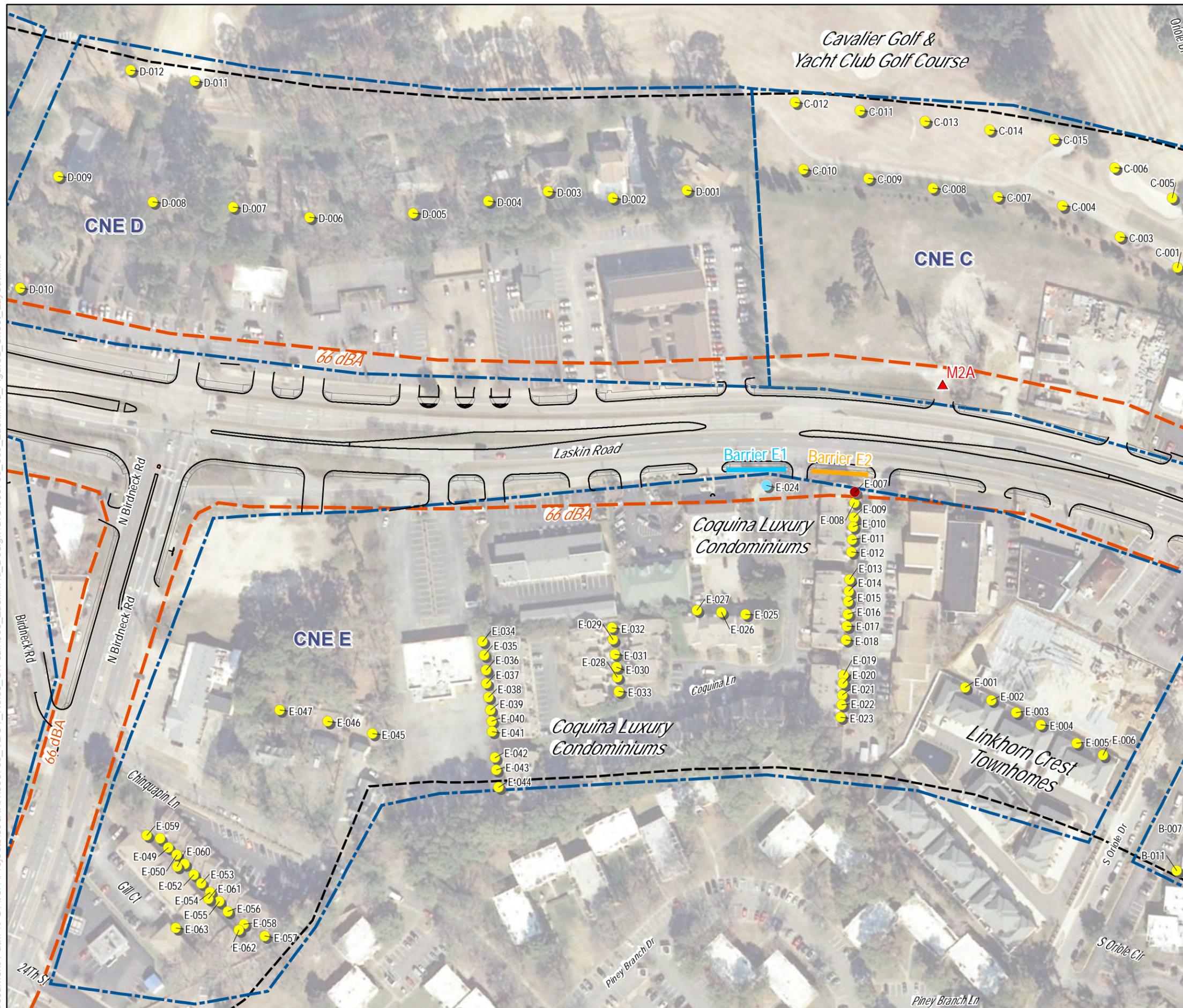


Figure 2
Location Map for Common Noise
Environments, Receptors,
Build Contours and Barriers

Laskin Road (US 58)
Improvements Project
Noise Analysis

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- Not Feasible
- M# Measurement Site
- CNE Boundary
- 66 dBA Noise Contour
- 500' Noise Study Area

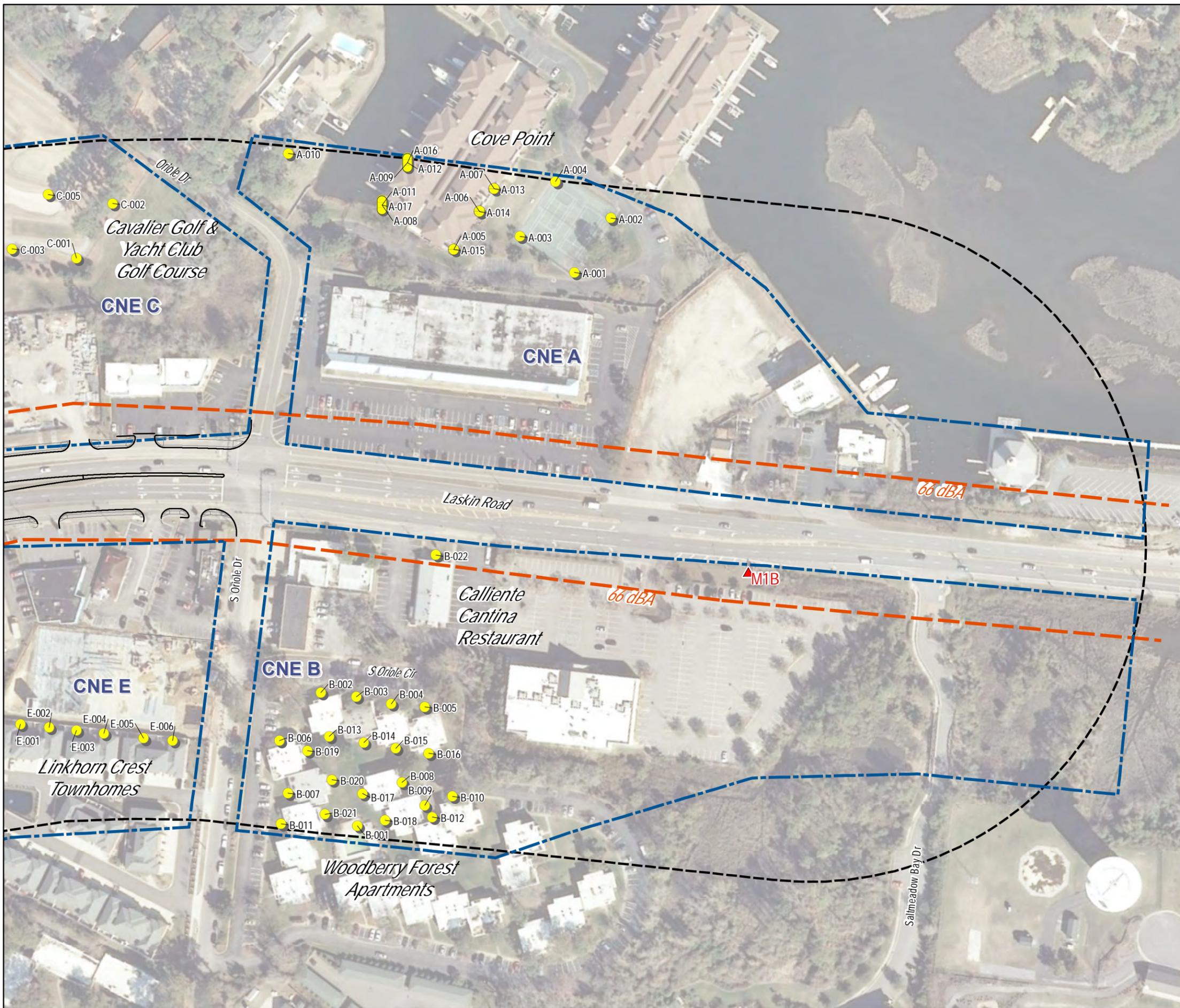
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5 NOISE IMPACT ASSESSMENT

The potential noise impact of the Laskin Road Improvements 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 (residential) and C (recreational), and approach within one decibel or exceed 72 dBA L_{eq} at noise-sensitive land uses in Activity Category E (outdoor commercial) 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 Laskin Road Improvements project.

Figure 2, the study area graphic presented in the previous section, shows the locations of individual receptors where noise impacts are predicted to occur in the 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 5-1 presents a summary of the predicted noise impact for the 2016 Existing and 2039 Build alternatives. The impacts are summarized for the entire study area and separated by NAC activity categories. All impact shown is where the NAC is predicted to be approached or exceeded. No impacts due to substantial increases in existing noise levels were identified in this study.

Table 5-1 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 |
| 2016 Existing | NAC | 26 | 5 | 0 | 0 | 31 |
| 2039 Build | NAC | 49 | 4 | 0 | 0 | 53 |

¹ The FHWA Activity Category is shown in parentheses
Source: HMMH, 2016.

Table 5-2 presents the total noise impact predicted in each CNE for both the Existing case and the Build Alternative. Most of the CNEs do not have predicted noise impact. Only residential and recreational areas in CNEs E, F, G, H and L are predicted to be impacted. For most CNEs, the predicted existing noise impact is comparable to the future impact, due to the relatively small increases in Existing noise levels predicted for the Build Alternative. However, at the Linkhorn Bay Condominiums in CNE F, the predicted existing sound levels at many of the balconies facing Laskin Road are just below the impact threshold. In addition to the traffic increase from the Existing to the Future case, opposite these properties, Laskin Road is being widened in the direction of the receptors, reducing the distance to the nearest travel lanes somewhat. Therefore, at the four-story balcony receptors, the predicted Build Alternative sound levels are typically between one and two decibels higher than the Existing levels. As a result of these two factors, 31 of the condominium balconies are predicted to be impacted under the Build Alternative, while only 9 balconies are predicted to be impacted in the Existing case.

Table 5-2 Predicted Traffic Noise Impact by Common Noise Environment (CNE)

| CNE | Land Use – Description | Number of Dwellings and Recreational Units Impacted by Traffic Noise | | |
|--------------|---|--|---------------|------------|
| | | Activity Category | 2016 Existing | 2039 Build |
| A | Cove Point residential and recreational set back north of Laskin Rd and east of Oriole Dr. | B, C | 0 | 0 |
| B | Woodberry Forest Apartments and pool set back south of Laskin Rd and east of Oriole Dr. | B, C | 0 | 0 |
| C | Cavalier Golf Course set back north of Laskin Road, west of Oriole Dr. | C | 0 | 0 |
| D | Residences, mostly set back north of Laskin Rd and east of Cardinal Rd. | B, C | 0 | 0 |
| E | Coquina Condos and pool south of and adjacent to Laskin Rd, east of Birdneck Rd. Other residential properties are set back. | B, C | 2 | 2 |
| F | Linkhorn Bay Condos and pool and Cavalier Golf Course north of and adjacent to Laskin Rd, east of Great Neck Creek | B, C | 12 | 33 |
| G | Lafonda, Birdneck Acres, and Linkhorn Place multi-family complexes and Virginia Beach Community Chapel south of and adjacent to Laskin Rd, east of Great Neck Creek | B, C, D | 13 | 12 |
| H | Residences north of and adjacent to Laskin Rd, west of Great Neck Creek | B | 1 | 3 |
| I | Christ Scientist Church and Virginia Beach School buildings south of and adjacent to Laskin Rd, west of Great Neck Creek. Residences are set back | B, C, D, E | 0 | 0 |
| J | Lutheran and Friends Meeting church buildings south of and adjacent to Laskin Rd. Residences set back | B, C, D | 0 | 0 |
| K | Outdoor seating in Hilltop North Shopping Center, north of Laskin Rd, east of First Colonial Rd. | E | 0 | 0 |
| L | Residential east of and adjacent to First Colonial Rd, north of Laurel Ln. | B | 3 | 3 |
| M | Outdoor seating in Marketplace at Hilltop shopping center, north of Laskin Rd, west of First Colonial Rd | E | 0 | 0 |
| N | Chantilly Court multi-family residential, north of and adjacent to Republic Rd, west of First Colonial Rd. | B | 0 | 0 |
| O | St. Nicholas church and restaurant seating, adjacent to and west of First Colonial Rd and south of Laskin Rd. | C, D, E | 0 | 0 |
| P | Residential along Hilltop Rd, outdoor seating at Whole Foods and La Promenade shopping mall, north of Laskin Rd, west of Republic Rd. | B, E | 0 | 0 |
| Q | Eastwind Apartments and pool set back south of Laskin Rd, east of Phillip Ave. | B, C | 0 | 0 |
| Total | | | 31 | 53 |

Source: HMMH, 2016

6 NOISE ABATEMENT MEASURES

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.

Traffic management measures normally considered for noise abatement include reduced speeds and truck restrictions. Reduced speeds would not be an effective noise mitigation measure alone since a substantial decrease in speed is necessary to provide a significant noise reduction. Typically, a 10 mph reduction in speed will result in only a 2 dBA decrease in noise level, which is not considered a sufficient level of attenuation to be considered feasible. Further, a 2 dBA change in noise level is not considered to be generally perceptible. Restricting truck usage on Laskin Road is not practical since one of the primary purposes of this facility is to accommodate trucks. Diversion of truck traffic to other roadways would increase noise levels in heavily developed residential areas.

A significant alteration of the horizontal alignment of Laskin Road 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 create undesirable impacts by increasing right-of-way acquisitions and relocations. Also, shifting the horizontal alignment is not practical since there are impacted receptors and/or private development 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. Alteration of the vertical alignment would not be feasible since there is driveway and side-street access to Laskin Road over its entire length. Raising or lowering the Laskin Road vertical alignment would result in significant impacts to the surrounding environment and costly engineering challenges.

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.

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.

Berms are considered a more attractive alternative to noise walls where there is sufficient land and fill available for them. However, berms are not feasible for Laskin Road because they would greatly increase the cost and the footprint of the project and would displace the residences that they would be intended to benefit.

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 E.

6.2 Noise Barriers

The only remaining abatement measure for consideration is the construction of noise barriers. The feasibility of noise barriers is evaluated for locations where noise impact is predicted to occur in the Build condition. Where the construction of noise barriers is found to be physically practical, barrier noise reduction is 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.

To be feasible, a barrier must be effective, that is it must reduce noise levels at noise sensitive locations by at least five decibels, thereby “benefiting” the property. VDOT requires that at least 50 percent of the impacted receptors receive five 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 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 1600 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 30 feet, these receptors are not assessed and included in the determination of a barrier's feasibility or reasonableness.

The second reasonableness criterion is VDOT's noise reduction design goal of seven 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 in the final design phase of projects.

Section 7.3, *Noise Abatement Determination* in VDOT's Guidance Manual discusses the maximum height that VDOT considers for building noise barriers. VDOT has found that costs increase substantially for noise barriers that are taller than 30 feet, so they have established 30 feet as a maximum statewide. Further, VDOT has established a policy to ensure equitable evaluations of the Feasibility and Reasonableness of noise barriers that would benefit multistory residential building units with individual outdoor usage such as balconies and patios. This policy requires the noise analyst to draw a horizontal line from the top of a 30-foot tall noise barrier perpendicular to the highway to the multi-story building. Where the line meets the building is called the "point of intersection." This also can be thought of as the elevation of a 30-foot barrier opposite the building. Only noise sensitive sites that meet or are below the point of intersection may be considered in the feasibility and reasonableness determinations.

6.2.2 Barriers Found to be Not Feasible

Three single-family homes are located in CNE H, north of Laskin Road and west of Linkhorn Bay/Great Neck Creek, and are projected to be impacted in the Build Alternative. The affected receivers are shown in Figure 2, sheets 7 and 8. Each of these homes is close to Laskin Road and has driveway access to it. Because of this driveway access, and the necessary significant gap in any noise barrier to allow for the driveway and sufficient sight distances, feasible noise barriers cannot be designed to provide 5 decibels of noise reduction or more. Therefore, barriers would not be feasible for any of these homes.

Barrier E2 was evaluated for the three most eastern Coquina Luxury Condominium buildings within CNE E, located on the eastbound side of Laskin Road, east of Coquina Lane. The barrier is shown in Figure 2, sheet 11. Due to existing roads and driveways, the maximum length of the barrier would be 87 feet. At a height of 30 feet, and with a surface area of 2,598 square feet, the barrier could only provide 4 decibels of noise reduction to the area's one impacted receptor, and smaller amounts of noise reduction to all other receptors. As five decibels constitutes the minimum amount of noise reduction considered as a benefit, this barrier provides no benefits, making it not feasible.

Barrier L was evaluated for single-family homes within CNE L along the northbound side of First Colonial Road, directly north of Laurel Lane. The barrier, shown in Figure 2, sheet 4, would benefit all 3 of the area's impacted receptors with 8 to 13 decibels of noise reduction. The barrier would be

268 feet long, 10 feet high, and have surface area of 2,679 square feet. Barrier L would have a surface area per benefited receptor of 893, and would also meet the 7 decibel noise reduction design goal for all three of the impacted receptors, making the barrier appear to be both feasible and reasonable.

Barrier L is located in the section of the project that is undergoing design. As a result of the determination that the barrier appeared to be feasible and reasonable from an acoustical standpoint, VDOT engineers examined the study area in detail to determine if the barrier would be feasible from an engineering standpoint. There are a number of utilities in the area where the barrier would have to be constructed. Based on correspondence with Regional Utilities, in order to construct Barrier L, it is estimated that utility relocation costs would range from \$4.2M to \$5.7M. This cost includes raising four high-tension distribution towers, re-routing of current underground utilities in conflict with the proposed barrier, and the acquisition of easements required to perform these relocations. Additionally, a Verizon fiber optic hut will likely have to be relocated due to access issues if the barrier were constructed with cost estimates ranging from \$1M to \$1.5M. Total overall utility relocation costs range from \$5.2M to \$7.2M. Based on a barrier cost of \$42 per square foot, Barrier L is estimated to cost \$116,298. Since the overall utility relocation costs would be 45 to 62 times greater than the cost of Barrier L, the barrier is considered not feasible due to engineering constraints. Appendix H includes further documentation and details on the engineering feasibility investigation, including FHWA concurrence with the determination.

6.2.3 Details of Potential Feasible Barriers

Details of each of the potential feasible barriers are given in Table 6-1 and described in narratives below. Each of the barriers is also shown in Figure 2 as a solid line. The color of the line indicates whether it would be reasonable and feasible (red), feasible and not reasonable (light blue), or not feasible (orange). Appendix F presents the preliminary Warranted, Feasible and Reasonable Worksheets for all barriers. The table of predicted sound levels for all receivers in Appendix C 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 with a 30-foot high barrier is also indicated in the table.

The potential barriers evaluated and shown in the graphics have not been intentionally placed outside of VDOT right of way. While the need for 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 noise analysis.

Barrier E1 is a potential noise barrier for part of the Coquina Luxury Condominiums complex within CNE E, covering the pool as well as the complex building directly south of it. The barrier would be located on the eastbound side of Laskin Road, west of Coquina Lane, as shown in Figure 2, Sheet 11. The barrier would benefit the pool, the area's one impacted receptor, with 6 decibels of noise reduction. The length of Barrier E1 would be 91 feet and 14 feet high, with a surface area of 1,269 square feet. Because the barrier only benefits one total receptor, its surface area per benefited receptor would also be 1,269. Barrier E1 would be feasible because it benefits the one impacted receptor, but would not be reasonable because the noise reduction design goal of 7 decibels is not met at this receptor. A taller barrier would not provide sufficient noise reduction, and a longer barrier is not feasible due to roadway and driveway access to Laskin Road.

Barrier F is a potential noise barrier system for CNE F, and was concurrently evaluated to this report in detail as part of the final noise abatement design study attached in Appendix G. For comparison purposes, a less detailed summary is included here as well. The barrier system would be

in two parts along the westbound side of Laskin Road to benefit the impacted balconies of the Linkhorn Bay Condominiums and a portion of the Cavalier Golf and Yacht Club golf course. The barrier would extend from Great Neck Creek to the southwestern corner of the Cavalier golf course, with a break in the middle to accommodate access from Laskin Road to the Linkhorn Bay Condos parking lot. The barrier system is shown in Figure 2, sheets 9 and 10, and would benefit the Linkhorn Bay Condominium balconies and recreation areas, the southwestern end of the Cavalier golf course, and single-family homes. Of the 16 impacted balcony receptors below the point of intersection with a 30-ft high barrier, Barrier F would benefit 13 of them with 5 to 13 decibels of noise reduction. The other three impacted receptors would not be benefited due to their proximity to the gap between the two barrier segments, limiting their protection from Laskin Road. Two impacted recreational receptors at the Cavalier golf course closest to Laskin Road also would be benefited by the barrier. Twenty-two additional non-impacted receivers below the point of intersection would also be benefited. The height of the barrier system would range from 10 to 18 feet, and would be in total 1,211 feet long, with a total surface area of 17,659 square feet. Barrier F would be feasible because it benefits the majority of impacted receptors below the point of intersection. It would also be reasonable because it meets the noise reduction design goal at the majority of the benefited receptors, and would have a surface area per benefited receptor of 477, well below VDOT's maximum of 1,600. Section 7 of this report documents the public preference survey carried out for Barrier F.

Barrier G1 is a potential noise barrier for the Birdneck Common Condominiums within CNE G, which are located along the westbound side of Laskin Road east of Red Robin Road. The barrier, shown in Figure 2, sheet 10, would benefit all 11 of the areas impacted receptors with 5 to 10 decibels of noise reduction. The barrier would be 316 feet long, 10 feet high, and have a surface area of 3,169 square feet, with a surface area per benefited receptor of 288. The barrier would be both feasible and reasonable, as it meets the 7-decibel noise reduction design goal for all but one of the impacted receptors, and has a surface area per benefited receptor well below the VDOT maximum of 1,600. Barrier G1 is not being considered for construction under the bridge replacement phase of this project as it is outside of the limits of construction. The inclusion of Barrier G1 in the design plans would require extensive modifications to overhead utilities, acquisition of right-of-way, and impact the frontage road. This barrier will be reevaluated under the design noise analysis phase of the Laskin Road Widening Project for the section east of Red Robin Road.

Barrier G2 is a potential noise barrier for the Virginia Beach Community Chapel outdoor patio area within CNE G, located along the westbound side of Laskin Road west of Red Robin Road. The barrier, shown in Figure 2, sheet 9, would benefit the patio area receptor with 5 of noise reduction. The barrier would be 160 feet long, 14 feet high, and have a surface area of 2,238 square feet, with a surface area per benefited receptor of 2238. The barrier would be feasible but not reasonable, as it does not meet the 7-decibel noise reduction design goal at the impacted receptor, and has a surface area per benefited receptor above the VDOT maximum of 1,600.

Table 6-1 Details of Potential Noise Barriers

| Barrier ID | Barrier Data | | | | | | Total Number of Impacted Receptors ¹ | Impacted and Benefited Receptors | Non-Impacted and Benefited Receptors | Total Benefited Receptors | Barrier Surface Area per Benefited Receptor (SF/BR) ² | Barrier Status ³ |
|------------|-----------------------|------|-------------|-------------------|----------------------|-----------------------|---|----------------------------------|--------------------------------------|---------------------------|--|-----------------------------|
| | Noise Reduction (dBA) | | Length (ft) | Height Range (ft) | Surface Area (sq ft) | Cost at \$48.50/sq ft | | | | | | |
| | Range | Avg. | | | | | | | | | | |
| E1 | 6 | 6 | 91 | 14 | 1269 | \$61,547 | 1 | 1 | 0 | 1 | 1269 | F & NR |
| E2 | 4 | 4 | 87 | 30 | 2598 | \$126,003 | 1 | 0 | 0 | 0 | NA | NF |
| F | 5 – 13 | 8 | 1,211 | 10 – 18 | 17,659 | \$856,462 | 18 (33) | 15 | 22 | 37 | 477 | F & R |
| G1 | 5 – 10 | 8 | 316 | 10 | 3,169 | \$153,697 | 11 | 11 | 0 | 11 | 288 | F & R |
| G2 | 5 | 5 | 160 | 14 | 2,238 | \$108,543 | 1 | 1 | 0 | 1 | 2,238 | F & NR |
| L | 8 – 13 | 11 | 268 | 10 | 2,679 | \$129,932 | 3 | 3 | 0 | 3 | 893 | NF |

Notes: 1. Total number of impacted receptors first lists those below the point of intersection with a 30-ft tall noise barrier that are eligible to be counted as benefited. The second number in parentheses is the total number of impacted receptors behind the barrier, regardless of elevation.
 2. Where SF/BR exceeds VDOT's maximum of 1600, a barrier would not be considered cost-reasonable
 3. Barrier Status: F & R – Feasible and Reasonable; F & NR – Feasible and Not Reasonable; NF – Not Feasible.
 Source: HMMH 2016

7 PUBLIC INVOLVEMENT PROCESS

This section documents the administration and results of the public preference survey that was performed for Barrier F, the one feasible and reasonable barrier carried through design in this project. The outreach, survey and voting procedures followed VDOT's revised procedures as specified in the 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*.

7.1 Public Preference Survey

Property owners and residents, including tenants, of all properties that would be benefited by the recommended Noise Barrier F were sent survey letters and ballots by certified mail. The letters were from the VDOT Noise Abatement Section on VDOT letterhead, and asked the respondents to indicate whether they wished to have the proposed noise barriers constructed or not. In these mailings, barrier details, contact information, a survey ballot and return envelope were provided to provide homeowners and residents with an understanding of the proposal and its implications, an opportunity to ask questions, and a formal survey ballot for expressing their views. Survey recipients were informed that respondents must be in favor of the proposed noise barrier in order for the noise barrier to be considered for construction. The letters and surveys were sent out on March 15, 2017.

For Barrier F, 39 certified letters were mailed, and the disposition of all certified letters was tracked. In a few cases, the ownership had changed from what had been in the public records, so a few additional letters were sent. Appendix I includes examples of the letter packages that were sent to the property owners and residents. Appendix I also includes a list of all affected property owners and residents to whom mailings were sent. Where units were not owner-occupied, letters were sent both to the owners and the current residents of the units. The list includes the property owners' name(s) and the address of the affected property. Owner-occupied units are listed first, followed by non-resident owners and then non-owner occupants. The list also provides the result of the mailing, including whether the letter was received, whether the recipient is the current owner, and whether they are in favor of the barrier, as well as the Receiver ID for determining the property location on the report graphic.

7.2 Survey Responses

All survey response ballots received indicated the property owners and residents were in favor of the barrier. No "no" votes were received at all. Twenty-one property owners sent ballots and two non-owner residents also sent ballots, for a total of 23. According to the VDOT vote-weighting system implemented in the Barrier Voting Summary Worksheet, a total of 81 weighted "yes" votes were received, out of a potential maximum of 125 votes. The pages from this worksheet are included in Appendix I. As a result, 65 percent of the potential votes were received, and since they were all in favor, the decision was made and a second mailing was not needed. Barrier F will be carried forward for construction. Appendix I also includes a graphic showing which receptors responded to the survey, entitled Appendix I Figure 1, Location Map for Receptors with Survey Responses, Barrier System F.

8 CONSTRUCTION NOISE CONSIDERATION

Construction noise provisions are contained in Section 107.16(b)3 Noise of the 2016 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 PM and 6 AM. 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.

9 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.

9.1 Noise-Compatible Land-Use Planning

Section 12.0 of VDOT's 2011 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 2039 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

9.2 VDOT's Noise Abatement Program

Information on VDOT's noise program is provided in "Highway Traffic Noise Impact Analysis Guidance Manual (Version 7)," updated July 14, 2015. This document is available from VDOT's Noise Abatement Section, Virginia Department of Transportation, 1401 E. Broad St., Richmond, VA 23219 and at

http://www.virginiadot.org/projects/resources/noisewalls/Highway_Traffic_Noise_impact_Analysis_Guidance_Manual.pdf.

APPENDIX A LIST OF PREPARERS AND REVIEWERS

This appendix lists the preparers and reviewers of this report.

Preparers with HMMH are as follows:

- Christopher Menge, traffic data processing, noise modeling, barrier analysis, reporting, Project Manager
- Christopher Bajdek, noise modeling support, quality assurance
- Zachary Weiss, noise modeling, barrier design and reporting
- Michael Hamilton, GIS support, report graphics
- Ruth Mazur, noise modeling

Preparers and reviewers with VDOT are as follows:

- L. J. Muchenje, noise measurements and analysis
- Joshua Kozlowski, noise measurements and analysis
- T. Ross Hudnall, review and coordination

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

APPENDIX B TRAFFIC DATA USED IN NOISE ANALYSIS

This appendix lists all of the roadway traffic data used in the noise analysis. The vehicle volumes and speeds shown are those used in the TNM runs for the two alternatives, Existing and Build. After the traffic data tables, the memorandum that provides the details of the loudest-hour analysis and shows the results for each alternative is given. That memorandum and also Section 4.3 in the body of the report describes how the loudest-hour data in these tables were developed from the ENTRADA sheets.

Table B-1 Loudest-hour 2016 Existing Case Traffic Data used in Noise Analysis

| Loudest Hour | Roadway Name | Location | Vehicles per hour (vph) | | | Speed (mph) |
|--------------|--------------------------------|--------------------------------------|-------------------------|---------------|--------------|-------------|
| | | | Autos | Medium Trucks | Heavy Trucks | |
| 17:00 | Laskin Road Eastbound | Va Beach Blvd to First Colonial Road | 1410 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Va Beach Blvd to First Colonial Road | 982 | 2 | 0 | 45 |
| 17:00 | Laskin Road Eastbound | First Colonial Road to Birdneck Rd | 1176 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | First Colonial Road to Birdneck Rd | 1142 | 3 | 1 | 45 |
| 17:00 | Laskin Road Eastbound | Birdneck Rd to Pacific Ave | 1106 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Birdneck Rd to Pacific Ave | 1083 | 0 | 0 | 45 |
| 17:00 | First Colonial Road Northbound | I-264 to Laskin Road | 669 | 0 | 0 | 36 |
| 17:00 | First Colonial Road Southbound | I-264 to Laskin Road | 719 | 0 | 0 | 35 |
| 17:00 | First Colonial Road Northbound | Laskin Road to Great Neck Rd | 1261 | 113 | 1 | 35 |
| 17:00 | First Colonial Road Southbound | Laskin Road to Great Neck Rd | 1019 | 72 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | I-264 to Laskin Road | 1060 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Southbound | I-264 to Laskin Road | 1046 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | Laskin Rd to Kamichi Pl | 113 | 0 | 0 | 30 |
| 17:00 | Birdneck Road Southbound | Laskin Rd to Kamichi Pl | 103 | 0 | 0 | 31 |

Table B-2 Loudest-hour 2039 Build Case Traffic Data used in Noise Analysis

| Loudest Hour | Roadway Name | Location | Vehicles per hour (vph) | | | Speed (mph) |
|--------------|--------------------------------|--------------------------------------|-------------------------|---------------|--------------|-------------|
| | | | Autos | Medium Trucks | Heavy Trucks | |
| 17:00 | Laskin Road Eastbound | Va Beach Blvd to First Colonial Road | 1790 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Va Beach Blvd to First Colonial Road | 1248 | 2 | 0 | 45 |
| 17:00 | Laskin Road Eastbound | First Colonial Road to Birdneck Rd | 1495 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | First Colonial Road to Birdneck Rd | 1452 | 4 | 2 | 45 |
| 17:00 | Laskin Road Eastbound | Birdneck Rd to Pacific Ave | 1406 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Birdneck Rd to Pacific Ave | 1377 | 0 | 0 | 45 |
| 17:00 | First Colonial Road Northbound | I-264 to Laskin Road | 755 | 0 | 0 | 36 |
| 17:00 | First Colonial Road Southbound | I-264 to Laskin Road | 812 | 0 | 0 | 35 |
| 17:00 | First Colonial Road Northbound | Laskin Road to Great Neck Rd | 1586 | 142 | 1 | 35 |
| 17:00 | First Colonial Road Southbound | Laskin Road to Great Neck Rd | 1282 | 91 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | I-264 to Laskin Road | 1412 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Southbound | I-264 to Laskin Road | 1393 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | Laskin Rd to Kamichi Pl | 137 | 0 | 0 | 30 |
| 17:00 | Birdneck Road Southbound | Laskin Rd to Kamichi Pl | 125 | 0 | 0 | 30 |

APPENDIX C PREDICTED NOISE LEVELS

This appendix provides the predicted noise levels at all of the receiver (receptor) locations shown in the study graphics for the 2016 Existing and design-year 2039 Build alternative. The receptor sites are organized by CNE number. 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 computed loudest-hour L_{eq} sound levels. Build alternative sound levels are shown both without and with the effects of potential noise abatement measures. No-barrier sound levels shown in red indicate impact due to NAC. A column also shows whether balcony receptors on multi-story buildings are above the point of intersection with a 30-ft barrier and not counted as benefited. Further, those receptors are shown with gray shading in the row.

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|---|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| A-001 | Cove Point Tennis Court, 700 Oriole Dr, Row 2 | 1 | C | Rec. | 67 | No | 53 | 54 | NA | NA |
| A-002 | Cove Point Tennis Court, 700 Oriole Dr, Row 2 | 1 | C | Rec. | 67 | No | 53 | 53 | NA | NA |
| A-003 | Cove Point Tennis Court, 700 Oriole Dr, Row 2 | 1 | C | Rec. | 67 | No | 49 | 50 | NA | NA |
| A-004 | Cove Point Tennis Court, 700 Oriole Dr, Row 2 | 1 | C | Rec. | 67 | No | 50 | 51 | NA | NA |
| A-005 | Cove Point, 700 Oriole Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| A-006 | Cove Point, 700 Oriole Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| A-007 | Cove Point, 700 Oriole Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| A-008 | Cove Point, 700 Oriole Dr, Row 2 Flr. 1 | 1 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| A-009 | Cove Point, 700 Oriole Dr, Row 2 Flr. 1 | 1 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| A-010 | 724 Oriole Dr, Row 2 | 1 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| A-011 | Cove Point, 700 Oriole Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 52 | 53 | NA | NA |
| A-012 | Cove Point, 700 Oriole Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| A-013 | Cove Point, 700 Oriole Dr, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 51 | 52 | NA | NA |
| A-014 | Cove Point, 700 Oriole Dr, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 51 | 52 | NA | NA |
| A-015 | Cove Point, 700 Oriole Dr, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| A-016 | Cove Point, 700 Oriole Dr, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 52 | 52 | NA | NA |
| A-017 | Cove Point, 700 Oriole Dr, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| B-001 | Woodberry Forest Apartments Pool, 900 Oriole Cir S, Row 3 | 1 | C | Rec. | 67 | No | 46 | 47 | NA | NA |
| B-002 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 1 | 4 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| B-003 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 1 | 4 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| B-004 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 1 | 4 | B | Res. | 67 | No | 56 | 57 | NA | NA |
| B-005 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 1 | 4 | B | Res. | 67 | No | 57 | 58 | NA | NA |
| B-006 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 1 | 4 | B | Res. | 67 | No | 54 | 55 | NA | NA |
| B-007 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| B-008 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| B-009 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 51 | 53 | NA | NA |
| B-010 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 53 | 55 | NA | NA |
| B-011 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 49 | 49 | NA | NA |
| B-012 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 1 | 4 | B | Res. | 67 | No | 52 | 54 | NA | NA |
| B-013 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 2 | 2 | B | Res. | 67 | No | 44 | 45 | NA | NA |
| B-014 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 2 | 2 | B | Res. | 67 | No | 44 | 45 | NA | NA |
| B-015 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 2 | 2 | B | Res. | 67 | No | 43 | 44 | NA | NA |
| B-016 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 2 Flr. 2 | 2 | B | Res. | 67 | No | 43 | 44 | NA | NA |
| B-017 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 2 | 2 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| B-018 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 2 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| B-019 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 2 | 2 | B | Res. | 67 | No | 53 | 52 | NA | NA |
| B-020 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 2 | 2 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| B-021 | Woodberry Forest Apartments, 900 Oriole Cir S, Row 3 Flr. 2 | 2 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| B-022 | Calliente Cantina, 981 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 69 | 70 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| C-001 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 55 | 55 | NA | NA |
| C-002 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 53 | 53 | NA | NA |
| C-003 | Cavalier Golf & Yacht Club Golf Course, 1040 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 55 | 54 | NA | NA |
| C-004 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 55 | 54 | NA | NA |
| C-005 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 53 | 53 | NA | NA |
| C-006 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 51 | 52 | NA | NA |
| C-007 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 55 | 54 | NA | NA |
| C-008 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 54 | 54 | NA | NA |
| C-009 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 54 | 54 | NA | NA |
| C-010 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 53 | 53 | NA | NA |
| C-011 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 50 | 51 | NA | NA |
| C-012 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 51 | 52 | NA | NA |
| C-013 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 51 | 52 | NA | NA |
| C-014 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 52 | 52 | NA | NA |
| C-015 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 52 | 52 | NA | NA |
| D-001 | 1105 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 55 | 55 | NA | NA |
| D-002 | 1109 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 54 | 53 | NA | NA |
| D-003 | 1113 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 54 | 53 | NA | NA |
| D-004 | 1117 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 53 | 52 | NA | NA |
| D-005 | 1121 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 53 | 52 | NA | NA |
| D-006 | 1129 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| D-007 | 1133 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 56 | 56 | NA | NA |
| D-008 | 1137 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 57 | 58 | NA | NA |
| D-009 | 716 Cardinal Rd, Row 2 | 1 | B | Res. | 67 | No | 58 | 58 | NA | NA |
| D-010 | 708 Cardinal Rd, Row 1 | 1 | B | Res. | 67 | No | 65 | 64 | NA | NA |
| D-011 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 53 | 54 | NA | NA |
| D-012 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 53 | 54 | NA | NA |
| E-001 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| E-002 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| E-003 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| E-004 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 51 | 52 | NA | NA |
| E-005 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| E-006 | Linkhorn Crest Townhomes, 1033 Draketail Ln, Row 2 | 2 | B | Res. | 67 | No | 54 | 55 | NA | NA |
| E-007 | Coquina Luxury Condominiums, 760 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 67 | 68 | 64 | 4 |
| E-008 | Coquina Luxury Condominiums, 758 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 65 | 65 | 63 | 3 |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|---|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| E-009 | Coquina Luxury Condominiums, 756 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 63 | 63 | 61 | 2 |
| E-010 | Coquina Luxury Condominiums, 754 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 62 | 61 | 60 | 2 |
| E-011 | Coquina Luxury Condominiums, 752 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 60 | 60 | 59 | 1 |
| E-012 | Coquina Luxury Condominiums, 750 Coquina Ln, Row 1 | 1 | B | Res. | 67 | No | 59 | 59 | 57 | 1 |
| E-013 | Coquina Luxury Condominiums, 746 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 59 | 58 | 57 | 1 |
| E-014 | Coquina Luxury Condominiums, 744 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 56 | 55 | 54 | 1 |
| E-015 | Coquina Luxury Condominiums, 742 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 56 | 55 | 53 | 1 |
| E-016 | Coquina Luxury Condominiums, 740 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 55 | 54 | 53 | 1 |
| E-017 | Coquina Luxury Condominiums, 738 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 54 | 53 | 52 | 1 |
| E-018 | Coquina Luxury Condominiums, 736 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 54 | 52 | 51 | 1 |
| E-019 | Coquina Luxury Condominiums, 732 Coquina Ln, Row 3 | 1 | B | Res. | 67 | No | 54 | 53 | 52 | 1 |
| E-020 | Coquina Luxury Condominiums, 730 Coquina Ln, Row 3 | 1 | B | Res. | 67 | No | 53 | 52 | 51 | 1 |
| E-021 | Coquina Luxury Condominiums, 728 Coquina Ln, Row 3 | 1 | B | Res. | 67 | No | 51 | 51 | 49 | 1 |
| E-022 | Coquina Luxury Condominiums, 726 Coquina Ln, Row 3 | 1 | B | Res. | 67 | No | 51 | 50 | 49 | 1 |
| E-023 | Coquina Luxury Condominiums, 724 Coquina Ln, Row 3 | 1 | B | Res. | 67 | No | 51 | 50 | 50 | 1 |
| E-024 | Coquina Luxury Condominiums Pool, Coquina Ln, Row 1 | 1 | C | Rec. | 67 | No | 68 | 69 | 64 | 6 |
| E-025 | Coquina Luxury Condominiums, 715 & 717 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 56 | 54 | 52 | 2 |
| E-026 | Coquina Luxury Condominiums, 711 & 713 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 55 | 53 | 52 | 1 |
| E-027 | Coquina Luxury Condominiums, 709 & 719 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 52 | 51 | 50 | 1 |
| E-028 | Coquina Luxury Condominiums, 699 & 1009 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 47 | 46 | NA | NA |
| E-029 | Coquina Luxury Condominiums, 705 & 1003 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 49 | 48 | NA | NA |
| E-030 | Coquina Luxury Condominiums, 701 & 1007 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| E-031 | Coquina Luxury Condominiums, 703 & 1005 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 48 | 47 | NA | NA |
| E-032 | Coquina Luxury Condominiums, 707 & 1001 Coquina Ln, Row 2 | 2 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| E-033 | Coquina Luxury Condominiums, 1011 Coquina Ln, Row 2 | 1 | B | Res. | 67 | No | 47 | 45 | NA | NA |
| E-034 | Coquina Luxury Condominiums, 1000 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| E-035 | Coquina Luxury Condominiums, 1002 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 52 | 52 | NA | NA |
| E-036 | Coquina Luxury Condominiums, 1004 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| E-037 | Coquina Luxury Condominiums, 1006 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 49 | 48 | NA | NA |
| E-038 | Coquina Luxury Condominiums, 1008 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| E-039 | Coquina Luxury Condominiums, 1010 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| E-040 | Coquina Luxury Condominiums, 1012 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| E-041 | Coquina Luxury Condominiums, 1014 Coquina Chase, Row 2 | 1 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| E-042 | Coquina Luxury Condominiums, 1024 Coquina Chase, Row 3 | 1 | B | Res. | 67 | No | 47 | 49 | NA | NA |
| E-043 | Coquina Luxury Condominiums, 1020 & 1022 Coquina Chase, Row 3 | 2 | B | Res. | 67 | No | 47 | 49 | NA | NA |
| E-044 | Coquina Luxury Condominiums, 1016 & 1018 Coquina Chase, Row 3 | 2 | B | Res. | 67 | No | 47 | 49 | NA | NA |
| E-045 | 1052 Chinquapin Ln, Row 1 | 1 | B | Res. | 67 | No | 52 | 53 | NA | NA |
| E-046 | Chinquapin Ln, Row 1 | 1 | B | Res. | 67 | No | 54 | 55 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|-----------|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| E-047 | 1056 Chinquapin Ln, Row 1 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| E-048 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 54 | 56 | NA | NA |
| E-049 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 52 | 53 | NA | NA |
| E-050 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 50 | 52 | NA | NA |
| E-051 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 49 | 51 | NA | NA |
| E-052 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 48 | 50 | NA | NA |
| E-053 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| E-054 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| E-055 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| E-056 | Chinquapin Ln, Row 2 | 1 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| E-057 | Chinquapin Ln, Row 2 | 2 | B | Res. | 67 | No | 45 | 46 | NA | NA |
| E-058 | Chinquapin Ln, Row 2 | 2 | B | Res. | 67 | No | 45 | 46 | NA | NA |
| E-059 | Chinquapin Ln, Row 2 | 8 | B | Res. | 67 | No | 59 | 60 | NA | NA |
| E-060 | Chinquapin Ln, Row 2 | 8 | B | Res. | 67 | No | 51 | 52 | NA | NA |
| E-061 | Chinquapin Ln, Row 2 | 8 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| E-062 | Chinquapin Ln, Row 2 | 8 | B | Res. | 67 | No | 45 | 47 | NA | NA |
| E-063 | 1000 Gill Ct, Row 3 | 8 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| F-001 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 68 | 70 | 59 | 11 |
| F-002 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | C | Rec. | 67 | No | 68 | 69 | 62 | 8 |
| F-003 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 57 | 58 | 53 | 5 |
| F-004 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 56 | 57 | 54 | 3 |
| F-005 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 52 | 53 | 51 | 3 |
| F-006 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 54 | 55 | 54 | 2 |
| F-007 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 53 | 54 | 53 | 1 |
| F-008 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 2 | 1 | C | Rec. | 67 | No | 58 | 60 | 59 | 1 |
| F-009 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 49 | 51 | 49 | 2 |
| F-010 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 53 | 54 | 53 | 1 |
| F-011 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 53 | 54 | 53 | 1 |
| F-012 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 52 | 53 | 52 | 1 |
| F-013 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 51 | 51 | 51 | 1 |
| F-014 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 3 | 1 | C | Rec. | 67 | No | 51 | 52 | 52 | 1 |
| F-015 | 1201 Tanager Trl, Row 1 | 1 | B | Res. | 67 | No | 61 | 62 | 62 | 0 |
| F-016 | 1205 Tanager Trl, Row 1 | 1 | B | Res. | 67 | No | 60 | 60 | 60 | 0 |
| F-017 | 1209 Tanager Trl, Row 1 | 1 | B | Res. | 67 | No | 59 | 59 | 59 | 0 |
| F-018 | 1213 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 55 | 55 | 55 | 0 |
| F-019 | 1221 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 54 | 55 | 54 | 1 |
| F-020 | 717 Cardinal Rd, Row 2 | 1 | B | Res. | 67 | No | 54 | 54 | 53 | 0 |
| F-021 | 1208 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 51 | 52 | 52 | 0 |
| F-022 | 1212 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 51 | 51 | 51 | 0 |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|---|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| F-023 | 1216 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 50 | 51 | 50 | 1 |
| F-024 | 1225 Tanager Trl, Row 2 | 1 | B | Res. | 67 | No | 56 | 58 | 57 | 1 |
| F-025 | 1245 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 53 | 54 | 49 | 5 |
| F-026 | 1253 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 54 | 54 | 49 | 4 |
| F-027 | 1257 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 49 | 49 | 48 | 1 |
| F-028 | 1261 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 49 | 49 | 48 | 0 |
| F-029 | 1265 Tanager Trl, Row 3 | 1 | B | Res. | 67 | No | 53 | 52 | 51 | 1 |
| F-030 | Linkhorn Bay East Gazebo, 1276 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 58 | 60 | 48 | 12 |
| F-031 | Linkhorn Bay Pool, 1292 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 66 | 63 | 55 | 8 |
| F-032 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 62 | 62 | 55 | 7 |
| F-033 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 64 | 65 | 57 | 8 |
| F-034 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 60 | 61 | 49 | 13 |
| F-035 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 63 | 64 | 53 | 11 |
| F-036 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 61 | 62 | 50 | 13 |
| F-037 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 64 | 65 | 55 | 10 |
| F-038 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 60 | 61 | 57 | 4 |
| F-039 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 63 | 64 | 59 | 6 |
| F-040 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 64 | 66 | 61 | 5 |
| F-041 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 64 | 66 | 62 | 4 |
| F-042 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 65 | 66 | 61 | 5 |
| F-043 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 65 | 66 | 60 | 6 |
| F-044 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 40 | 40 | 39 | 1 |
| F-045 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 41 | 40 | 39 | 1 |
| F-046 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 44 | 45 | 44 | 0 |
| F-047 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 47 | 47 | 47 | 0 |
| F-048 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 65 | 67 | 57 | 9 |
| F-049 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 65 | 67 | 57 | 11 |
| F-050 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 51 | 52 | 52 | 0 |
| F-051 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 52 | 54 | 54 | 0 |
| F-052 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 67 | 69 | 56 | 13 |
| F-053 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 67 | 70 | 57 | 13 |
| F-054 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 62 | 64 | 57 | 7 |
| F-055 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 63 | 64 | 58 | 6 |
| F-056 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 62 | 63 | 57 | 6 |
| F-057 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 64 | 65 | 61 | 5 |
| F-058 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 61 | 62 | 51 | 11 |
| F-059 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 63 | 64 | 56 | 8 |
| F-060 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 61 | 63 | 51 | 11 |
| F-061 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 64 | 65 | 58 | 8 |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| F-062 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 60 | 61 | 57 | 4 |
| F-063 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 63 | 64 | 59 | 5 |
| F-064 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 64 | 66 | 61 | 4 |
| F-065 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 65 | 66 | 62 | 4 |
| F-066 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 65 | 66 | 61 | 5 |
| F-067 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 65 | 66 | 60 | 6 |
| F-068 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 42 | 42 | 41 | 1 |
| F-069 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 42 | 42 | 41 | 1 |
| F-070 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 45 | 46 | 45 | 0 |
| F-071 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 47 | 48 | 48 | 0 |
| F-072 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 65 | 67 | 59 | 8 |
| F-073 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 66 | 67 | 58 | 9 |
| F-074 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 52 | 54 | 54 | 0 |
| F-075 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 52 | 54 | 54 | 0 |
| F-076 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 67 | 69 | 61 | 8 |
| F-077 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 1 | B | Res. | 67 | No | 67 | 69 | 63 | 7 |
| F-078 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | No | 63 | 64 | 58 | 7 |
| F-079 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 1 | B | Res. | 67 | Yes | 63 | 65 | 59 | 6 |
| F-080 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 62 | 63 | 60 | 3 |
| F-081 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 64 | 65 | 63 | 3 |
| F-082 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 61 | 62 | 55 | 7 |
| F-083 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 63 | 64 | 61 | 3 |
| F-084 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 61 | 63 | 57 | 6 |
| F-085 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 64 | 65 | 62 | 3 |
| F-086 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 60 | 61 | 59 | 3 |
| F-087 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 63 | 64 | 62 | 2 |
| F-088 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 64 | 66 | 63 | 2 |
| F-089 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 65 | 66 | 63 | 2 |
| F-090 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 65 | 66 | 63 | 3 |
| F-091 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 65 | 66 | 63 | 4 |
| F-092 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 44 | 44 | 42 | 1 |
| F-093 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 44 | 44 | 42 | 1 |
| F-094 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 46 | 46 | 46 | 1 |
| F-095 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 48 | 49 | 49 | 0 |
| F-096 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 65 | 67 | 63 | 3 |
| F-097 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 65 | 67 | 63 | 4 |
| F-098 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 52 | 54 | 54 | 0 |
| F-099 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 53 | 55 | 55 | 0 |
| F-100 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 67 | 68 | 67 | 2 |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| F-101 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 4 | 1 | B | Res. | 67 | Yes | 67 | 69 | 68 | 1 |
| F-102 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 63 | 64 | 58 | 6 |
| F-103 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 4 | 1 | B | Res. | 67 | Yes | 63 | 65 | 59 | 5 |
| F-104 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 62 | 63 | 61 | 2 |
| F-105 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 64 | 65 | 64 | 1 |
| F-106 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 61 | 62 | 59 | 3 |
| F-107 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 63 | 64 | 61 | 2 |
| F-108 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 61 | 62 | 59 | 3 |
| F-109 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 64 | 65 | 63 | 2 |
| F-110 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 60 | 61 | 59 | 2 |
| F-111 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 63 | 64 | 62 | 2 |
| F-112 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 64 | 65 | 64 | 2 |
| F-113 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 64 | 66 | 64 | 2 |
| F-114 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 65 | 66 | 64 | 2 |
| F-115 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 65 | 66 | 64 | 2 |
| F-116 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 45 | 45 | 44 | 1 |
| F-117 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 45 | 45 | 44 | 2 |
| F-118 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 47 | 47 | 47 | 1 |
| F-119 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 49 | 50 | 49 | 0 |
| F-120 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 65 | 67 | 64 | 2 |
| F-121 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 65 | 67 | 65 | 2 |
| F-122 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 52 | 54 | 54 | 0 |
| F-123 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 53 | 55 | 55 | 0 |
| F-124 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 66 | 68 | 68 | 1 |
| F-125 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 1 Flr. 5 | 1 | B | Res. | 67 | Yes | 67 | 69 | 69 | 0 |
| F-126 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | Yes | 63 | 64 | 61 | 4 |
| F-127 | Linkhorn Bay Condos, 1268-1292 Laskin Rd, Row 2 Flr. 5 | 1 | B | Res. | 67 | No | 63 | 64 | 61 | 3 |
| F-128 | Linkhorn Bay West Gazebo, 1292 Laskin Rd, Row 2 | 1 | C | Rec. | 67 | No | 56 | 55 | 54 | 1 |
| F-129 | Linkhorn Bay Dock Tables, 1292 Laskin Rd, Row 2 | 1 | C | Rec. | 67 | No | 58 | 57 | 55 | 2 |
| G-001 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 1 | 16 | B | Res. | 67 | No | 64 | 65 | NA | NA |
| G-002 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| G-003 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 54 | 54 | NA | NA |
| G-004 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 56 | 57 | NA | NA |
| G-005 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 52 | 52 | NA | NA |
| G-006 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| G-007 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| G-008 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 45 | 46 | NA | NA |
| G-009 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 45 | 46 | NA | NA |
| G-010 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 47 | 48 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| G-011 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 2 | 16 | B | Res. | 67 | No | 56 | 57 | NA | NA |
| G-012 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 48 | 50 | NA | NA |
| G-013 | Birdneck Common Condos, 1200 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 68 | 69 | 63 | 7 |
| G-014 | Birdneck Common Condos, 1204 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 68 | 69 | 62 | 8 |
| G-015 | Birdneck Common Condos, 1208 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 68 | 70 | 61 | 9 |
| G-016 | Birdneck Common Condos, 1212 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 68 | 70 | 61 | 9 |
| G-017 | Birdneck Common Condos, 1216 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 61 | 9 |
| G-018 | Birdneck Common Condos, 1220 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 60 | 10 |
| G-019 | Birdneck Common Condos, 1228 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 61 | 9 |
| G-020 | Birdneck Common Condos, 1232 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 60 | 10 |
| G-021 | Birdneck Common Condos, 1236 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 61 | 9 |
| G-022 | Birdneck Common Condos, 1240 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 62 | 8 |
| G-023 | Birdneck Common Condos, 1244 Peoples Way, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 65 | 5 |
| G-024 | Birdneck Common Condos, 1201 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| G-025 | Birdneck Common Condos, 1209 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 39 | 40 | NA | NA |
| G-026 | Birdneck Common Condos, 1213 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 39 | 40 | NA | NA |
| G-027 | Birdneck Common Condos, 1229 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| G-028 | Birdneck Common Condos, 1233 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| G-029 | Birdneck Common Condos, 1241 & 1245 Peoples Way, Row 2 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| G-030 | Birdneck Common Condos, 1217 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 40 | 41 | NA | NA |
| G-031 | Birdneck Common Condos, 1221 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 51 | 50 | NA | NA |
| G-032 | Birdneck Common Condos, 1205 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| G-033 | Birdneck Common Condos, 1237 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 39 | 39 | NA | NA |
| G-034 | Birdneck Common Condos, 1225 Peoples Way, Row 2 | 1 | B | Res. | 67 | No | 39 | 40 | NA | NA |
| G-035 | 1200 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| G-036 | 1204 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| G-037 | 1208 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 51 | 49 | NA | NA |
| G-038 | 1212 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| G-039 | 1216 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| G-040 | 600 Red Robin Rd, Row 3 | 1 | B | Res. | 67 | No | 43 | 44 | NA | NA |
| G-041 | 601 Red Robin Rd, Row 3 | 1 | B | Res. | 67 | No | 49 | 49 | NA | NA |
| G-042 | 1228 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 51 | 50 | NA | NA |
| G-043 | 1232 Bluebird Dr, Row 2 | 1 | B | Res. | 67 | No | 50 | 49 | NA | NA |
| G-044 | 1233 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 50 | 49 | NA | NA |
| G-045 | 1229 Bluebird Dr, Row 3 | 1 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| G-046 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 66 | 65 | NA | NA |
| G-047 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 62 | 62 | NA | NA |
| G-048 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 61 | 60 | NA | NA |
| G-049 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 59 | 59 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|---|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----------|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| G-050 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 64 | 63 | NA | NA |
| G-051 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 58 | 58 | NA | NA |
| G-052 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| G-053 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 62 | 61 | NA | NA |
| G-054 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 58 | 58 | NA | NA |
| G-055 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 59 | 58 | NA | NA |
| G-056 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 61 | 60 | NA | NA |
| G-057 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 64 | 63 | NA | NA |
| G-058 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| G-059 | Lafonda Condominiums, 1245 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| G-060 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| G-061 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| G-062 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 44 | 45 | NA | NA |
| G-063 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| G-064 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| G-065 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| G-066 | Lafonda Condominiums, 1245 Laskin Rd, Row 2 | 1 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| G-067 | Virginia Beach Community Chapel Patio, 1261 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 67 | 67 | 62 | 5 |
| G-068 | Virginia Beach Community Chapel, 1265 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 42 | 42 | NA | NA |
| G-069 | Virginia Beach Community Chapel, 1261 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 43 | 44 | NA | NA |
| G-070 | Virginia Beach Community Chapel Playground, 1265 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 59 | 58 | NA | NA |
| G-071 | Virginia Beach Community Chapel Playground, 1265 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 58 | 57 | NA | NA |
| G-072 | Virginia Beach Community Chapel Courtyard, 1265 Laskin Rd, Row 2 | 1 | C | Rec. | 67 | No | 45 | 46 | NA | NA |
| G-073 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 47 | 49 | NA | NA |
| G-074 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 46 | 48 | NA | NA |
| G-075 | Linkhorn Place Apartments, 1128 Allendale Dr, Row 3 | 16 | B | Res. | 67 | No | 45 | 47 | NA | NA |
| G-076 | 1108 Bluebird Dr, Row 4 | 1 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| G-077 | 1104 Bluebird Dr, Row 4 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| G-078 | 1100 Bluebird Dr, Row 4 | 1 | B | Res. | 67 | No | 63 | 64 | NA | NA |
| H-001 | 1320 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 56 | 56 | NA | NA |
| H-002 | 1345 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 58 | 59 | NA | NA |
| H-002 | 1345 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 58 | 59 | NA | NA |
| H-003 | 1349 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 58 | NA | NA |
| H-004 | 1357 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 57 | NA | NA |
| H-005 | 700 Linbay Dr, Row 1 | 1 | B | Res. | 67 | No | 65 | 66 | NA | NA |
| H-006 | 1388 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 65 | 66 | NA | NA |
| H-007 | 1400 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 65 | 65 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| H-008 | 1408 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 64 | 65 | NA | NA |
| H-009 | 1369 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| H-010 | 1401 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| H-011 | 1409 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| H-012 | 1417 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| H-013 | 1425 Carolyn Dr, Row 1 | 1 | B | Res. | 67 | No | 58 | 56 | NA | NA |
| H-014 | 1433 Carolyn Dr, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| H-015 | 1441 Carolyn Dr, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| H-016 | 1453 Carolyn Dr, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| H-017 | 1461 Carolyn Dr, Row 1 | 1 | B | Res. | 67 | No | 58 | 57 | NA | NA |
| H-018 | 1469 Carolyn Dr, Row 2 | 1 | B | Res. | 67 | No | 58 | 58 | NA | NA |
| H-019 | 1484 Laskin Rd, Row 1 | 1 | B | Res. | 67 | No | 66 | 67 | NA | NA |
| H-020 | 809 Winwood Dr, Row 1 | 1 | B | Res. | 67 | No | 59 | 61 | NA | NA |
| H-021 | 813 Winwood Dr, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| H-022 | 817 Winwood Dr, Row 3 | 1 | B | Res. | 67 | No | 51 | 52 | NA | NA |
| I-001 | 644 Bayway Rd, Row 2 | 1 | B | Res. | 67 | No | 56 | 55 | NA | NA |
| I-002 | 633 Bayway Rd, Row 3 | 1 | B | Res. | 67 | No | 53 | 52 | NA | NA |
| I-003 | 613 Gay Dr, Row 2 | 1 | B | Res. | 67 | No | 53 | 52 | NA | NA |
| I-004 | 609 Gay Dr, Row 3 | 1 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| I-005 | First Church Of Christ Scientist, 1341 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 40 | 39 | NA | NA |
| I-006 | Sugar Plum Bakery, 1353 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 64 | 63 | NA | NA |
| I-007 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 49 | 48 | NA | NA |
| I-008 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| I-009 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 47 | 46 | NA | NA |
| I-010 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 46 | 45 | NA | NA |
| I-011 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 46 | 45 | NA | NA |
| I-012 | 1300 Linkhorn Cir, Row 3 | 1 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| I-013 | 1300 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| I-014 | 1300 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 52 | 53 | NA | NA |
| I-015 | 1300 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| I-016 | 1300 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| I-017 | 1330 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| I-018 | 1332 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 54 | 54 | NA | NA |
| I-019 | 1334 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 54 | 54 | NA | NA |
| I-020 | 1336 Linkhorn Cir, Row 2 | 1 | B | Res. | 67 | No | 54 | 54 | NA | NA |
| I-021 | Apple Blossom Apartments, 1313 Linkhorn Cir, Row 3 | 8 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| I-022 | Children's Learning Paradise, 612 Fremac Dr, Row 2 | 1 | D | Int. | 52 | No | 29 | 29 | NA | NA |
| I-023 | Children's Learning Paradise Playground, 612 Fremac Dr, Row 2 | 1 | C | Rec. | 67 | No | 55 | 55 | NA | NA |
| I-024 | Va Beach Public Schools Laskin Road Annex, 1413 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 38 | 38 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| J-001 | Good Shepard Lutheran Church, 1489 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 38 | 39 | NA | NA |
| J-002 | Friends Meeting Pow, 1537 Laskin Rd, Row 1 | 1 | D | Int. | 52 | No | 34 | 35 | NA | NA |
| J-003 | Good Shepard Lutheran Church Outdoor Area, 1489 Laskin Rd, Row 1 | 1 | C | Rec. | 67 | No | 58 | 60 | NA | NA |
| J-004 | Friends Meeting Pow Outdoor Area, 1537 Laskin Rd, Row 2 | 1 | C | Rec. | 67 | No | 55 | 56 | NA | NA |
| J-005 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 1 | 2 | B | Res. | 67 | No | 56 | 55 | NA | NA |
| J-006 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 51 | 50 | NA | NA |
| J-007 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 51 | NA | NA |
| J-008 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 52 | NA | NA |
| J-009 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 52 | NA | NA |
| J-010 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| J-011 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| J-012 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| J-013 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 54 | 53 | NA | NA |
| J-014 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 54 | 54 | NA | NA |
| J-015 | Virginia Beach Friends School, 1537 Laskin Rd, Row 2 | 1 | D | Int. | 52 | No | 26 | 26 | NA | NA |
| J-016 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| J-017 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| J-018 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| J-019 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| J-020 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| J-021 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-022 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-023 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-024 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-025 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 3 | B | Res. | 67 | No | 40 | 41 | NA | NA |
| J-026 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 51 | 50 | NA | NA |
| J-027 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 49 | 47 | NA | NA |
| J-028 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 48 | 46 | NA | NA |
| J-029 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 46 | 45 | NA | NA |
| J-030 | Courtyards Of Chanticleer Dogpark, 1470 Reynard Dr, Row 1 | 1 | C | Rec. | 67 | No | 57 | 56 | NA | NA |
| J-031 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 51 | 51 | NA | NA |
| J-032 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 50 | 49 | NA | NA |
| J-033 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 48 | 47 | NA | NA |
| J-034 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 2 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| J-035 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 39 | 40 | NA | NA |
| J-036 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-037 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-038 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 38 | 39 | NA | NA |
| J-039 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 3 | 2 | B | Res. | 67 | No | 37 | 38 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| J-040 | Courtyards Of Chanticleer Dogpark, 1470 Reynard Dr, Row 1 | 1 | C | Rec. | 67 | No | 56 | 55 | NA | NA |
| J-041 | Courtyards Of Chanticleer, 1470 Reynard Dr, Row 1 | 2 | B | Res. | 67 | No | 55 | 54 | NA | NA |
| K-001 | Outdoor Seating, 612 Hilltop West Sc, Row 2 | 1 | E | Com. | 72 | No | 55 | 56 | NA | NA |
| K-002 | Outdoor Seating, 1625 Hilltop West Sc, Row 2 | 1 | E | Com. | 72 | No | 51 | 51 | NA | NA |
| K-003 | Baker's Crust Outdoor Seating, 1620 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 58 | 58 | NA | NA |
| L-001 | 825 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 55 | 56 | 53 | 3 |
| L-002 | 821 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 59 | 60 | 58 | 2 |
| L-003 | 817 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 62 | 62 | 60 | 2 |
| L-004 | 813 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 64 | 65 | 60 | 4 |
| L-005 | 809 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 66 | 67 | 59 | 8 |
| L-006 | 805 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 67 | 68 | 57 | 12 |
| L-007 | 801 Plymouth Ln, Row 1 | 1 | B | Res. | 67 | No | 69 | 70 | 57 | 13 |
| L-008 | 800 Plymouth Ln, Row 2 | 1 | B | Res. | 67 | No | 59 | 59 | 58 | 1 |
| L-009 | 804 Plymouth Ln, Row 2 | 1 | B | Res. | 67 | No | 58 | 59 | 57 | 1 |
| L-010 | 808 Plymouth Ln, Row 2 | 1 | B | Res. | 67 | No | 57 | 57 | 56 | 1 |
| L-011 | 1657 Dearborn Dr, Row 3 | 1 | B | Res. | 67 | No | 54 | 55 | 54 | 1 |
| L-012 | 1672 Laurel Ln, Row 3 | 1 | B | Res. | 67 | No | 54 | 54 | 54 | 1 |
| L-013 | 1668 Laurel Ln, Row 4 | 1 | B | Res. | 67 | No | 52 | 53 | 52 | 1 |
| L-014 | 1653 Dearborn Dr, Row 4 | 1 | B | Res. | 67 | No | 52 | 53 | 52 | 1 |
| L-015 | 820 Plymouth Ln, Row 2 | 1 | B | Res. | 67 | No | 54 | 55 | 54 | 1 |
| L-016 | 816 Plymouth Ln, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | 54 | 1 |
| L-017 | 1657 Bailey Ln, Row 2 | 1 | B | Res. | 67 | No | 53 | 54 | 53 | 1 |
| L-018 | 1656 Dearborn Dr, Row 3 | 1 | B | Res. | 67 | No | 53 | 54 | 52 | 1 |
| M-001 | Dairy Queen Patio Tables, 729 First Colonial Rd, Row 1 | 1 | E | Com. | 72 | No | 65 | 67 | NA | NA |
| M-002 | Dairy Queen Patio Tables, 729 First Colonial Rd, Row 1 | 1 | E | Com. | 72 | No | 53 | 54 | NA | NA |
| M-003 | Burton's Grill Outdoor Seating, 729 First Colonial Rd, Row 2 | 1 | E | Com. | 72 | No | 55 | 56 | NA | NA |
| M-004 | Moe's Southwest Grill Seating, 729 First Colonial Rd, Row 1 | 1 | E | Com. | 72 | No | 56 | 57 | NA | NA |
| M-005 | Panera Seating, 729 First Colonial Rd, Row 1 | 1 | E | Com. | 72 | No | 55 | 56 | NA | NA |
| M-006 | Chipotle, 1724 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 66 | 68 | NA | NA |
| N-001 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 56 | 57 | NA | NA |
| N-002 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 58 | 59 | NA | NA |
| N-003 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 54 | 55 | NA | NA |
| N-004 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| N-005 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 57 | 57 | NA | NA |
| N-006 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 59 | 59 | NA | NA |
| N-007 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 57 | 57 | NA | NA |
| N-008 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 56 | 57 | NA | NA |
| N-009 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 57 | 58 | NA | NA |
| N-010 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 59 | 60 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|--|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| N-011 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 57 | 58 | NA | NA |
| N-012 | Chesterfield Station, Chantilly Ct, Row 2 | 12 | B | Res. | 67 | No | 57 | 57 | NA | NA |
| O-001 | Sonic Drive-In, 1769 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 66 | 67 | NA | NA |
| O-002 | St. Nicholas Greek Orthodox Church, 621 First Colonial Rd, Row 1 | 1 | D | Int. | 52 | No | 38 | 39 | NA | NA |
| O-003 | St. Nicholas Greek Orthodox Church, 621 First Colonial Rd, Row 0 | 1 | C | Rec. | 67 | No | 53 | 56 | NA | NA |
| P-001 | Plaza Azteca Mexican Restaurant Seating, 1824 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 67 | 68 | NA | NA |
| P-002 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 60 | 61 | NA | NA |
| P-003 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 58 | 58 | NA | NA |
| P-004 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 57 | 57 | NA | NA |
| P-005 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 57 | 57 | NA | NA |
| P-006 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 58 | 60 | NA | NA |
| P-007 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 56 | 56 | NA | NA |
| P-008 | Strip Mall Outdoor Seating, 1860 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 56 | 57 | NA | NA |
| P-009 | Whole Foods Outdoor Seating, 1800 Laskin Rd, Row 1 | 1 | E | Com. | 72 | No | 58 | 59 | NA | NA |
| P-010 | 712 Victor Rd, Row 1 | 1 | B | Res. | 67 | No | 58 | 59 | NA | NA |
| P-011 | 717 Victor Rd, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| P-012 | 1837 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| P-013 | 1841 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 55 | 55 | NA | NA |
| P-014 | 1845 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |
| P-015 | 1849 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 50 | 51 | NA | NA |
| P-016 | 1853 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| P-017 | 1857 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| P-018 | 1861 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 47 | 47 | NA | NA |
| P-019 | 1865 Karen Ln, Row 2 | 1 | B | Res. | 67 | No | 46 | 47 | NA | NA |
| P-020 | 720 Victor Rd, Row 2 | 1 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| P-021 | 716 Victor Rd, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| P-022 | 705 Hilltop Rd, Row 1 | 1 | B | Res. | 67 | No | 59 | 60 | NA | NA |
| P-023 | 709 Hilltop Rd, Row 2 | 1 | B | Res. | 67 | No | 55 | 56 | NA | NA |
| P-024 | 713 Hilltop Rd, Row 3 | 1 | B | Res. | 67 | No | 54 | 55 | NA | NA |
| P-025 | 717 Hilltop Rd, Row 4 | 1 | B | Res. | 67 | No | 52 | 53 | NA | NA |
| Q-001 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 57 | 57 | NA | NA |
| Q-002 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| Q-003 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 57 | 56 | NA | NA |
| Q-004 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 53 | 53 | NA | NA |
| Q-005 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| Q-006 | Eastwind Apartments, 487 Kriste Ct, Row 2 | 2 | B | Res. | 67 | No | 49 | 49 | NA | NA |
| Q-007 | Eastwind Apartments, 487 Kriste Ct, Row 3 | 2 | B | Res. | 67 | No | 49 | 50 | NA | NA |
| Q-008 | Eastwind Apartments, 512 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 51 | NA | NA |
| Q-009 | Eastwind Apartments, 512 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 52 | NA | NA |

Table C-1: Predicted Existing (2016) and Design Year (2039) Noise Levels for Laskin Road Improvements Project

| CNE-Site No. | Address | Recp. Unit | Cat.* | Land Use* | NAC Imp. Crit. | Above Point of Intersection? | Loudest-Hour Leq (dBA)** | | | |
|--------------|---|------------|-------|-----------|----------------|------------------------------|--------------------------|------------|--------------|----|
| | | | | | | | Existing | Build | | |
| | | | | | | | | No-Barrier | With-Barrier | IL |
| Q-010 | Eastwind Apartments, 512 Maxey Dr, Row 3 | 2 | B | Res. | 67 | No | 41 | 42 | NA | NA |
| Q-011 | Eastwind Apartments, 512 Maxey Dr, Row 3 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| Q-012 | Eastwind Apartments, 487 Kriste Ct, Row 3 | 2 | B | Res. | 67 | No | 48 | 49 | NA | NA |
| Q-013 | Eastwind Apartments, 512 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 52 | 51 | NA | NA |
| Q-014 | Eastwind Apartments, 512 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 48 | 48 | NA | NA |
| Q-015 | Eastwind Apartments, 509 Maxey Dr, Row 1 | 2 | B | Res. | 67 | No | 55 | 53 | NA | NA |
| Q-016 | Eastwind Apartments, 509 Maxey Dr, Row 1 | 2 | B | Res. | 67 | No | 53 | 51 | NA | NA |
| Q-017 | Eastwind Apartments, 509 Maxey Dr, Row 1 | 2 | B | Res. | 67 | No | 50 | 50 | NA | NA |
| Q-018 | Eastwind Apartments, 509 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| Q-019 | Eastwind Apartments, 509 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| Q-020 | Eastwind Apartments, 509 Maxey Dr, Row 2 | 2 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| Q-021 | Eastwind Apartments Play Area/Pool, Eastwood Villa Ln, Row 1 | 1 | C | Rec. | 67 | No | 56 | 56 | NA | NA |
| Q-022 | Eastwind Apartments Play Area/Pool, 1997 Eastwood Villa Ln, Row 1 | 1 | C | Rec. | 67 | No | 57 | 56 | NA | NA |
| Q-023 | Eastwind Apartments Play Area/Pool, 1997 Eastwood Villa Ln, Row 1 | 1 | C | Rec. | 67 | No | 57 | 56 | NA | NA |
| Q-024 | Eastwind Apartments Play Area/Pool, 1997 Eastwood Villa Ln, Row 1 | 1 | C | Rec. | 67 | No | 55 | 54 | NA | NA |
| Q-025 | Eastwind Apartments Play Area/Pool, 509 Maxey Dr, Row 1 | 1 | C | Rec. | 67 | No | 55 | 54 | NA | NA |
| Q-026 | Maxey Manor, Fountain Dr, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| Q-027 | Maxey Manor, Fountain Dr, Row 1 Flr. 2 | 1 | B | Res. | 67 | No | 54 | 55 | NA | NA |
| Q-028 | Maxey Manor, Fountain Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 55 | 57 | NA | NA |
| Q-029 | Maxey Manor, Fountain Dr, Row 2 Flr. 2 | 1 | B | Res. | 67 | No | 50 | 51 | NA | NA |
| Q-030 | Maxey Manor, Fountain Dr, Row 3 Flr. 2 | 1 | B | Res. | 67 | No | 49 | 51 | NA | NA |
| Q-031 | Maxey Manor, Fountain Dr, Row 3 Flr. 2 | 1 | B | Res. | 67 | No | 46 | 46 | NA | NA |
| Q-032 | Maxey Manor, Fountain Dr, Row 4 Flr. 2 | 1 | B | Res. | 67 | No | 47 | 48 | NA | NA |
| Q-033 | Maxey Manor, Fountain Dr, Row 4 Flr. 2 | 1 | B | Res. | 67 | No | 53 | 54 | NA | NA |

* 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, 2016

APPENDIX D NOISE MONITORING DATA

This appendix includes data acquired during the 2015 noise monitoring program. First a page of data for each site is given that includes name and location, date and time, location map, photograph, calibration records, atmospheric conditions, traffic counts and other field notes. Second, the measurement site data spreadsheet output is provided, which includes a summary page of the measurements at all of the sites, then for each site the minute-by-minute sound levels and the overall sound levels are given as well as the counted traffic and the traffic counts normalized to one hour for input to TNM for the validation runs.

| | |
|-----------|--------------------|
| Job#: | 306780.009 |
| Name: | Laskin Road |
| Location: | Virginia Beach, VA |
| Date: | 9/16/2015 |

NOISE MEASUREMENT SUMMARY

| | | Measurement data | | | | |
|------|---|------------------|------------|----------|----------------|-----------------------|
| Site | Address | Date | Time Start | Duration | Total Leq, dBA | Traffic Only Leq, dBA |
| M1B | Laskin Road (South of L. Neck Creek) | 16-Sep-15 | 14:33:00 | 15 | 69.9 | 69.1 |
| M2A | Laskin Road west of Oriole Dr. | 16-Sep-15 | 14:02:00 | 15 | 83.0 | 65.0 |
| M4 | Laskin Road (west of bridge over G. Neck Creek) | 16-Sep-15 | 13:33:00 | 15 | 69.4 | 69.1 |
| M5 | Laskin Road Shopping Plaza | 16-Sep-15 | 13:01:00 | 15 | 62.9 | 62.9 |

| | |
|------------------------|--------------------------------------|
| Site Number | M1B |
| Location: | Laskin Road (South of L. Neck Creek) |
| Date: | 9/16/2015 |
| Start Time: | 14:33 |
| Duration (min): | 15 |

VALIDATION SOUND LEVEL

| Time | Overall Leq | Traffic-only Leq |
|----------------------|--------------------|-------------------------|
| 14:33 | 67.8 | 67.8 |
| 14:34 | 70.3 | 70.3 |
| 14:35 | 70.4 | 70.4 |
| 14:36 | 68.6 | 68.6 |
| 14:37 | 67.8 | 67.8 |
| 14:38 | 69.7 | 69.7 |
| 14:39 | 69.0 | 69.0 |
| 14:40 | 70.4 | 68.4 |
| 14:41 | 74.9 | 70.2 |
| 14:42 | 70.3 | 70.3 |
| 14:43 | 67.6 | 67.6 |
| 14:44 | 69.7 | 69.7 |
| 14:45 | 68.1 | 68.1 |
| 14:46 | 70.1 | 70.1 |
| 14:47 | 66.1 | 66.1 |
| 15 Minute Leq | 69.9 | 69.1 |

TRAFFIC INPUT

Data Entry Table

Adjusted speeds per ENTRADA

| Roadway | Direction | VehicleType | Start_Time | Duration | Count | Speed |
|------------------------|-----------------|-------------|------------|----------|-------|--------|
| Laskin Road | EB | A | 14:33 | | 15 | 210 40 |
| Laskin Road | EB | MT | 14:33 | | 15 | 9 40 |
| Laskin Road | EB | HT | 14:33 | | 15 | 1 40 |
| Laskin Road (end at Ba | EB Turning Lane | A | 14:33 | | 15 | 6 20 |
| Laskin Road (end at Ba | EB Turning Lane | MT | 14:33 | | 15 | 0 20 |
| Laskin Road (end at Ba | EB Turning Lane | HT | 14:33 | | 15 | 0 20 |
| Laskin Road | WB | A | 14:33 | | 15 | 225 40 |
| Laskin Road | WB | MT | 14:33 | | 15 | 3 40 |
| Laskin Road | WB | HT | 14:33 | | 15 | 4 40 |

TNM Input Table

Adjusted speeds

Adjusted speeds

| Roadway | Direction | VehicleType | Total_Duration | Total_Type_Count | Avg_Speed | Hour_Count | Speed | Total_Count | Percentage |
|------------------------|-----------------|-------------|----------------|------------------|-----------|------------|-------|-------------|------------|
| Laskin Road | EB | A | 15 | 210 | 40 | 840 | 40 | 880 | 95% |
| Laskin Road | EB | MT | 15 | 9 | 40 | 36 | 40 | 880 | 4% |
| Laskin Road | EB | HT | 15 | 1 | 40 | 4 | 40 | 880 | 0% |
| Laskin Road (end at Ba | EB Turning Lane | A | 15 | 6 | 20 | 24 | 20 | 24 | 100% |
| Laskin Road (end at Ba | EB Turning Lane | MT | 15 | 0 | 20 | 0 | 0 | 24 | 0% |
| Laskin Road (end at Ba | EB Turning Lane | HT | 15 | 0 | 20 | 0 | 0 | 24 | 0% |
| Laskin Road | WB | A | 15 | 225 | 40 | 900 | 40 | 928 | 97% |
| Laskin Road | WB | MT | 15 | 3 | 40 | 12 | 40 | 928 | 1% |
| Laskin Road | WB | HT | 15 | 4 | 40 | 16 | 40 | 928 | 2% |

| | |
|------------------------|--------------------------------|
| Site Number | M2A |
| Location: | Laskin Road west of Oriole Dr. |
| Date: | 9/16/2015 |
| Start Time: | 14:02 |
| Duration (min): | 15 |

VALIDATION SOUND LEVEL

| Time | Overall Leq | Traffic-only Leq |
|----------------------|--------------------|-------------------------|
| 14:02 | 62.4 | 62.4 |
| 14:03 | 93.0 | 63.6 |
| 14:04 | 89.9 | 65.1 |
| 14:05 | 63.4 | 63.4 |
| 14:06 | 65.8 | 65.8 |
| 14:07 | 64.6 | 64.6 |
| 14:08 | 65.4 | 65.4 |
| 14:09 | 64.6 | 64.6 |
| 14:10 | 63.0 | 63.0 |
| 14:11 | 64.9 | 64.9 |
| 14:12 | 64.1 | 64.1 |
| 14:13 | 65.2 | 65.2 |
| 14:14 | 64.5 | 64.5 |
| 14:15 | 69.6 | 69.6 |
| 14:16 | 62.4 | 62.4 |
| 15 Minute Leq | 83.0 | 65.0 |

TRAFFIC INPUT

Data Entry Table

| Roadway | Direction | VehicleType | Start_Time | Duration | Count | Speed |
|---------------------------------------|-----------------|-------------|------------|----------|-------|-------|
| Laskin Road | EB | A | 14:02 | | 15 | 173 |
| Laskin Road | EB | MT | 14:02 | | 15 | 3 |
| Laskin Road | EB | HT | 14:02 | | 15 | 0 |
| Laskin Road | WB | A | 14:02 | | 15 | 251 |
| Laskin Road | WB | MT | 14:02 | | 15 | 3 |
| Laskin Road | WB | HT | 14:02 | | 15 | 4 |
| Laskin Road (Near) | EB/WB Collector | A | 14:02 | | 15 | 7 |
| Laskin Road (Near) | EB/WB Collector | MT | 14:02 | | 15 | 0 |
| Laskin Road (Near) | EB/WB Collector | HT | 14:02 | | 15 | 0 |
| Laskin Road (Far Lane:EB/WB Collector | | A | 14:02 | | 15 | 5 |
| Laskin Road (Far Lane:EB/WB Collector | | MT | 14:02 | | 15 | 0 |
| Laskin Road (Far Lane:EB/WB Collector | | HT | 14:02 | | 15 | 0 |

Adjusted speeds per ENTRADA

Note: VDOT Provided speed ranges. The

TNM Input Table

| Roadway | Direction | VehicleType | Total_Duration | Total_Type_Count | Adjusted Speeds | | Adjusted Speeds | | Total_Count | Percentage |
|------------------------|-----------------|-------------|----------------|------------------|-----------------|------------|-----------------|--|-------------|------------|
| | | | | | Avg_Speed | Hour_Count | Speed | | | |
| Laskin Road | EB | A | 15 | 173 | 40 | 692 | 40 | | 704 | 98% |
| Laskin Road | EB | MT | 15 | 3 | 40 | 12 | 40 | | 704 | 2% |
| Laskin Road | EB | HT | 15 | 0 | 40 | 0 | 0 | | 704 | 0% |
| Laskin Road | WB | A | 15 | 251 | 40 | 1004 | 40 | | 1032 | 97% |
| Laskin Road | WB | MT | 15 | 3 | 40 | 12 | 40 | | 1032 | 1% |
| Laskin Road | WB | HT | 15 | 4 | 40 | 16 | 40 | | 1032 | 2% |
| Laskin Road (Near) | EB/WB Collector | A | 15 | 7 | 20 | 28 | 20 | | 28 | 100% |
| Laskin Road (Near) | EB/WB Collector | MT | 15 | 0 | 20 | 0 | 0 | | 28 | 0% |
| Laskin Road (Near) | EB/WB Collector | HT | 15 | 0 | 20 | 0 | 0 | | 28 | 0% |
| Laskin Road (Far Lane) | EB/WB Collector | A | 15 | 5 | 20 | 20 | 20 | | 20 | 100% |
| Laskin Road (Far Lane) | EB/WB Collector | MT | 15 | 0 | 20 | 0 | 0 | | 20 | 0% |
| Laskin Road (Far Lane) | EB/WB Collector | HT | 15 | 0 | 20 | 0 | 0 | | 20 | 0% |

| | |
|------------------------|---|
| Site Number | M4 |
| Location: | Laskin Road (west of bridge over G. Neck Creek) |
| Date: | 9/16/2015 |
| Start Time: | 13:33 |
| Duration (min): | 15 |

VALIDATION SOUND LEVEL

| Time | Overall Leq | Traffic-only Leq |
|----------------------|-------------|------------------|
| 13:33 | 69.4 | 69.4 |
| 13:34 | 68.8 | 68.8 |
| 13:35 | 70.5 | 70.5 |
| 13:36 | 67.9 | 67.9 |
| 13:37 | 69.3 | 69.3 |
| 13:38 | 67.5 | 67.5 |
| 13:39 | 69.4 | 69.4 |
| 13:40 | 67.2 | 67.2 |
| 13:41 | 70.8 | 70.8 |
| 13:42 | 71.8 | 68.2 |
| 13:43 | 69.8 | 69.8 |
| 13:44 | 68.5 | 68.5 |
| 13:45 | 68.5 | 68.5 |
| 13:46 | 68.2 | 68.2 |
| 13:47 | 70.4 | 70.4 |
| 15 Minute Leq | 69.4 | 69.1 |

TRAFFIC INPUT

Data Entry Table

Adjusted speeds per ENTRADA

| Roadway | Direction | VehicleType | Start_Time | Duration | Count | Speed |
|-------------|-----------|-------------|------------|----------|-------|--------|
| Laskin Road | EB | A | 13:33 | | 15 | 215 39 |
| Laskin Road | EB | MT | 13:33 | | 15 | 0 0 |
| Laskin Road | EB | HT | 13:33 | | 15 | 1 39 |
| Laskin Road | WB | A | 13:33 | | 15 | 230 39 |
| Laskin Road | WB | MT | 13:33 | | 15 | 3 39 |
| Laskin Road | WB | HT | 13:33 | | 15 | 1 39 |

TNM Input Table

Adjusted speed

Adjusted speed

| Roadway | Direction | VehicleType | Total_Duration | Total_Type_Count | Avg_Speed | Hour_Count | Speed | Total_Count | Percentage |
|-------------|-----------|-------------|----------------|------------------|-----------|------------|-------|-------------|------------|
| Laskin Road | EB | A | 15 | 215 | 39 | 860 | 39 | 864 | 100% |
| Laskin Road | EB | MT | 15 | 0 | 0 | 0 | 0 | 864 | 0% |
| Laskin Road | EB | HT | 15 | 1 | 39 | 4 | 39 | 864 | 0% |
| Laskin Road | WB | A | 15 | 230 | 39 | 920 | 39 | 936 | 98% |
| Laskin Road | WB | MT | 15 | 3 | 39 | 12 | 39 | 936 | 1% |
| Laskin Road | WB | HT | 15 | 1 | 39 | 4 | 39 | 936 | 0% |

| | |
|------------------------|----------------------------|
| Site Number | M5 |
| Location: | Laskin Road Shopping Plaza |
| Date: | 9/16/2015 |
| Start Time: | 13:01 |
| Duration (min): | 15 |

VALIDATION SOUND LEVEL

| Time | Overall Leq | Traffic-only Leq |
|----------------------|--------------------|-------------------------|
| 13:01 | 64.9 | 64.9 |
| 13:02 | 63.1 | 63.1 |
| 13:03 | 64.3 | 64.3 |
| 13:04 | 60.6 | 60.6 |
| 13:05 | 63.7 | 63.7 |
| 13:06 | 60.5 | 60.5 |
| 13:07 | 64.1 | 64.1 |
| 13:08 | 62.4 | 62.4 |
| 13:09 | 62.9 | 62.9 |
| 13:10 | 61.8 | 61.8 |
| 13:11 | 62.3 | 62.3 |
| 13:12 | 61.5 | 61.5 |
| 13:13 | 64.3 | 64.3 |
| 13:14 | 59.9 | 59.9 |
| 13:15 | 63.3 | 63.3 |
| 15 Minute Leq | 62.9 | 62.9 |

TRAFFIC INPUT

Data Entry Table

| Roadway | Direction | VehicleType | Start_Time | Duration | Count | Speed |
|---------------------------------------|-----------------|-------------|------------|----------|-------|-------|
| Laskin Road | EB | A | 13:01 | | 15 | 185 |
| Laskin Road | EB | MT | 13:01 | | 15 | 1 |
| Laskin Road | EB | HT | 13:01 | | 15 | 0 |
| Laskin Road | WB | A | 13:01 | | 15 | 251 |
| Laskin Road | WB | MT | 13:01 | | 15 | 4 |
| Laskin Road | WB | HT | 13:01 | | 15 | 0 |
| Laskin Road (Near) | EB/WB Collector | A | 13:01 | | 15 | 10 |
| Laskin Road (Near) | EB/WB Collector | MT | 13:01 | | 15 | 1 |
| Laskin Road (Near) | EB/WB Collector | HT | 13:01 | | 15 | 0 |
| Laskin Road (Far Lane:EB/WB Collector | | A | 13:01 | | 15 | 49 |
| Laskin Road (Far Lane:EB/WB Collector | | MT | 13:01 | | 15 | 0 |
| Laskin Road (Far Lane:EB/WB Collector | | HT | 13:01 | | 15 | 0 |

Adjusted speeds per ENTRADA

Note: VDOT Provided speed ranges. The

TNM Input Table

| Roadway | Direction | VehicleType | Total_Duration | Total_Type_Count | Adjusted speed | | Adjusted speed | | Total_Count | Percentage |
|---------------------------------------|-----------------|-------------|----------------|------------------|----------------|------------|----------------|--|-------------|------------|
| | | | | | Avg_Speed | Hour_Count | Speed | | | |
| Laskin Road | EB | A | 15 | 185 | 36 | 740 | 36 | | 744 | 99% |
| Laskin Road | EB | MT | 15 | 1 | 36 | 4 | 36 | | 744 | 1% |
| Laskin Road | EB | HT | 15 | 0 | 36 | 0 | 0 | | 744 | 0% |
| Laskin Road | WB | A | 15 | 251 | 39 | 1004 | 39 | | 1020 | 98% |
| Laskin Road | WB | MT | 15 | 4 | 39 | 16 | 39 | | 1020 | 2% |
| Laskin Road | WB | HT | 15 | 0 | 39 | 0 | 0 | | 1020 | 0% |
| Laskin Road (Near) | EB/WB Collector | A | 15 | 10 | 20 | 40 | 20 | | 44 | 91% |
| Laskin Road (Near) | EB/WB Collector | MT | 15 | 1 | 20 | 4 | 20 | | 44 | 9% |
| Laskin Road (Near) | EB/WB Collector | HT | 15 | 0 | 20 | 0 | 0 | | 44 | 0% |
| Laskin Road (Far Lane:EB/WB Collector | | A | 15 | 49 | 25 | 196 | 25 | | 196 | 100% |
| Laskin Road (Far Lane:EB/WB Collector | | MT | 15 | 0 | 25 | 0 | 0 | | 196 | 0% |
| Laskin Road (Far Lane:EB/WB Collector | | HT | 15 | 0 | 25 | 0 | 0 | | 196 | 0% |

APPENDIX E RESPONSE FROM VDOT PROJECT MANAGEMENT ON ALTERNATIVE NOISE ABATEMENT PROCEDURES

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.

HMMH

77 South Bedford Street
Burlington, Massachusetts 01803
781.229.0707
www.hmmh.com

MEMORANDUM

To: Nelson Lee, PE – Project Manager, VDOT
From: Christopher Menge, Noise Abatement Engineer
Subject: UPC 12546, Laskin Road Improvements
Virginia HB 2577 form
Reference: HMMH No. 306780.009
Date: November 1, 2016



The 2009 General Assembly passed Chapter 120 (HB 2577), 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) 229-0707 x3153, Jim Ponticello at (804) 371-6769 or Ross Hudnall at (804) 371-6829. 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: The Environmental Assessment (EA) is based on improvements that would occur within or directly adjacent to the existing project corridor. As such, roadway alignments are not being developed in order to make the determination if shifting the alignments is feasible. This can be examined during final design once a preferred alternative is selected and more information is available. (Nelson Lee, PE)

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. Upon completion of the Quiet Pavement Pilot Program and approval from FHWA, the use of "quiet pavement" will be given additional consideration. (Nelson Lee, PE)

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

Response: The EA does not prescribe specific construction materials or methods as a means of reducing impacts. This can be examined during final design once a preferred alternative is chosen and more information is available. (Nelson Lee, PE)

Note: Please provide the name of each responder.

APPENDIX F WARRANTED, FEASIBLE AND REASONABLE WORKSHEETS

This appendix provides the required Warranted, Feasible and Reasonable Worksheets for all Barriers evaluated in detail.

**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: | 9-Feb-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | E1 |
| Community Name and/or CNE# | E |
| 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." | Yes |
| 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: | 1 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 1 |
| 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? | No |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | No |
| 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) | 1,269 SF |
| b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 1 |
| c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 0 |
| d. Total number of benefited receptors. | 1 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | 1,269 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? | No |

2 Additional Noise Barrier Details

| | |
|---|------------|
| a. Length of the proposed noise barrier. (ft) | 91 ft |
| b. Height range of the proposed noise barrier. (ft) | 14 ft |
| c. Average height of the proposed noise barrier. (ft) | 14 ft |
| d. Cost per square foot. (\$/ft ²) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$61,547 |
| f. Barrier Material | NA |

3 Community Desires Related to the Barrier

NA

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: | 9-Feb-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | E2 |
| Community Name and/or CNE# | E |
| 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." | Yes |
| 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: | 1 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 0 |
| c. | Percentage of impacted receptor units receiving 5 dB(A) or more IL | 0% |
| 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? | No |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | No |
| 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) | 2,598 SF |
| b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 0 |
| c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 0 |
| d. Total number of benefited receptors. | 0 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | #DIV/0! |
| f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? | #DIV/0! |
| g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? | No |

2 Additional Noise Barrier Details

| | |
|---|------------|
| a. Length of the proposed noise barrier. (ft) | 87 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) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$126,003 |
| f. Barrier Material | NA |

3 Community Desires Related to the Barrier

NA

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: | 12-Jul-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | F |
| Community Name and/or CNE# | F |
| Noise Abatement Category(s) | B and C |
| Design phase: | Final 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." | Yes |
| 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: | 18 |
| 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 | 83% |
| 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? | No |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | No |
| 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) | 17,659 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. | 22 |
| d. Total number of benefited receptors. | 37 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | 477 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) | 1,211 ft |
| b. Height range of the proposed noise barrier. (ft) | 10-18 ft |
| c. Average height of the proposed noise barrier. (ft) | 14 ft |
| d. Cost per square foot. (\$/ft ²) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$856,462 |
| f. Barrier Material | Absorptive |

3 Community Desires Related to the Barrier

A total of 81 weighted "yes" votes were received, and no "no" votes. The total number of potential weighted votes was 125, so 65% of possible votes indicated desire for the barrier.

Yes

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: | 9-Feb-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | G1 |
| Community Name and/or CNE# | G |
| 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." | Yes |
| 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: | 11 |
| 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 | 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? | No |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | No |
| 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) | 3,169 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. | 0 |
| d. Total number of benefited receptors. | 11 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | 288 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) | 316 ft |
| b. Height range of the proposed noise barrier. (ft) | 10 ft |
| c. Average height of the proposed noise barrier. (ft) | 10 ft |
| d. Cost per square foot. (\$/ft ²) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$153,697 |
| f. Barrier Material | Absorptive |
| 3 Community Desires Related to the Barrier | |
| | NA |

| 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: | 18-Oct-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | G2 |
| Community Name and/or CNE# | G2 |
| Noise Abatement Category(s) | C |
| Design phase: | Final 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." | Yes |
| 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: | 1 |
| b. | Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): | 1 |
| 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? | No |
| 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) | 2,238 SF |
| b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 1 |
| c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. | 0 |
| d. Total number of benefited receptors. | 1 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | 2,238 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? | No |

2 Additional Noise Barrier Details

| | |
|---|------------|
| a. Length of the proposed noise barrier. (ft) | 160 ft |
| b. Height range of the proposed noise barrier. (ft) | 14-14 |
| c. Average height of the proposed noise barrier. (ft) | 14 ft |
| d. Cost per square foot. (\$/ft ²) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$108,543 |
| f. Barrier Material | Absorptive |

3 Community Desires Related to the Barrier

NA

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: | 18-Oct-17 |
| Project No. and UPC: | VDOT Project No. 0058-134-F02 and UPC 12546 |
| County: | City of Virginia Beach |
| District: | Hampton Roads |
| Barrier System ID: | L |
| Community Name and/or CNE# | L |
| Noise Abatement Category(s) | B |
| Design phase: | Final 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." | Yes |
| 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: | 3 |
| 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 | 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? | No |
| 3 | Will placement of the noise barrier restrict access to vehicular or pedestrian travel? | No |
| 4 | Will placement of the noise barrier conflict with existing utility locations? | Yes |

Reasonableness

1 Surface Area (Square foot)-Benefit Factors

| | |
|--|-----------|
| a. Surface Area (Total square foot) of the proposed noise barrier. (ft ²) | 2,679 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. | 0 |
| d. Total number of benefited receptors. | 3 |
| e. Surface Area per benefited receptor unit. (ft ² /BR) | 893 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) | 268 ft |
| b. Height range of the proposed noise barrier. (ft) | 10 ft |
| c. Average height of the proposed noise barrier. (ft) | 10 ft |
| d. Cost per square foot. (\$/ft ²) | \$48.50/SF |
| e. Total Barrier Cost (\$) | \$129,932 |
| f. Barrier Material | NA |

3 Community Desires Related to the Barrier

NA

Decision

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

Additional Reasons for Decision:

Several utility conflicts are present, and would cost over 45 times the cost of the barrier to address.

Therefore, the barrier is considered not feasible due to engineering constraints.

APPENDIX G NOISE ABATEMENT DESIGN REPORT FOR BARRIER SYSTEM F IN CNE F

This appendix presents the complete Noise Abatement Design Report prepared for Barrier System F in CNE F.

Description: CNE F, Potential Barrier System F

The Laskin Road (US 58) Improvements project (VDOT Project No. 0058-134-F02, UPC 12546) is located in the City of Virginia Beach, Virginia. The project includes roadway widening and replacement of the bridge over Linkhorn Bay/Great Neck Creek. Common Noise Environment (CNE) F is located north of Laskin Road and east of the bridge. Traffic noise impact is predicted to occur with the 2039 design-year Build case at 16 balconies of dwellings in the Linkhorn Bay Condominiums that are at heights of less than 30 feet and eligible for abatement consideration and a portion of the Cavalier Golf Course. Therefore, noise abatement is warranted, and Potential Noise Barrier System F, in two sections has been considered to benefit the impacted homes, additional homes and the impacted portion of the golf course. Separate sections are necessary to allow for a break at the driveway where the Condominium residents access their building from Laskin Road. Potential Barrier System F would be located along the north side of Laskin Road and extend from station 81+25 in the west to station 94+25 in the east.

Table 1 provides an overall summary of the system of two barrier segments that was considered for CNE F. Table 1A summarizes the individual barrier parameters.

Table 1: Summary of Results – Potential Barrier System F

| | |
|--|-----------|
| Impacted residential receptors with NAC of 67 dBA, Leq | 16 |
| Impacted non-residential residential receptors with NAC of 67 dBA, Leq | 2 |
| Impacts due to substantial increases in existing noise | 0 |
| Impacted residential receptors receiving 5 dBA IL or more | 13 |
| Impacted non-residential receptors receiving 5 dBA IL or more | 2 |
| Not Impacted receptors receiving 5 dBA IL or more | 22 |
| Total benefited noise-sensitive receptors receiving 5 dBA IL or more | 37 |
| Are 50% Impacted receptors receiving 5 dB IL (Yes/No, %) | Yes, 83% |
| Impacted receptors receiving 7 dBA or more IL | 10 |
| Total Barrier Surface Area (Square Feet) | 17,659 |
| Barrier Surface Area (SF) per Benefited Receptor (SF/BR) | 477 |
| Is Barrier Reasonable (Surface Area ≤1600 SF/BR)? | Yes |
| Average Noise Reduction at benefited receptors (dB) | 8.1 |
| Total Barrier Length (Feet) | 1,211 |
| Minimum Barrier Height (Feet) | 10 |
| Maximum Barrier Height (Feet) | 18 |
| Average Barrier Height (Feet) | 14.6 |
| Cost per Square Foot (based on 18,232 SF) | \$48.50 |
| Total Barrier Cost | \$856,462 |

Table 1A: Individual Barrier Section Parameters

| Barrier | Length (feet) | Height (feet) | Surface Area (square feet) |
|---------|---------------|---------------|----------------------------|
| F-1 | 530 | 16 - 18 | 9070 |
| F-2 | 681 | 10 - 14 | 8589 |

Noise Analysis Approach and Comments:

Harris Miller Miller & Hanson Inc. (HMMH) prepared this report after conducting a detailed noise barrier design study in close coordination with VDOT. The purposes of this study were to develop a refined and detailed noise modeling for the study area, to determine whether and where traffic noise impacts are predicted to occur in the 2039 design year, and to design noise barriers to mitigate potential impacts, wherever they are warranted. The methods and procedures used in this study are consistent with the latest noise assessment policies issued by FHWA and VDOT; VDOT’s Highway Traffic Noise Impact Analysis Guidance Manual was updated most recently on July 14, 2015.

Project Improvements

The overall design study project is for the replacement of the existing bridge on Laskin Road (Route 58), located 1 mile east of First Colonial Road. Built in 1938 and later widened in 1956, the Laskin Road Bridge crosses Linkhorn Bay east of Hilltop Shopping area. The limits of construction, including transitions, are from Fremac Avenue to the east and Red Robin Road to the west. Approximate stations based on the current plan development are 66+00 to 92+50. The new bridge will match the proposed typical section for the corridor improvements proposed along Laskin Road. Improvements include widening to a six-lane facility with 5-ft sidewalk and a 10-ft shared use path. The bridge is in need of replacement due to the continued deterioration of the structure which has exceeded its useful life.

Modeling Approach

HMMH used the latest version of the FHWA’s Traffic Noise Model (TNM Version 2.5) to compute future Build case loudest-hour noise levels and noise barrier performance at all of the noise sensitive receptors in the study area, and to develop the appropriate heights, lengths and locations for all warranted noise barriers. TNM runs were developed from MicroStation roadway design files supplied by VDOT, existing terrain elevation information from LiDAR, aerial imagery from ArcGIS Online, and additional information from Virginia Beach’s GIS data. The modeling accounted for the variability in the local terrain and included the following parameters that affect the propagation of traffic noise: terrain lines, ground zones, building rows and fixed height barriers to represent large buildings. The default ground type used in the modeling was “lawn.”

In the study area, aircraft from Oceana Naval Air Station occasionally dominate the noise level on a momentary basis, but due to the intermittent nature of aircraft operations, aircraft noise does not necessarily affect traffic noise levels in any given hour of the day. The Navy updated an

“AICUZ” study report on compatible land uses around the air station in 2014, and annual average day-night noise levels from aircraft operations are reported in the form of contours. However, as a result of the highly intermittent nature of the aircraft noise in the study area, aircraft noise levels are not added to the predicted highway traffic noise levels in this study.

Noise Monitoring and Model Validation

VDOT conducted short-term monitoring at four locations on September 16, 2015. During the noise measurement program, VDOT also counted traffic and classified vehicle types on Laskin Road. Short-term noise measurements were conducted at three locations, identified as Sites M1B, M2A, M4 and M5, for periods of 15 minutes at each site. All four sites were used to validate the modeling assumptions for receptors in all CNEs. *Figure 1: Study Area and Measurement Location Map* shows all of the monitoring locations and the extent of the study area.

The validation process compares monitored sound levels at each measurement site to the noise levels calculated with TNM using the existing site geometry and counted traffic as input to the model. The modeling assumptions are revised, as necessary, until the agreement between monitored and calculated noise levels are within an acceptable range of ± 3 dBA, in accordance with VDOT policy.

At Site M1B within CNE B, the monitored traffic L_{eq} was 69.1 dBA, while the corresponding TNM-calculated noise level was 68.4 dBA. At Site M2A within CNE C, the monitored traffic L_{eq} was 65.0 dBA, while the corresponding TNM-calculated noise level was 65.9 dBA. At Site M4 within CNE I, the monitored traffic L_{eq} was 69.1 dBA, while the corresponding TNM-calculated noise level was 67.2 dBA. At Site M5 within CNE M, the monitored L_{eq} was 62.9 dBA, while the TNM-calculated noise level was 65.6 dBA. The Project-wide average difference between calculated noise levels and monitored noise levels was +0.2 decibels (over all four sites), which shows excellent agreement between monitored and modeled sound levels, and suggests confidence in the modeling assumptions. The validation comparisons are shown in *Table 2: Noise Modeling Validation Results*. TNM monitoring site input data is shown in *Table 3: Monitoring Site Location Data*. During the monitoring session, traffic classification counts were obtained, and are shown in *Table 4: Validation Traffic Counts Converted to One Hour Volumes*.

Traffic Data Used in Noise Modeling

The noise model for CNE F included roadways for Laskin Road and Birdneck Road. Traffic data was supplied by VDOT for the design year of 2039 for all roadways, and was presented as hourly volumes in VDOT’s Environmental Traffic Data (ENTRADA) spreadsheets. HMMH conducted a determination of the loudest hour of the day consistent with VDOT’s current (2014) methodology. The loudest-hour evaluation began by using TNM to compute the overall traffic noise level at a reference distance from Laskin Road and First Colonial Road for each hour of the day. The TNM model of the complete study area was then used with all receptors to refine the

selection of the loudest hour. For the vast majority of receptors in the study area, and also all noise-sensitive receptors along Laskin Road, the loudest hour of the day was found to be the hour from 5:00 p.m. to 6:00 p.m. Therefore, the traffic for that hour was used for all roadways in the analysis.

The design-year traffic data used as input to the TNM are shown in *Table 5: TNM Build Case Loudest-Hour Traffic Data - Design Year 2039*.

Predicted Sound Levels, Impact and Noise Barrier Details

Table 6: Predicted Loudest-hour Noise Levels provides the details of the predicted noise levels at receptors behind Barrier System F that are below the point of intersection with a 30-foot high noise barrier along Laskin Road. The Linkhorn Bay Condominiums include balconies on the second through fifth floors. Only those on the second and third floors are below the top of a 30-ft high barrier and are therefore included in the barrier evaluation. Table 6 includes the address or land-use description, the site number for reference with the attached figure, the number of noise-sensitive dwelling units associated with the receptor, the predicted design-year (2039) loudest-hour L_{eq} without and with the potential noise barriers, and the barrier insertion loss. Sound levels within Table 6 are colored red to indicate receptors for which the loudest hour L_{eq} approaches or exceeds the FHWA Noise Abatement Criteria (NAC). Receptors' insertion loss values in Table 6 are shown in bold to indicate benefited receptors (receptors that receive 5 dBA, or more, of insertion loss from the noise barrier). *Figure 2: Location Map for Receptors and Barriers – Barrier F* shows the locations of all receptors as well as the noise barriers and nearby roadways. The coordinates of the modeled receptor locations contained within the TNM are shown in *Table 7: Receptor Site Locations*.

Details of the barrier location and height are given in *Table 1: Summary of Results - Potential Barrier System F* and coordinates and recommended height and top elevation of the potential barriers are given in *Table 8: Sound Attenuation Line*. The potential barrier system and its location are shown on the attached plan map graphic, *Figure 2: Location Map for Receptors and Barriers – Barrier F*.

Seventy-one receptors within CNE F north of Laskin Road were evaluated to determine noise impact. Receptors were located at 48 balconies of the Linkhorn Bay Condominiums on the second and third floors, four recreational receivers at the condominiums, five single-family homes on Tanager Trail behind the condominiums, and 14 Cavalier Golf Course receptors. Noise impact is predicted at 16 Linkhorn Bay condo balconies, all on the buildings facing Laskin Road. Two golf course receptors on the portion of the course closest to Laskin Road are also predicted to be impacted. The impacted receptors have projected Build case exterior L_{eq} s ranging from 66 to 70 dBA, which exceed the FHWA NAC for Activity Category B. Because noise impact is predicted to occur with the design-year Build alternative, noise abatement is warranted, and therefore HMMH evaluated the feasibility and reasonableness for noise barrier design options for these properties and other noise-sensitive receptors in the area.

Two separate barrier sections are necessary to allow for a break where the driveway to the Linkhorn Bay condos intersects Laskin Road. The barrier ends near the driveway have been placed outside of the required minimum sight lines needed by drivers exiting the driveway; HMMH received sight lines plans from project engineers and confirmed the barriers are set back somewhat from them. The barrier system has been located on the future right-of-way line. Barriers 14 to 16 feet high are of sufficient height to benefit the impacted third-floor balconies at the two buildings set back somewhat from Laskin Road, at the 1280, 1284 and 1288 Laskin Road addresses. However, the four balconies on the westernmost condominium building at 1292 Laskin Road are considerably closer to Laskin Road, and an 18-foot high barrier is required to provide shielding to the far lanes of Laskin Road at the third-floor balconies. Barrier F-1, the proposed barrier west of the driveway entrance is proposed to range in height from 16 feet to 18 feet, with the highest portion directly opposite the near balconies, at receptors F-052, F-053, F-076, and F-077. East of the driveway, Barrier F-2 would be 14 feet high opposite the condominium buildings, and drop to 10 feet high opposite the golf course. Three balcony receptors opposite the driveway entrance cannot be benefited with 5 decibels of noise reduction, even with taller barriers, due to the significant gap for the driveway. However, all of those balconies are predicted to receive 4 decibels of noise reduction with proposed Barrier System F.

Combined, the potential barrier system would have a total length of 1,211 feet, surface area of 17,659 square feet, and benefit a total of 31 condominium balconies, one home on Tanager Trail and five recreational receptors. Ten impacted receptors, including seven homes would be benefited and meet or exceed the noise reduction design goal of 7 decibels, receiving insertion loss from the barriers ranging from 8 dBA to 13 dBA, and averaging 10 dBA. For all benefited receptors, the average insertion loss would be 8 dBA. The resulting surface area per benefited receptor for Barrier System F would be 477, which is below VDOT's reasonableness criterion of 1600 SF/BR. Therefore, Barrier System F is reasonable per VDOT policy.

Table 2: Noise Modeling Validation Results

| CNE | Site Number | Location | Monitored Leq (dBA) | TNM Computed Leq (dBA) | Difference (dB) (computed – monitored) |
|-----------------------------------|-------------|--|---------------------|------------------------|---|
| B | M1B | Laskin Road south of Little Neck Creek | 69.1 | 68.4 | -0.7 |
| C | M2A | Laskin Road west of Oriole Dr. | 65.0 | 65.9 | 0.9 |
| I | M4 | Laskin Road west of bridge over Great Neck Creek | 69.1 | 67.2 | -1.9 |
| M | M5 | Laskin Road Shopping Plaza | 62.9 | 65.6 | 2.7 |
| Average difference: | | | | | 0.2 |
| Standard deviation of difference: | | | | | 2.0 |

Table 3: Monitoring Site Location Data

| Site Number | Address | Coordinates – Virginia State Plane (feet) | | |
|-------------|--|---|--------------|-------|
| | | X | Y | Z |
| M1B | Laskin Road south of Little Neck Creek | 12,217,730.00 | 3,481,398.25 | 5.30 |
| M2A | Laskin Road west of Oriole Dr. | 12,216,441.00 | 3,481,130.25 | 14.20 |
| M4 | Laskin Road west of bridge over Great Neck Creek | 12,212,904.00 | 3,479,459.50 | 8.80 |
| M5 | Laskin Road Shopping Plaza | 12,207,113.00 | 3,478,632.25 | 17.20 |

Note: Data used in the TNM validation modeling.

Table 4: Validation Traffic Counts Converted to One Hour Volumes

| CNE | Site Number | Roadway | Autos | MT | HT | Speed* (mph) |
|-----|-------------|--------------------------|-------|----|----|-----------------|
| B | M1B | Laskin Rd EB | 840 | 36 | 4 | 40 |
| | | Laskin Rd EB Turning | 24 | 0 | 0 | 20 |
| | | Laskin Rd WB | 900 | 12 | 16 | 40 |
| C | M2A | Laskin Rd EB | 692 | 12 | 0 | 40 |
| | | Laskin Rd far collector | 20 | 0 | 0 | 20 |
| | | Laskin Rd WB | 1004 | 12 | 16 | 40 |
| | | Laskin Rd near collector | 28 | 0 | 0 | 20 |
| I | M4 | Laskin Rd EB | 860 | 0 | 4 | 39 |
| | | Laskin Rd WB | 920 | 12 | 4 | 39 |
| M | M5 | Laskin Rd EB | 740 | 4 | 0 | 36 |
| | | Laskin Rd far collector | 196 | 0 | 0 | 25 |
| | | Laskin Rd WB | 1004 | 16 | 0 | 39 |
| | | Laskin Rd near collector | 40 | 4 | 0 | 20 |

* Speeds on Laskin Road are based on Existing speeds from the ENTRADA sheets for the same hour as the monitoring occurred.

Table 5: TNM Build Case Loudest-Hour Traffic Data - Design Year 2039

| Loudest Hour | Roadway Name | Location | Vehicles per hour (vph) | | | Speed (mph) |
|--------------|--------------------------------|--------------------------------------|-------------------------|---------------|--------------|-------------|
| | | | Autos | Medium Trucks | Heavy Trucks | |
| 17:00 | Laskin Road Eastbound | Va Beach Blvd to First Colonial Road | 1790 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Va Beach Blvd to First Colonial Road | 1248 | 2 | 0 | 45 |
| 17:00 | Laskin Road Eastbound | First Colonial Road to Birdneck Rd | 1495 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | First Colonial Road to Birdneck Rd | 1452 | 4 | 2 | 45 |
| 17:00 | Laskin Road Eastbound | Birdneck Rd to Pacific Ave | 1406 | 0 | 0 | 45 |
| 17:00 | Laskin Road Westbound | Birdneck Rd to Pacific Ave | 1377 | 0 | 0 | 45 |
| 17:00 | First Colonial Road Northbound | I-264 to Laskin Road | 755 | 0 | 0 | 36 |
| 17:00 | First Colonial Road Southbound | I-264 to Laskin Road | 812 | 0 | 0 | 35 |
| 17:00 | First Colonial Road Northbound | Laskin Road to Great Neck Rd | 1586 | 142 | 1 | 35 |
| 17:00 | First Colonial Road Southbound | Laskin Road to Great Neck Rd | 1282 | 91 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | I-264 to Laskin Road | 1412 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Southbound | I-264 to Laskin Road | 1393 | 0 | 0 | 35 |
| 17:00 | Birdneck Road Northbound | Laskin Rd to Kamichi Pl | 137 | 0 | 0 | 30 |
| 17:00 | Birdneck Road Southbound | Laskin Rd to Kamichi Pl | 125 | 0 | 0 | 30 |

Table 6: Predicted Loudest Hour Noise Levels

| Receptor Site Number | Site Address* | No. Units* | 2039 Loudest-hour Noise Levels | | |
|----------------------|--|------------|----------------------------------|------------------------------------|-----------------------|
| | | | No-Barrier L _{eq} (dBA) | With-Barrier L _{eq} (dBA) | Insertion Loss (dB)** |
| F-001 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 1 | 70 | 59 | 11 |
| F-002 | Cavalier Golf Course, Row 1 | 1 | 69 | 62 | 8 |
| F-003 | Cavalier Golf Course, Row 2 | 1 | 58 | 53 | 5 |
| F-004 | Cavalier Golf Course, Row 2 | 1 | 57 | 54 | 3 |
| F-005 | Cavalier Golf Course, Row 2 | 1 | 53 | 51 | 3 |
| F-006 | Cavalier Golf Course, Row 2 | 1 | 55 | 54 | 2 |
| F-007 | Cavalier Golf Course, Row 2 | 1 | 54 | 53 | 1 |
| F-008 | Cavalier Golf Course, Row 2 | 1 | 60 | 59 | 1 |
| F-009 | Cavalier Golf Course, Row 3 | 1 | 51 | 49 | 2 |
| F-010 | Cavalier Golf Course, Row 3 | 1 | 54 | 53 | 1 |
| F-011 | Cavalier Golf Course, Row 3 | 1 | 54 | 53 | 1 |
| F-012 | Cavalier Golf Course, Row 3 | 1 | 53 | 52 | 1 |
| F-013 | Cavalier Golf Course, Row 3 | 1 | 51 | 51 | 1 |
| F-014 | Cavalier Golf Course, Row 3 | 1 | 52 | 52 | 1 |
| F-025 | 1245 TANAGER TRL, Row 3 | 1 | 54 | 49 | 5 |
| F-026 | 1253 TANAGER TRL, Row 3 | 1 | 54 | 49 | 4 |
| F-027 | 1257 TANAGER TRL, Row 3 | 1 | 49 | 48 | 1 |
| F-028 | 1261 TANAGER TRL, Row 3 | 1 | 49 | 48 | 0 |
| F-029 | 1265 TANAGER TRL, Row 3 | 1 | 52 | 51 | 1 |
| F-030 | Linkhorn Bay East Gazebo, 1276 Laskin Rd, Row 1 | 1 | 60 | 48 | 12 |
| F-031 | Linkhorn Bay Pool, 1292 Laskin Rd, Row 1 | 1 | 63 | 55 | 8 |
| F-032 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | 62 | 55 | 7 |
| F-033 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | 65 | 57 | 8 |
| F-034 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | 61 | 49 | 13 |
| F-035 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 1 | 64 | 53 | 11 |
| F-036 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | 62 | 50 | 13 |
| F-037 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | 65 | 55 | 10 |

| Receptor Site Number | Site Address* | No. Units* | 2039 Loudest-hour Noise Levels | | |
|----------------------|---|------------|--------------------------------|------------------------|-----------------------|
| | | | No-Barrier Leq (dBA) | With-Barrier Leq (dBA) | Insertion Loss (dB)** |
| F-038 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | 61 | 57 | 4 |
| F-039 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 1 | 64 | 59 | 6 |
| F-040 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 1 | 66 | 61 | 5 |
| F-041 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 1 | 66 | 62 | 4 |
| F-042 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 1 | 66 | 61 | 5 |
| F-043 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 1 | 66 | 60 | 6 |
| F-044 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 1 | 40 | 39 | 1 |
| F-045 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 1 | 40 | 39 | 1 |
| F-046 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 1 | 45 | 44 | 0 |
| F-047 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 1 | 47 | 47 | 0 |
| F-048 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 1 | 67 | 57 | 9 |
| F-049 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 1 | 67 | 57 | 11 |
| F-050 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 1 | 52 | 52 | 0 |
| F-051 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 1 | 54 | 54 | 0 |
| F-052 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 1 | 69 | 56 | 13 |
| F-053 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 1 | 70 | 57 | 13 |
| F-054 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 1 | 64 | 57 | 7 |
| F-055 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 1 | 64 | 58 | 6 |
| F-056 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | 63 | 57 | 6 |

| Receptor Site Number | Site Address* | No. Units* | 2039 Loudest-hour Noise Levels | | |
|----------------------|---|------------|--------------------------------|------------------------|-----------------------|
| | | | No-Barrier Leq (dBA) | With-Barrier Leq (dBA) | Insertion Loss (dB)** |
| F-057 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | 65 | 61 | 5 |
| F-058 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | 62 | 51 | 11 |
| F-059 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 1 | 64 | 56 | 8 |
| F-060 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | 63 | 51 | 11 |
| F-061 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | 65 | 58 | 8 |
| F-062 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | 61 | 57 | 4 |
| F-063 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 1 | 64 | 59 | 5 |
| F-064 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 1 | 66 | 61 | 4 |
| F-065 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 1 | 66 | 62 | 4 |
| F-066 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 1 | 66 | 61 | 5 |
| F-067 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 1 | 66 | 60 | 6 |
| F-068 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 1 | 42 | 41 | 1 |
| F-069 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 1 | 42 | 41 | 1 |
| F-070 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 1 | 46 | 45 | 0 |
| F-071 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 1 | 48 | 48 | 0 |
| F-072 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 1 | 67 | 59 | 8 |
| F-073 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 1 | 67 | 58 | 9 |
| F-074 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 1 | 54 | 54 | 0 |
| F-075 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 1 | 54 | 54 | 0 |

| Receptor Site Number | Site Address* | No. Units* | 2039 Loudest-hour Noise Levels | | |
|----------------------|---|------------|----------------------------------|------------------------------------|-----------------------|
| | | | No-Barrier L _{eq} (dBA) | With-Barrier L _{eq} (dBA) | Insertion Loss (dB)** |
| F-076 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 1 | 69 | 61 | 8 |
| F-077 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 1 | 69 | 63 | 7 |
| F-078 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 1 | 64 | 58 | 7 |
| F-079 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 1 | 65 | 59 | 6 |
| F-128 | Linkhorn Bay West Gazebo, 1292 Laskin Rd, Row 2 | 1 | 55 | 54 | 1 |
| F-129 | Linkhorn Bay Dock Tables, 1292 Laskin Rd, Row 2 | 1 | 57 | 55 | 2 |

* All land use is single-family residential, except for F-001 thru F-014, F-030, F-031, F-0128 and F-129, which are recreational

** Rounding of decibels may make some subtractions appear incorrect

Table 7: Receptor Site Locations

| Receptor Site Number | Site Address | Coordinates - Virginia State Plane (feet) | | |
|----------------------|--|---|-------------|------|
| | | X | Y | Z |
| F-001 | Cavalier Golf & Yacht Club Golf Course, 928 Bobolink Dr, Row 1 | 12,214,254.0 | 3,479,945.2 | 10.5 |
| F-002 | Cavalier Golf Course, Row 1 | 12,214,350.0 | 3,479,972.0 | 13.7 |
| F-003 | Cavalier Golf Course, Row 2 | 12,214,231.0 | 3,480,042.8 | 5.5 |
| F-004 | Cavalier Golf Course, Row 2 | 12,214,328.0 | 3,480,069.5 | 6.1 |
| F-005 | Cavalier Golf Course, Row 2 | 12,214,209.0 | 3,480,140.0 | 4.5 |
| F-006 | Cavalier Golf Course, Row 2 | 12,214,305.0 | 3,480,166.8 | 7.0 |
| F-007 | Cavalier Golf Course, Row 2 | 12,214,402.0 | 3,480,193.0 | 3.9 |
| F-008 | Cavalier Golf Course, Row 2 | 12,214,424.0 | 3,480,095.5 | 9.4 |
| F-009 | Cavalier Golf Course, Row 3 | 12,214,186.0 | 3,480,237.5 | 3.7 |
| F-010 | Cavalier Golf Course, Row 3 | 12,214,283.0 | 3,480,264.2 | 11.4 |
| F-011 | Cavalier Golf Course, Row 3 | 12,214,379.0 | 3,480,290.2 | 10.3 |
| F-012 | Cavalier Golf Course, Row 3 | 12,214,357.0 | 3,480,387.8 | 12.2 |
| F-013 | Cavalier Golf Course, Row 3 | 12,214,260.0 | 3,480,361.8 | 8.7 |
| F-014 | Cavalier Golf Course, Row 3 | 12,214,454.0 | 3,480,413.0 | 13.5 |
| F-025 | 1245 TANAGER TRL, Row 3 | 12,214,019.0 | 3,480,141.5 | 2.9 |
| F-026 | 1253 TANAGER TRL, Row 3 | 12,213,867.0 | 3,480,120.8 | 4.5 |
| F-027 | 1257 TANAGER TRL, Row 3 | 12,213,738.0 | 3,480,093.0 | 5.3 |
| F-028 | 1261 TANAGER TRL, Row 3 | 12,213,638.0 | 3,480,054.8 | 2.2 |
| F-029 | 1265 TANAGER TRL, Row 3 | 12,213,422.0 | 3,480,077.2 | 4.5 |
| F-030 | Linkhorn Bay East Gazebo, 1276 Laskin Rd, Row 1 | 12,213,959.0 | 3,479,984.0 | 1.2 |
| F-031 | Linkhorn Bay Pool, 1292 Laskin Rd, Row 1 | 12,213,267.0 | 3,479,723.5 | 5.0 |
| F-032 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 12,214,145.0 | 3,480,029.5 | 6.4 |
| F-033 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 12,214,153.0 | 3,479,991.8 | 8.4 |
| F-034 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 12,214,043.0 | 3,480,008.8 | 5.7 |
| F-035 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 2 | 12,214,055.0 | 3,479,969.8 | 5.6 |
| F-036 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 12,213,927.0 | 3,479,973.5 | 5.2 |
| F-037 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 12,213,935.0 | 3,479,934.5 | 5.8 |
| F-038 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 12,213,830.0 | 3,479,955.5 | 5.2 |
| F-039 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 2 | 12,213,840.0 | 3,479,917.8 | 5.2 |
| F-040 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 12,213,787.0 | 3,479,908.5 | 6.0 |

| Receptor Site Number | Site Address | Coordinates - Virginia State Plane (feet) | | |
|----------------------|---|---|-------------|-----|
| | | X | Y | Z |
| F-041 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 2 | 12,213,745.0 | 3,479,900.8 | 6.3 |
| F-042 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 12,213,676.0 | 3,479,885.0 | 6.7 |
| F-043 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 2 | 12,213,637.0 | 3,479,874.8 | 6.1 |
| F-044 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 12,213,754.0 | 3,479,997.0 | 4.5 |
| F-045 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 2 | 12,213,715.0 | 3,479,990.5 | 5.2 |
| F-046 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 12,213,638.0 | 3,479,973.5 | 4.8 |
| F-047 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 2 | 12,213,604.0 | 3,479,965.8 | 5.0 |
| F-048 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 12,213,563.0 | 3,479,842.0 | 6.2 |
| F-049 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 2 | 12,213,529.0 | 3,479,824.0 | 5.3 |
| F-050 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 12,213,503.0 | 3,479,921.0 | 5.0 |
| F-051 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 2 | 12,213,473.0 | 3,479,903.8 | 5.7 |
| F-052 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 12,213,424.0 | 3,479,766.0 | 5.8 |
| F-053 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 2 | 12,213,389.0 | 3,479,746.8 | 5.6 |
| F-054 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 12,213,365.0 | 3,479,842.2 | 5.2 |
| F-055 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 2 | 12,213,335.0 | 3,479,826.8 | 5.0 |
| F-056 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 12,214,145.0 | 3,480,029.5 | 6.4 |
| F-057 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 12,214,153.0 | 3,479,991.8 | 8.4 |
| F-058 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 12,214,043.0 | 3,480,008.8 | 5.7 |
| F-059 | Linkhorn Bay Condos, 1268 Laskin Rd, Row 1 Flr. 3 | 12,214,055.0 | 3,479,969.8 | 5.6 |
| F-060 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 12,213,927.0 | 3,479,973.5 | 5.2 |
| F-061 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 12,213,935.0 | 3,479,934.5 | 5.8 |
| F-062 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 12,213,830.0 | 3,479,955.5 | 5.2 |

| Receptor Site Number | Site Address | Coordinates - Virginia State Plane (feet) | | |
|----------------------|---|---|-------------|------|
| | | X | Y | Z |
| F-063 | Linkhorn Bay Condos, 1276 Laskin Rd, Row 1 Flr. 3 | 12,213,840.0 | 3,479,917.8 | 5.2 |
| F-064 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 12,213,787.0 | 3,479,908.5 | 6.0 |
| F-065 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 1 Flr. 3 | 12,213,745.0 | 3,479,900.8 | 6.3 |
| F-066 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 12,213,676.0 | 3,479,885.0 | 6.7 |
| F-067 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 1 Flr. 3 | 12,213,637.0 | 3,479,874.8 | 6.1 |
| F-068 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 12,213,754.0 | 3,479,997.0 | 4.5 |
| F-069 | Linkhorn Bay Condos, 1280 Laskin Rd, Row 2 Flr. 3 | 12,213,715.0 | 3,479,990.5 | 5.2 |
| F-070 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 12,213,638.0 | 3,479,973.5 | 4.8 |
| F-071 | Linkhorn Bay Condos, 1284 Laskin Rd, Row 2 Flr. 3 | 12,213,604.0 | 3,479,965.8 | 5.0 |
| F-072 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 12,213,563.0 | 3,479,842.0 | 6.2 |
| F-073 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 1 Flr. 3 | 12,213,529.0 | 3,479,824.0 | 5.3 |
| F-074 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 12,213,503.0 | 3,479,921.0 | 5.0 |
| F-075 | Linkhorn Bay Condos, 1288 Laskin Rd, Row 2 Flr. 3 | 12,213,473.0 | 3,479,903.8 | 5.7 |
| F-076 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 12,213,424.0 | 3,479,766.0 | 5.8 |
| F-077 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 1 Flr. 3 | 12,213,389.0 | 3,479,746.8 | 5.6 |
| F-078 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 12,213,365.0 | 3,479,842.2 | 5.2 |
| F-079 | Linkhorn Bay Condos, 1292 Laskin Rd, Row 2 Flr. 3 | 12,213,335.0 | 3,479,826.8 | 5.0 |
| F-128 | Linkhorn Bay West Gazebo, 1292 Laskin Rd, Row 2 | 12,213,265.0 | 3,479,902.8 | -1.4 |
| F-129 | Linkhorn Bay Dock Tables, 1292 Laskin Rd, Row 2 | 12,213,238.0 | 3,479,806.2 | -1.4 |

Table 8: Sound Attenuation Line

Potential Barrier System F

| Approximate Station No. (Laskin Rd) | Barrier Coordinates (feet) (Virginia State Plane South) | | Elevation (feet) | | Estimated Height Above Ground (feet) |
|---|--|-----------|------------------|----------------|--------------------------------------|
| | X | Y | Estimated Ground | Top of Barrier | |
| Barrier F-1 - West of break for Linkhorn Bay Condominiums Driveway | | | | | |
| 81.25 | 12213190.0 | 3479672.8 | 10.0 | 26.0 | 16.0 |
| 82.50 | 12213324.0 | 3479706.5 | 9.2 | 27.2 | 18.0 |
| 84.00 | 12213454.0 | 3479740.0 | 8.4 | 26.4 | 18.0 |
| 84.25 | 12213489.0 | 3479743.5 | 8.2 | 26.2 | 18.0 |
| 85.50 | 12213593.0 | 3479766.8 | 7.6 | 23.6 | 16.0 |
| 86.50 | 12213707.0 | 3479789.5 | 7.1 | 23.1 | 16.0 |
| Barrier F-2 - East of break for Linkhorn Bay Condominiums Driveway | | | | | |
| 87.50 | 12213795.0 | 3479811.0 | 6.8 | 20.8 | 14.0 |
| 88.50 | 12213898.0 | 3479828.5 | 6.7 | 20.7 | 14.0 |
| 89.25 | 12213983.0 | 3479849.0 | 6.8 | 20.8 | 14.0 |
| 90.25 | 12214068.0 | 3479871.0 | 7.1 | 21.1 | 14.0 |
| 91.50 | 12214186.0 | 3479902.5 | 7.7 | 21.7 | 14.0 |
| 92.25 | 12214267.0 | 3479924.5 | 8.5 | 18.5 | 10.0 |
| 93.25 | 12214347.0 | 3479946.0 | 9.2 | 19.2 | 10.0 |
| 94.25 | 12214456.0 | 3479975.0 | 10.2 | 20.2 | 10.0 |

Figure 2
Location Map for
Receptors and Barriers
Barrier System F

Laskin Road (US 58)
Improvements Project
Noise Abatement Design Study

VDOT Project No. 0058-134-F02; UPC No. 12546

Receiver Site and Number

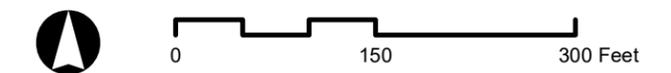
- Impacted and 5 or 6 dBA Insertion Loss
- Impacted and 7 dBA or more Insertion Loss
- Impacted but Not Benefited
- Benefited but Not Impacted
- Not Benefited or Impacted
- Not impacted, benefit not determined

- Top Floor Noise Prediction Result
- Bottom Floor Noise Prediction Result

Note: Grouped Receiver Labels are in order of Leader Occurrence.

Noise Barriers

- Feasible and Reasonable
- Feasible and Not Reasonable
- M# Measurement Site
- CNE Boundary
- Noise Barrier Segment Station



Document Path: \\FS1\vol1\Projects\306XX\1306780_VDOT_Noise_On-call\009_LaskinRd_Design\GIS\306780_009_LaskinRd_Barrier_F.mxd



APPENDIX H FEASIBILITY DETERMINATION FOR BARRIER L IN CNE L

This appendix presents the details and correspondence pertaining to the determination that Barrier L is not feasible due to engineering constraints.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219 2000

Charles A. Kilpatrick, P.E.
Commissioner

July 11, 2017

To: File

From: T. Ross Hudnall

Subject: Laskin Road Widening – Barrier L
UPC: 12546
Project No: 0058-134-F02, C501

The purpose of this memorandum is to document the feasibility determination of Barrier L associated with the Laskin Road Widening Project. The results of the Final Design Noise Analysis for the above project determined that while Barrier L meets the acoustical requirements of feasibility by providing at least 5 dB(A) of reduction at all three (3) impacted receptors in CNE L. Barrier L is 268 feet long at an average height of 10 feet. Barrier L was evaluated to be 2,679 square feet which is below the reasonableness criteria maximum of 1600 square feet per benefited receptor (SF/BR) with 893 SF/BR. This determination has been made in accordance with The State Noise Abatement Policy that was developed to implement the requirements of 23 Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2011), Federal Highway Administration's (FHWA's) Highway Traffic Noise Analysis and Abatement Policy and Guidance (December 2011), and the noise related requirements of The National Environmental Policy Act of 1969. The current Virginia Department of Transportation (VDOT) State Noise Abatement Policy became effective on July 13, 2011 and was updated on July 14, 2014.

Based on correspondence with Regional Utilities, in order to construct Barrier L, it is estimated that utility relocation costs would range from \$4.2M – \$5.7M. This cost includes raising four high-tension distribution towers, re-routing of current underground utilities in conflict with the proposed barrier, and the acquisition of easements required to perform these relocations. Additionally, a Verizon fiber optic hut will likely have to be relocated due to access issues if the barrier were constructed with cost estimates ranging from \$1M – \$1.5M. Total overall utility relocation costs range from \$5.2M – \$7.2M. Based on a barrier cost of \$42 square foot, Barrier L is estimated to cost \$116,298. Since the overall utility costs are 45 to 62 times the cost of Barrier L, the barrier is considered not feasible due to engineering constraints.

The total time required to complete these relocations would be approximately two years, which adds to the overall construction costs of the project. As this project is funded via the SmartScale program, any change to scope or costs has to be justified and approved by the CTB. The current estimate and schedule for this project do not have the capacity to absorb either the increase in cost or time.

On June 26th, 2017 FHWA provided concurrence with VDOT's recommendation that Barrier L is not feasible due to extensive utility conflicts. In conclusion, due to the extensive utility conflicts associated with construction, Barrier L is considered not feasible and not recommended for construction.

Feel free to contact the VDOT noise section with any questions.

Ross,

This e-mail is to formally request a re-evaluation of Sound Barrier "L" along First Colonial Road (north of Laurel Lane) from a feasibility and reasonableness perspective. Based on the attached e-mail from Regional Utilities, in order to construct this sound barrier, it is estimated to cost approximately \$4.2M – \$5.7M. This cost includes the "Raising" of 4 high tension and distribution towers, re-routing of current underground utilities in conflict with the proposed barrier, as well as easements required to perform the relocations. Additionally, there is a Fiber Optic hut (Verizon) that may have to be relocated due to access issues, if the barrier were constructed.

The total time to perform these relocations is approximately 2 years. This would add to the overall construction costs of the project, from a purely inflationary perspective. Given that this project is funded via the SmartScale program, any change to scope or costs has to be justified and approved by the CTB. The current estimate and schedule for this project do not have the capacity to absorb either the increase in cost or time.

It is clear that the costs to construct this barrier clearly outweigh the potential benefits the barrier would provide. Therefore, we request the barrier be removed from the project.

If you would like to discuss further, please give either Troy Eisenberger or myself a call.

Thanks

Ty

Ty Lee, P.E.
Senior Project Manager
Hampton Roads PMO
757.494.5485 (O)
nelson.lee@vdot.virginia.gov

Hudnall, Ross (VDOT)

From: Wilder, Michael T. (VDOT)
Sent: Thursday, May 11, 2017 2:59 PM
To: Eisenberger, Troy (VDOT); Lee, Nelson T. "Ty" PE (VDOT)
Cc: Baines, Keith (VDOT)
Subject: First Colonial Road Sound Wall (0058-134-F02, C501, UPC# 12546)

Troy and Ty,

Here is the estimate cost and time needed for the utilities that would be in conflict if the sound wall was added to the Laksin Road project.

Utility Estimate

| | | |
|-----------------------|---|----------------|
| Electric Transmission | - | \$4,000,000.00 |
| Electric | - | \$ 175,000.00 |
| Telephone | - | \$ 90,000.00 |
| Total | - | \$4,265,000.00 |

Utility Time Frames

| | | |
|--------------------|---|-----------|
| Utility Easement | - | 3 months |
| Utility Design | - | 4 months |
| Utility Relocation | - | 18 months |
| Total | - | 25 months |

Note:

- A) The estimated cost above does not include the relocation cost for the existing Telephone Hut. These costs are under the assumption that the sound wall would be stopped per to the Hut.

In addition there would need to be additional utility easement acquired for the relocation of the utility do to the conflict with the sound wall. If reviewing the proposed sound wall location this would affect 4 parcels.

Here is the estimate additional cost if the Telephone Hut would need to be relocated.

Utility Estimate

Telephone Hut - \$1,000,000.00 to \$1,500,000.00

Note:

- A) The time to relocate the hunt would be 18 months. This would be covered in the relocation time frames above.

If you have any question, please call me.

Thanks,

Michael T. Wilder

Southeast Regional Utilities Manager
(Hampton Roads & Richmond)

1750 North Main Street

Suffolk, VA. 23434

Phone: (757) 925-2471 (Hampton Roads Office)

Phone: (804) 524-6060 (Richmond Office)

Cell: (757) 416-4851, Fax: (757) 925-2532

E-mail: Michael.Wilder@VDOT.Virginia.gov

Hudnall, Ross (VDOT)

From: Sundra, Ed (FHWA) <Ed.Sundra@dot.gov>
Sent: Monday, June 26, 2017 12:38 PM
To: Hudnall, Ross (VDOT)
Cc: Ponticello, James (VDOT)
Subject: RE: UPC 12546 - Laskin Road Barrier L

Ross,

FHWA concurs with VDOT's recommendation that Barrier L is not feasible due to extensive utility conflicts and therefore, should not be constructed. VDOT looked at what it would cost to address the utility conflicts and based on the documentation below, the cost to address the utility conflicts associated with constructing the barrier are 45 to 62 times the cost of Barrier L.

Ed Sundra
Director of Program Development
FHWA Virginia Division
(804) 775-3357

From: Hudnall, Ross (VDOT) [<mailto:Ross.Hudnall@vdot.virginia.gov>]
Sent: Monday, June 19, 2017 2:10 PM
To: Sundra, Ed (FHWA) <Ed.Sundra@dot.gov>
Cc: Ponticello, James (VDOT) <Jim.Ponticello@VDOT.Virginia.gov>
Subject: UPC 12546 - Laskin Road Barrier L

Good afternoon Ed,

Thank you for your prompt response regarding the expansion of the *Design Noise Report* portion of the Laskin Road Widening Project. We are now requesting your concurrence regarding the feasibility of Noise Barrier L in the newly included Phase 1A portion of the DNR study area. The results of the analysis determined that Barrier L meets the acoustical requirements of feasibility by providing at least 5 dB(A) of reduction at all three (3) impacted receptors in CNE L. Barrier L (shown in the graphic below) is 268 feet long at an average height of 10 feet. Barrier L was evaluated to be 2,679 square and is below the reasonableness criteria maximum of 1600 square feet per benefited receptor (SF/BR) with 893 SF/BR.



However, based on coordination with the District and Regional Utilities, in order to construct Barrier L, it is estimated that power utility relocation costs would range from \$4.2M – \$5.7M. This cost includes raising four high-tension distribution towers, re-routing of current underground utilities in conflict with the proposed barrier, and the acquisition of easements required to perform these relocations. Additionally, a Verizon fiber optic hut will likely have to be relocated due to access conflicts with the proposed barrier with cost estimates ranging from \$1M – \$1.5M for relocation. Total utility relocation costs range from \$5.2M – \$7.2M. Per the results of the Final Design Noise Report, Barrier L is estimated to cost \$116,298, using the current barrier unit cost of \$42/SF. From the numbers presented, the overall utility costs associated with constructing the barrier are 45 to 62 times the cost of Barrier L. In addition to costs, the total time required to complete these relocations would be approximately two years, which adds to the overall construction costs of the project. As this project is funded via the SmartScale program, any change to scope or costs has to be justified and approved by the CTB. The current estimate and schedule for this project do not have the capacity to absorb either the increase in cost or time.

VDOT is seeking your concurrence that due to the extensive utility conflicts associated with construction, Barrier L is not feasible and not recommended for construction.

If you have any questions or concerns, please let me know.

Thank you,

-Ross

T. Ross Hudnall

Senior Highway Noise Specialist | Virginia Department of Transportation | 1401 East Broad Street, Richmond, VA 23219 | (804) 371-6829

APPENDIX I PUBLIC PREFERENCE SURVEY DETAILS

This appendix presents the details of the public preference survey conducted for Barrier System F. Included are examples of the letter packages that were sent to the property owners and residents, a list of all affected property owners and residents to whom mailings were sent, pertinent pages from the Barrier Voting Summary Worksheet, and a graphic showing the locations of the receptors for those who responded to the survey.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219-2000

Charles A. Kilpatrick, P.E.
Commissioner

March 15, 2017

«First_Name» «Last_Name»
«Address» «Street»
«City», «State» «Zip»

Re: Noise Barrier Opinion Survey Ballots for Laskin Road Improvements: Barrier F
Project 0058-134-F02, UPC 12546
Hampton Roads District

Dear Property Owner or Resident:

In conjunction with the proposed Laskin Road Improvements Project, the Virginia Department of Transportation (VDOT) is asking for your input concerning a proposed noise barrier along Laskin Road Westbound, between Cardinal Road and the bridge over Linkhorn Bay/Great Neck Creek. The noise barrier under consideration is the best solution available to reduce predicted roadway noise impact at your property.

The proposed noise barrier F would be located between Laskin Road and the Linkhorn Bay Condominiums and parking lot, and extend to the east to benefit a small portion of the Cavalier Golf & Yacht Club Golf Course. The barrier would necessarily be in two sections, to preserve the driveway and access to Linkhorn Bay Condominiums from Laskin Road. The barrier would be a total of approximately 1,211 feet long and would range in height from 10 feet at the eastern end to a maximum of 18 feet near the western end. The noise barrier would be located as shown on the attached graphic, along the north side of Laskin Road. The precise location of the barrier may be shifted slightly to avoid utility conflicts. It would be constructed of concrete with a sound-absorptive facing on the roadway side, but the exact texture and color have not been determined to date. The barrier would be constructed within state right of way. The barrier is predicted to provide a noise reduction of between 5 and 13 decibels to the benefited properties.

Per VDOT policy, the survey ballots have been mailed only to owners and residents of the nearby properties that are affected by noise and would benefit from the noise barrier. Also, VDOT policy limits barrier heights to 30 feet, and dwelling units with balconies above that height cannot be included in the barrier approval process. Therefore, only units on the second

(continued on reverse)

and third floors of the Linkhorn Bay Condominiums can be considered. Not all of these units would be benefited by the barrier, including a few near the driveway opening where the gap in the barrier will be, and many on the side of the buildings facing away from Laskin Road. A property is said to be “benefited” if it receives a minimum of 5 decibels of traffic noise reduction by the noise barrier.

VDOT is providing the attached survey ballot to solicit and document your opinion concerning the proposed noise barrier. Please use the enclosed postage-paid envelope to return your completed ballot by **April 15, 2017**. Along with any associated comments, your vote and the votes of the other property owners benefited by this noise barrier will determine the final decision whether or not the noise barrier is carried through to construction.

Information on VDOT’s noise abatement program is available on VDOT’s Website, at: <http://www.virginiadot.org/projects/pr-noise-walls-about.asp>. The site provides information on VDOT’s noise program and policies including noise barrier voting, noise walls, and a downloadable noise wall brochure.

Should you have any questions, I can be reached by phone at (804) 371-6769, or by e-mail at jim.ponticello@vdot.virginia.gov

Sincerely,

A handwritten signature in blue ink, appearing to read 'JP', with a long horizontal stroke extending to the right.

James Ponticello
Noise Abatement Program Manager

Attachments

Laskin Road Improvements Project
Project No. 0058-134-F02, UPC 12546
Noise Barrier F
March 15, 2017
Public Input Survey Ballot

«First_Name» «Last_Name»
«Address» «Street»
«City», «State» «Zip»

Email: _____

Phone: _____

Are you the current property owner? Yes No

Do you want the sound barrier wall? Yes No

Comments:

Signed: _____ Date: _____

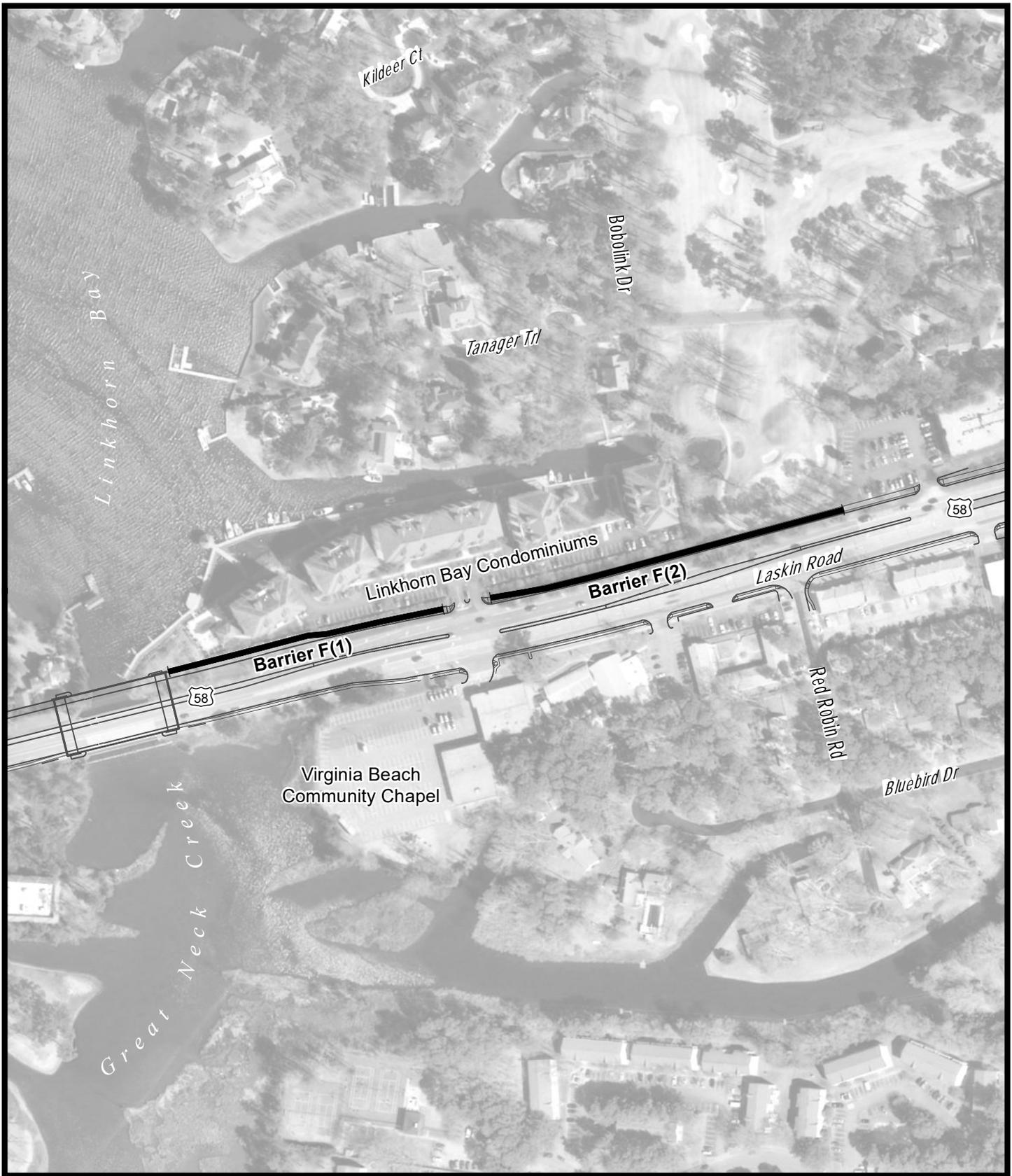
Signed: _____ Date: _____

Please return the ballot using the postage-paid envelope by April 15, 2017 to VDOT's consultant. For your convenience, the mailing address is presented below in the event the postage-paid envelope is misplaced.

Ms. Kristine Collins
Harris Miller Miller & Hanson Inc.
77 South Bedford Street
Burlington, MA 01803

Thank you for your input in this roadway design process.

Path: \\fs1\vol\1\Projects\306XX\306780_VDOT_Noise_On-call\009_LaskinRd_Design\GIS\306780_009_LaskinRd_Barrier_F_Mailing.mxd



-  Recommended Noise Barrier Location
-  Existing Noise Barrier to Remain
-  Existing Noise Barrier to be Replaced



Laskin Road (US 58) Improvements Project Proposed Noise Barrier Location Map

Virginia Beach, Virginia

February 01, 2017



| Name | Street Address | City | State | Zip | Other | Certified Mail # | USPS Tracking | Letter Received | Current Owner | Want Barrier | Receiver ID | Other notes: |
|--|----------------------------|----------------|-------|------------|--|----------------------|------------------------|-----------------|------------------------|-------------------|-------------|----------------------|
| Owners and Residents | | | | | | | | | | | | |
| 1 Rhonda Singer | 1245 Tanager Trail | Virginia Beach | VA | 23451 | | 70141820000235268034 | 9590940101505234604287 | Y | | | F-025 | Benefited/Non-Impact |
| 2 Mary Erhard | 1268 Laskin Road, Unit 100 | Virginia Beach | VA | 23451 | | 70141820000235268027 | 9590940101505234603068 | Y | Y | Y | F-032 | Benefited/Non-Impact |
| 3 Allen Hardin White III | 1268 Laskin Road, Unit 101 | Virginia Beach | VA | 23451 | | 70141820000235268010 | 9590940101505234604294 | Y | Y | Y | F-033 | Benefited/Non-Impact |
| 4 Allan Strange | 1268 Laskin Road, Unit 102 | Virginia Beach | VA | 23451 | signed for by Nancy Strange, her son owns the property, but she lives there. | 70141820000235267990 | 9590940101505234604386 | Y | N | Y | F-034 | Benefited/Non-Impact |
| 5 Martha Robinson | 1268 Laskin Road, Unit 200 | Virginia Beach | VA | 23451 | | 70141820000235267976 | 9590940101505234604317 | | Not Deliverable | | | Benefited/Non-Impact |
| 6 To the residents of: (Johanna Perkins) | 1268 Laskin Road, Unit 200 | Virginia Beach | VA | 23451 | | 70141820000235268065 | 9590940101505234603853 | Y | Y | Y | F-056 | Benefited/Non-Impact |
| 7 Margot Fefer | 1268 Laskin Road, Unit 201 | Virginia Beach | VA | 23451 | | 70141820000235267983 | 9590940101505234604362 | Y | Y | Y | F-057 | Benefited/Non-Impact |
| 8 Chun So Hui | 1268 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | | 70141820000235267952 | 9590940101505234604324 | Y | Y | Y | F-058 | Benefited/Non-Impact |
| 9 Mary Wales | 1268 Laskin Road, Unit 203 | Virginia Beach | VA | 23451 | | 70141820000235267945 | 9590940101505234604355 | Y | Y | Y | F-059 | Benefited/Non-Impact |
| 10 Matthew Howard | 1276 Laskin Road, Unit 100 | Virginia Beach | VA | 23451 | | 70141820000235267938 | 9590940101505234604331 | Y | Y | Y | F-039 | Benefited/Non-Impact |
| 11 Richard Chinappi | 309A 51st Street | Virginia Beach | VA | 23451-2429 | For property located at 1276 Laskin Road, Unit 103 | 70141820000235267891 | 9590940101505234603259 | Y | Y | Y | F-036 | Benefited/Non-Impact |
| 12 Elizabeth Barnes | 1276 Laskin Road, Unit 200 | Virginia Beach | VA | 23451 | | 70141820000235267884 | 9590940101505234603181 | Y | Y | Y | F-063 | Benefited/Non-Impact |
| 13 Dorena Peterson | 1276 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | | 70141820000235267877 | 9590940101505234603242 | Y | Y | Y | F-061 | Benefited/Non-Impact |
| 14 To the residents of: | 1276 Laskin Road, Unit 203 | Virginia Beach | VA | 23451 | | 70141820000235267860 | 9590940101505234603174 | Y | Y | No response given | F-060 | Benefited/Non-Impact |
| 15 James Vanderhill | 1280 Laskin Road, Unit 103 | Virginia Beach | VA | 23451 | | 70141820000235267846 | 9590940101505234603167 | Y | Y | Y | F-040 | Benefited/Impact |
| 16 Timothy Christian | 1284 Laskin Road, Unit 103 | Virginia Beach | VA | 23451 | | 70141820000235267815 | 9590940101505234603211 | Y | | | F-042 | Benefited/Impact |
| 17 Charles Berle | 1284 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | Letter returned | 70141820000235267808 | 9590940101505234603143 | | Property Sold | | | Benefited/Impact |
| 18 John Ainsle or current resident | 1284 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | | 70141820000235268072 | 9590940101505234603884 | Y | Y | Y | F-067 | Benefited/Impact |
| 19 Paul Bratcher | 1284 Laskin Road, Unit 203 | Virginia Beach | VA | 23451 | | 70141820000235267792 | 9590940101505234603204 | Y | Y | Y | F-066 | Benefited/Impact |
| 20 Lawrence Lee | 1288 Laskin Road, Unit 103 | Virginia Beach | VA | 23451 | | 70141820000235267761 | 9590940101505234603099 | Y | Y | Y | F-048 | Benefited/Impact |
| 21 Sidney Golding | 1288 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | | 70141820000235267754 | 9590940101505234604232 | Y | | | F-073 | Benefited/Impact |
| 22 Frank Beckman | 1288 Laskin Road, Unit 203 | Virginia Beach | VA | 23451 | | 70141820000235267747 | 9590940101505234603105 | Y | Y | Y | F-072 | Benefited/Impact |
| 23 Richard G. Cook Revocable Trust | 1292 Laskin Road, Unit 102 | Virginia Beach | VA | 23451 | | 70141820000235267693 | 9590940101505234604256 | Y | Y | Y | F-053 | Benefited/Impact |
| 24 George Zakos | 1292 Laskin Road, Unit 103 | Virginia Beach | VA | 23451 | | 70141820000235267709 | 9590940101505234603112 | Y | Y | Y | F-052 | Benefited/Impact |
| 25 Kenneth Harris | 1292 Laskin Road, Unit 202 | Virginia Beach | VA | 23451 | VACANT | 70141820000235267716 | 9590940101505234604263 | | | | F-077 | Benefited/Impact |

Survey was mailed to 309A 51st Street. He noted on the survey that his current address has changed back to the Laskin Rd property.

delivered to Dorena at 7406 Lake Breeze Dr. #311, Fort Myers, FL 33907 Survey returned by Kenneth Bruce Nuckols who bought the property March 2017.

George signed for and returned the survey form that was addressed to "The Residents of" 1276 Laskin, Unit 103. My guess is that the post office accidentally had him sign for the wrong letter. The letter sent to George at 1292 Laskin was returned to HMMH.

Owners, not Residents

| | | | | | | | | | | | | |
|-----------------------------|----------------------------|----------------|----|------------|--|----------------------|------------------------|---|------------------------|---|-------|----------------------|
| 1 Necco Properties LLC | 1100 Eden Way N., Ste 101A | Chesapeake | VA | 23320-2785 | For property located at 1268 Laskin Road, Unit 103 | 70141820000235267969 | 9590940101505234604379 | | Not Deliverable | | F-035 | Benefited/Non-Impact |
| 2 Edwin Gadberry III | 14001 Southshore Road | Midlothian | VA | 23112-2046 | For property located at 1276 Laskin Road, Unit 102 | 70141820000235267914 | 9590940101505234603266 | Y | | | F-037 | Benefited/Non-Impact |
| 3 Diane Shulman Life Estate | 2061 Thomas Bishop Lane | Virginia Beach | VA | 23454 | Diane no longer owns 1276 Laskin Road, Unit 203. | 70141820000235267853 | 9590940101505234603235 | Y | N | | | Benefited/Impact |
| 4 Stephen Burke | 916 Downshire Chase | Virginia Beach | VA | 23452-6150 | For property located at 1284 Laskin Road, Unit 102 | 70141820000235267822 | 9590940101505234603150 | Y | | | F-043 | Benefited/Impact |
| 5 Forrest Bartlett | 153 Milltown Road | Shiloh | NC | 27974-6221 | For property located at 1288 Laskin Road, Unit 102 | 70141820000235267778 | 9590940101505234604249 | Y | Y | Y | F-049 | Benefited/Impact |
| 6 Shannon Croll | 924 Sandoval Drive | Virginia Beach | VA | 23454 | For property located at 1292 Laskin Road, Unit 203 | 70141820000235267730 | 9590940101505234604270 | Y | Y | Y | F-076 | Benefited/Impact |

Non-owners

| | | | | | | | | | | | | |
|------------------------|----------------------------|----------------|----|-------|--|----------------------|------------------------|-----------|---|---|-------|----------------------|
| 1 To the residents of: | 1268 Laskin Road, Unit 103 | Virginia Beach | VA | 23451 | signed for by Courtney Otto. Survey returned by Necco Prop | 70141820000235268003 | 9590940101505234604300 | Y | Y | Y | F-035 | Benefited/Non-Impact |
| 2 To the residents of: | 1276 Laskin Road, Unit 102 | Virginia Beach | VA | 23451 | Survey returned by E. Gadberry. | 70141820000235267921 | 9590940101505234604348 | Y | Y | Y | F-037 | Benefited/Non-Impact |
| 3 To the residents of: | 1284 Laskin Road, Unit 102 | Virginia Beach | VA | 23451 | | 70141820000235267839 | 9590940101505234603228 | Y | | | F-043 | Benefited/Impact |
| 4 To the residents of: | 1288 Laskin Road, Unit 102 | Virginia Beach | VA | 23451 | signed for by Amanda Miller | 70141820000235267785 | 9590940101505234603136 | Y | | | F-049 | Benefited/Impact |
| 5 To the residents of: | 1292 Laskin Road, Unit 203 | Virginia Beach | VA | 23451 | | 70141820000235267723 | 9590940101505234603129 | unclaimed | | | F-076 | Benefited/Impact |

Facilities

| | | | | | | | | | | | | |
|---|--------------------|----------------|----|-------|--|----------------------|------------------------|---|---|---|---------------------|------------------|
| 1 John Milleson, General Manager & COO, Cavalier Golf & Yacht Club Golf Course Joe Andrew, Assistant General Manager/Harbormaster, Cavalier Golf & Yacht | 1052 Cardinal Road | Virginia Beach | VA | 23451 | | 70141820000235268058 | 9590940101505234603082 | Y | Y | Y | F-001, F-002, F-003 | Benefited/Impact |
| 2 Club Golf Club | 1052 Cardinal Road | Virginia Beach | VA | 23451 | | 70141820000235268041 | 9590940101505234603075 | | | | | |

<http://cvb.manatron.com/tabs/propertysearch.aspx>

| Total Number of Representative Responses Sent | | | | | |
|---|--------------|----------------------------------|----------------------------------|---|---|
| (Include Permitted Developments) | NAC CATEGORY | Owner and Resident | Non-Resident Owner | | Apartment Complexes / Rental Properties / Residents |
| | | Number of Letters Sent to Owners | Number of Letters Sent to Owners | Number of Residences Represented by Letters sent to Non-Resident Owners | Number of Letters Sent to Residents (if known) |
| Impacted and Benefited | B | 12 | 3 | 3 | 3 |
| Not Impacted and Benefited | B | 13 | 3 | 2 | 2 |
| (Include Permitted Developments) | NAC CATEGORY | | Non-Resident Owner | | |
| | | | Number of Letters Sent to Owners | Number of Facilities Represented by Letters sent to Non-Resident Owners | |
| Impacted and Benefited | C | | 2 | 1 | |
| Not Impacted and Benefited | C | | | | |
| Impacted and Benefited | D | | | | |
| Not Impacted and Benefited | D | | | | |
| Impacted and Benefited | E | | | | |
| Not Impacted and Benefited | E | | | | |

NOTE: A Total of 38 letters have been sent.

| Total Number of Returned Responses (Representative) | | | | | | | |
|---|--------------|-----------------------|----------------------|--------------------------------------|-------------------------------------|---|----------------------|
| (Include Permitted Developments) | NAC CATEGORY | Owner and Resident | | Non-Resident Owner | | Apartment Complexes / Rental Properties / Residents | |
| | | Number of 'Yes' Votes | Number of 'No' Votes | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | Number of 'Yes' Votes | Number of 'No' Votes |
| Impacted and Benefited | B | 7 | | 2 | | | |
| Not Impacted and Benefited | B | 11 | | | | 2 | |
| (Include Permitted Developments) | NAC CATEGORY | | | Non-Resident Owner | | | |
| | | | | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | | |
| Impacted and Benefited | C | | | 1 | | | |
| Not Impacted and Benefited | C | | | | | | |
| Impacted and Benefited | D | | | | | | |
| Not Impacted and Benefited | D | | | | | | |
| Impacted and Benefited | E | | | | | | |
| Not Impacted and Benefited | E | | | | | | |

| | | |
|----------------|--------------|---------------------|
| UPC | 12546 | 1st Mailing Summary |
| Project Number | 0058-134-F02 | |
| Barrier Name | Barrier F | |

| (Include Permitted Developments) | NAC CATEGORY | Total Number of Representative Responses Sent | Total Maximum Number of Representative Votes |
|----------------------------------|--------------|---|--|
| Impacted and Benefited | B | 18 | 75 |
| Not Impacted and Benefited | B | 17 | 45 |
| Impacted and Benefited | C | 1 | 5 |
| Not Impacted and Benefited | C | 0 | 0 |
| Impacted and Benefited | D | 0 | 0 |
| Not Impacted and Benefited | D | 0 | 0 |
| Impacted and Benefited | E | 0 | 0 |
| Not Impacted and Benefited | E | 0 | 0 |

| |
|--|
| Potential Maximum Number of Weighted Votes |
| 125 |

| | | |
|-------------------------------|----|-------|
| Number of Weighted Votes Cast | | |
| YES | NO | Total |
| 81 | 0 | 81 |

| | |
|-----------------------------------|---|
| Number of Total Outstanding Votes | % Total Votes Cast / % Total Actual Votes |
| 44 | 64.80 64 |

| | | |
|------------------------------|-----------------------------|------------------------|
| % of "Yes" Votes (All Votes) | % of "No" Votes (All Votes) | % of Outstanding Votes |
| 64.8 | 0.0 | 35.2 |

| | |
|--------------------------------|-------------------------------|
| % of "Yes" Votes (Respondents) | % of "No" Votes (Respondents) |
| 100.0 | 0.0 |

Results in the box below should only be considered when all of the responses have been tallied

The Barrier Is Recommended for Construction

Version 1.2

| | |
|----------------|--------------|
| UPC | 12546 |
| Project Number | 0058-134-F02 |
| Barrier Name | Barrier F |

| |
|---------------------|
| 1st Mailing Summary |
|---------------------|

| (Include Permitted Developments) | NAC CATEGORY | Total Number of Returned Responses (Representative) | | | | | |
|----------------------------------|--------------|---|----------------------|--------------------------------------|-------------------------------------|---|----------------------|
| | | Owner and Resident | | Non-Resident Owner | | Apartment Complexes / Rental Properties / Residents | |
| | | Number of 'Yes' Votes | Number of 'No' Votes | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | Number of 'Yes' Votes | Number of 'No' Votes |
| Impacted and Benefited | B | 7 | 0 | 2 | 0 | 0 | 0 |
| Not Impacted and Benefited | B | 11 | 0 | 0 | 0 | 2 | 0 |

| (Include Permitted Developments) | NAC CATEGORY | Non-Resident Owner | | | |
|----------------------------------|--------------|--------------------------------------|-------------------------------------|--|--|
| | | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | | |
| Impacted and Benefited | C | 1 | 0 | | |
| Not Impacted and Benefited | C | 0 | 0 | | |
| Impacted and Benefited | D | 0 | 0 | | |
| Not Impacted and Benefited | D | 0 | 0 | | |
| Impacted and Benefited | E | 0 | 0 | | |
| Not Impacted and Benefited | E | 0 | 0 | | |

| (Include Permitted Developments) | NAC CATEGORY | Total Number of Weighted Votes | | | | | |
|----------------------------------|--------------|--------------------------------|----------------------|--------------------------------------|-------------------------------------|---|----------------------|
| | | Owner and Resident | | Non-Resident Owner | | Apartment Complexes / Rental Properties / Residents | |
| | | Number of 'Yes' Votes | Number of 'No' Votes | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | Number of 'Yes' Votes | Number of 'No' Votes |
| Impacted and Benefited | B | 35 | 0 | 6 | 0 | 0 | 0 |
| Not Impacted and Benefited | B | 33 | 0 | 0 | 0 | 2 | 0 |

| (Include Permitted Developments) | NAC CATEGORY | Non-Resident Owner | | | |
|----------------------------------|--------------|--------------------------------------|-------------------------------------|--|--|
| | | Representative Number of 'Yes' Votes | Representative Number of 'No' Votes | | |
| Impacted and Benefited | C | 5 | 0 | | |
| Not Impacted and Benefited | C | 0 | 0 | | |
| Impacted and Benefited | D | 0 | 0 | | |
| Not Impacted and Benefited | D | 0 | 0 | | |
| Impacted and Benefited | E | 0 | 0 | | |
| Not Impacted and Benefited | E | 0 | 0 | | |

Appendix I Figure 1 Location Map for Receptors with Survey Responses, Barrier System F

Laskin Road (US 58) Improvements Project Noise Abatement Design Study

VDOT Project No. 0058-134-F02; UPC No. 12546

Barrier Survey Status

- Yes Response
- Did Not Respond
- Vacant - No Response

Noise Barriers

- ▬ Feasible and Reasonable
- ▬ Feasible and Not Reasonable
- ▬ CNE Boundary

Document Path: \\fs1\vol11\Projects\306\XXX\306780_VDOT_Noise_On-call\009_LaskinRd_Design\GIS\306780_009_LaskinRd_Barrier_F_Survey_Results.mxd

