Virginia Department Of Transportation

Noise Report Development and Guidance Document

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(Version 3.0)

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1.0 Purpose

The State Noise Abatement Policy 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), 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 VDOT State Noise Abatement Policy became effective on July 13, 2011 and was updated subsequently. This guidance document is applicable to all Type I federal-aid highway projects and outlines the requirements of all noise reports outlined in VDOT's Highway Traffic Noise Impact Analysis Guidance Manual.

This guidance document is to aid in the preparation of all reports and graphics (figures) of traffic noise impact assessments and analyses that are to be submitted for review to VDOT's Central Office Noise Staff. This guidance document also ensures that all consultants and VDOT Central Office Noise Staff produce reports and graphics that achieve the necessary consistency to document and illustrate all important noise concepts.

2.0 Noise Report Guidance and Accountability Checklist

It is impossible to identify and account for every special consideration that may arise on a specific highway project and address it in the corresponding noise analysis. As such, the Department developed a checklist that needs to be digitally submitted with each report to be reviewed by the Department. This checklist is located in **Appendix A** and is also available as a PDF Form and excel spreadsheet (.xlsx) upon request. This checklist is not an inclusive document that accounts for all types of projects and scenarios. However, this guidance checklist outlines the most common items that will be verified during VDOT's noise report review process. This checklist follows guidance set forth in Section 13.1 of VDOT's Highway Traffic Noise Impact Analysis Guidance Manual.

When extenuating circumstances arise that require unusual or unique considerations be made that are not explicitly covered by these guidelines, project-level decisions will be made in accordance with the spirit of the FHWA regulations and the VDOT guidelines. It is imperative that these decisions be made collaboratively by VDOT, the environmental consultant responsible for the noise analysis, and the FHWA Division office staff. Unusual and unique circumstances will be considered on an individual project basis and the decision-making process must be fully documented in the noise technical report.

2.1 Checklist Overview

This checklist consists of the following sections that are currently outlined in Section 13.2 of VDOT's Highway Traffic Noise Impact Analysis Guidance Manual:

- Title Page
- Table of Contents (TOC)
- Executive Summary
- Introduction
- Methodology
- Existing Noise Environment
    - Noise Monitoring
    - Undeveloped Lands and Permitted Developments
    - Common Noise Environment (CNE) Determination
    - Worst Noise Hour
    - Receptor Identification and NAC Categorization
    - Modeled Existing Environment
- Future Noise Environment
    - Modeled Future Environment
    - Noise Abatement Determination
- Construction Noise
- Public Involvement Process
    - Noise Compatible Planning
    - Voting Procedures
- Other Considerations
- Appendices
- TNM Runs
- General

The checklist outlined in **Appendix A** must be submitted digitally with each noise report submission.

NOTE – The checklist should not be included in the report as an appendix. Submitting the completed checklist separately from the report is preferred.

3.0 Noise Report Graphics Examples

Section 13.2.1 of VDOT's Highway Traffic Noise Impact Analysis Manual states:
Note – Report Graphics: Detailed, public-friendly graphics should be incorporated throughout the entire Highway Traffic Noise Report, especially to illustrate CNE boundaries, monitored / modeled highway traffic noise locations, noise levels, and evaluated / proposed noise barrier locations. Each graphic needs to adequately identify and label names of highways / roadways, locations of structures (bridges, culverts, etc.), communities' names, special interest areas,

residential / commercial / industrial sites, municipal / county / state boundaries, monitored / modeled sites, right-of-way acquisitions, and areas where vehicle access to an existing roadway is to be removed as well as any other information discussed in the text that can be graphically depicted. Additional labeling may be necessary depending on the specifics of the transportation improvement project. Graphics are only as good as the text associated with them; therefore, an adequate description of the project area and explanation of the activities being proposed are also necessary.

This document provides additional guidance ensuring that all relevant items are incorporated into the creation of "Detailed, public-friendly graphics."

These graphics should be included in all noise reports:

- Project Location Map
- CNE's (Common Noise Environments) and Monitoring Sites
- Detailed Graphic Display of Results

Note – The graphic examples included in **Appendix A** are only for guidance purposes. The graphics produced do not need to be exact copy of the examples that are included; however, the content outlined in this document should be matched as closely as possible.

3.1 General Requirements for Report Graphics

General Requirements for Graphics (Figures)

- Figures are to be created in GIS or Microstation, or equivalent design program
- Tabloid Sized (11" x 17")
- Must contain North Arrows and Legends
- Scale (feet) is required
    - Must be a standard scale, eg: 1:3000, 1:6000, 1:9000, 1:12000, 1:24000 etc.
- Aerial Images must be at a resolution of 300 dpi (dots per inch) or greater
- Figures must include identifiers such as Figure Number, Name, and VDOT UPC (Universal Project Code), State Project Number, and be properly referenced in the Table of Contents (TOC) of the noise report.
- Graphics (figures) are not to be inserted into actual word document (text of report)
    - Inserting images into the word document
        - Breaks any set scale
        - Degrades the resolution of the aerials
        - Greatly increases file size
- Aerial photos must be properly documented with copyright information
    - "Aerial Imagery © Commonwealth of Virginia" must clearly be noted on the Aerial Imagery (.hmr files) if obtained from VDOT
    - Non-VDOT sources must also be documented with the proper reference
- May consist of multiple pages

Any variance of this guidance needs to be coordinated with VDOT's Central Office Noise Staff prior to the submission of the noise report.

3.2 Project Location Map

The Project Location Map must follow these guidelines:

- May be Portrait (8.5" x 11") or Tabloid Sized (11" x 17")
- This figure should show the project location and project limits. The "Detailed, public-friendly" graphics should make it easy for anyone to quickly locate the project. This may include a state and / or county inset map, and a more detailed map with the project limits
- This figure does not need to have an aerial photo, however all appropriate road labels (mentioned in the text of the report) should be clearly shown and labeled, as well as any landmarks which help identify the project area
- In addition to the project limits, the 500 foot buffer showing the study limits of the noise study should be shown

3.3 CNE's and Monitoring Locations

CNE's and Monitoring Locations is a generic name for the figure that must illustrate:

- CNE boundaries (labeled)
- Noise monitoring sites (short and / or long term) - labeled
- Other items that could be included are (depending on project):
    - Existing or Proposed Subdivisions (with or without building permits)
    - Existing or Proposed Neighborhood Names
    - Locations of interest (mentioned within the text of the report)
- The information required in the Project Location Map and the CNE's and Monitoring Locations Figure may be combined as long as the resulting figure utilizes an aerial photo background and is tabloid size.

3.4 Detailed Graphic Display of Modeling Results

The Detailed Graphic Display of Modeling Results is a generic name for the figure(s) that show the results of the modeling analysis. The actual name of this figure may be customized per each project. This figure(s) must show:

- All Receptor Locations (labeled)
- CNE Boundaries - unless receptor labels correlate to specific CNE's (eg. A01 = CNE A, Receptor #1)
- Inset Map (If graphics cover multiple pages)
- All Receptor Locations, labeled, and color coded to show
    - Impacted and Benefitted
    - Impacted and Not Benefitted
    - Not Impacted and Benefitted

    - Not Impacted and Not Benefitted
    - Potential Acquisitions or Potential Displacements
        - (DO NOT refer to them as "Takes, Acquisitions, or Displacements")
    - 66 dB Contour (For First Floor Receptors)
    - If impacts are located outside of the 66 dB contour boundary, it infers the receptors are either substantial increase impacts or non-ground floor NAC impacts. This condition needs to be documented in the legend and the text of the report if this condition occurs.
- Existing Noise Barriers or Retaining Walls
- If project plans have not been developed during the preliminary engineering phase and the project consists of a basic typical section or study corridor, then show:
    - Either the project limits or the study corridor, including the typical section referenced for the noise model
- If project plans have been developed during the preliminary engineering phase and the project plans, profiles, and cross-sections have been developed, then show:
    - Project Design Plans, with separate legend items including the following elements:
        - Proposed Edge of Pavement / Travel Lanes
        - Mainline, Ramp, and Potential Barrier Location Stationing
        - Proposed Noise Barriers
            - Evaluated Barrier - Not Feasible
            - Evaluated Barrier - Feasible and Not Reasonable
            - Potential Barrier - Feasible and Reasonable
- These items below are optional, but are preferred if they have been developed
    - Proposed Edge of Shoulder
    - Construction Limits (Cut/Fill)
    - Proposed Bridge Deck

- Other important information
    - NEM (Noise Exposure Map) contours
        - Only for projects affected by aviation noise

3.5 Sound Wall Public Survey Graphic

This graphic is prepared only for final design noise analyses when barriers are found to be feasible and reasonable. This graphic is sent to the affected public along with the Barrier Survey Form. This graphic should be easy to understand and not cluttered with extraneous information. This graphic must show:

- Aerial Photo
- Barrier Location (Labeled)
- Road Labels
- Letter Size (8.5 x 11)

This graphic should only show the barrier that the survey pertains to, not all the barriers in the project. The graphic should NOT show:

- Project Design
- Receptor Locations
- Any Barriers other than the one identified on the survey form, especially barriers that were not even feasible or reasonable
    - Separate graphics should be prepared for each feasible and reasonable barrier
- Sound Levels

3.6 Sound Wall Public Survey Response Graphic

After the voting comment period has commenced and votes have been tallied accordance with the voting procedures outlined in VDOT's Highway Traffic Noise Impact Analysis Guidance Manual, a graphic must be prepared which shows:

- Aerial Photo
- Barrier Locations (Labeled)
- Road Labels
- Tabloid Size (11 x 17)
- Inset Map (If graphics cover multiple pages)
- Graphical Depiction of Barrier Survey Results
    - Must show these items in Legend
        - Voted Yes (Barrier Survey Form Received)
        - Voted No (Barrier Survey Form Received)
        - Green Card Received (Barrier Survey Form Not Received)
        - Unclaimed / Returned (RTS) / Unknown
    - Each survey sent must be represented on the graphics
    - Survey results can be illustrated by parcel line boundaries, or color coded points

4.0 Sample Text Required for Use in Noise Reports

Report sections and headings are not required to have the exact same headings and item numbers identified in the checklist. This is due to projects having different scenarios. However, the sample text items identified in Section 4.2 should be incorporated into the report where applicable.

4.1 Definitions of Sample Text Requirements

- **REQUIRED** - This text is required for the appropriate section of the noise report and is not intended to be altered in any way
- **SUGGESTED** - This text can be used as it is shown or modified as needed, as long as the intent and items identified are covered, and are consistent with FHWA and VDOT guidelines
- **EXAMPLE** - This text can be modified to fit any project. Items that are shown in bold-face and the color red need to be modified to fit the project
- **OPTIONAL** - This text is optional and while it is not required, it can be valuable reference background information

4.2 Sample Text

The sample text provided below refers to the section numbers listed in the checklist (**Appendix A**). Text in red or bold-face is project specific and must be modified to fit the project.

- **Executive Summary**
  - ***Section 3.4 - REQUIRED***
    - A preliminary noise evaluation was performed 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.

- **Methodology**
  - ***Section 5.1 - OPTIONAL***
    - The Noise Control Act of 1972 gives the US Environmental Protection Agency (USEPA) the authority to establish noise regulations to control major noise sources, including motor vehicles and construction equipment. Furthermore, the USEPA is required to set noise emission standards for motor vehicles used for interstate commerce and the FHWA is required to enforce the USEPA noise emission standards through the Office of Motor Carrier Safety. The National Environmental Policy Act (NEPA) of 1969 gives broad authority and responsibility to Federal agencies to evaluate and mitigate adverse environmental impacts caused by Federal actions. FHWA is required to comply with NEPA including mitigating adverse highway traffic noise effects. The Federal-Aid Highway Act of 1970 mandates FHWA to develop standards for mitigating highway traffic noise. It also requires FHWA to establish traffic noise level criteria for various types of land uses. The Act prohibits FHWA approval of federal-aid highway projects unless adequate consideration has been made for noise abatement measures to comply with the standards. FHWA

regulations for highway traffic noise for federal-aid highway projects are contained in 23 CFR 772. The regulations contain noise abatement criteria, which represent the maximum acceptable level of highway traffic noise for specific types of land uses. The regulations do not mandate that the abatement criteria be met in all situations, but rather require that reasonable and feasible efforts be made to provide noise mitigation when the abatement criteria are approached or exceeded.

- ***Section 5.1 – SUGGESTED***
  - The State Noise Abatement Policy 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), 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 VDOT State Noise Abatement Policy became effective on July 13, 2011 and was updated on March 31, 2014.

- ***Section 5.2 – SUGGESTED***
  - Noise is generally defined as unwanted or annoying sound. Airborne sound occurs by a rapid fluctuation of air pressure above and below atmospheric pressure. Sound pressure levels are usually measured and expressed in decibels (dB). The decibel scale is logarithmic and expresses the ratio of the sound pressure unit being measured to a standard reference level.

    Most sounds occurring in the environment do not consist of a single frequency, but rather a broad band of differing frequencies. The intensities of each frequency add to generate sound. Because the human ear does not respond to all frequencies equally, the method commonly used to quantify environmental noise consists of evaluating all of the frequencies of a sound according to a weighting system. It has been found that the A-weighted filter on a sound level meter, which includes circuits to differentially measure selected audible frequencies, best approximates the frequency response of the human ear.

    Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources, creating a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of traffic noise, a statistical noise descriptor called the equivalent hourly sound level, or Leq (h), is commonly used. Leq (h) describes a noise sensitive receptor's cumulative exposure from all noise-producing events over a one-hour period.

Because decibels are logarithmic units, sound levels cannot be added by ordinary arithmetic means. The following general relationships provide a basic understanding of sound generation and propagation:

- An increase, or decrease, of 10 dB will be perceived by a receptor to be a doubling, or halving, of the sound level
- Doubling the distance between a highway and receptor will produce a 3 dB sound level decrease
- A 3 dB sound level increase is barely detectable by the human ear

- ***Section 5.3 – SUGGESTED***
  - The State Noise Abatement Policy has adopted the Noise Abatement Criteria (NAC) that have been established by FHWA (23 CFR 772) for determining traffic noise impacts for a variety of land uses. The NAC, listed in **Table #** for various activities, represent the upper limit of acceptable traffic noise conditions and also a balancing of that which may be desirable with that which may be achievable. The NAC applies to areas having regular human use and where lowered noise levels are desired. They do not apply to the entire tract of land on which the activity is based, but only to that portion where the activity takes place. The NAC is given in terms of the hourly, A-weighted, equivalent sound level in decibels (dBA). The noise impact assessment is made using the guidelines listed in **Table #**.

- ***Section 5.3 – REQUIRED***
  - Table #: FHWA Noise Abatement Criteria

TABLE 1 TO PART 772—NOISE ABATEMENT CRITERIA [Hourly A–Weighted Sound Level decibels (dB(A))[1]]				
Activity category	**Activity Leq(h)[4]**	**Criteria[2] L10(h)**	**Evaluation location**	**Activity description**
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67	70	Exterior	Residential.
C[3]	67	70	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	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.
F			Exterior	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G				Undeveloped lands that are not permitted.

[1] Either Leq(h) or L10(h) (but not both) may be used on a project.
[2] The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[3] Includes undeveloped lands permitted for this activity category.
[4] VDOT uses the Leq(h) designation

- ***Section 5.4 – REQUIRED***
  - Traffic noise impacts occur if either of the following two conditions is met:

    • The predicted traffic noise levels (future design year) approach or exceed the NAC, as shown in **Table #**. The VDOT State Noise Abatement Policy defines an approach level to be used when determining a traffic noise impact. The "Approach" level has been defined by VDOT as 1 dB(A) less than the Noise Abatement Criteria for Activity Categories A to E. For example, for a category B receptor, 66 dBA would be approaching 67 dBA and would be considered an impact. If design year noise levels "approach or exceed" the NAC, then the activity is impacted and a series of abatement measures must be considered.

• The predicted traffic noise levels are substantially higher than the existing noise levels. A substantial noise increase has been defined by VDOT when the predicted (future design year) highway traffic noise levels exceed existing noise levels by 10 dBA or more for all noise-sensitive exterior activity categories. For example, if a receptor's existing noise level is 50 dBA, and if the future noise level is 60 dBA, then it would be considered an impact. The noise levels of the substantial increase impact do not have to exceed the appropriate NAC. Receptors that satisfy this condition warrant consideration of highway traffic noise abatement.

If traffic noise impact is identified within the project corridor, then consideration of noise abatement measures is necessary. The final decision on whether or not to provide noise abatement along a project corridor will take into account the feasibility of the design and overall cost weighted against the environmental benefit.

- ***Section 5.6 – SUGGESTED***
  - Since roadway noise can be determined accurately through computer modeling techniques for areas that are dominated by road traffic, design year traffic noise calculations have been predicted using the Federal Highway Administration's Traffic Noise Model (FHWA TNM®) Version 2.5, which is the latest approved version. The FHWA TNM ® was developed and sponsored by the U. S. Department of Transportation and John A. Volpe National Transportation Systems Center, Acoustics facility. The TNM estimates vehicle noise emissions and resulting noise levels based on reference energy mean emission levels. The existing and proposed alignments (horizontal and vertical) are input into the model, along with the receptor locations, traffic volumes of cars, medium trucks (vehicles with 2 axles and 6 tires,) heavy trucks, average vehicle speeds, pavement type, and any traffic control devices. The TNM uses its acoustic algorithms to predict noise levels at the selected receptor locations by taking into account sound propagation variables such as, atmospheric absorption, divergence, intervening ground, barriers, building rows, and sometimes heavy vegetation.

- **Noise Monitoring**
  - ***Section 6.1.6 – REQUIRED***
    - NOTE: 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 CNE to validate the computer noise model.

- **Undeveloped Lands and Permitted Developments**
  - ***Section 6.2.1 – REQUIRED***
    - Highway traffic noise analyses 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.

  - ***Section 6.2.2 – EXAMPLE***
    - The presence of known undeveloped lands with an active building permit was confirmed with **#Town/County Planning Dept**.# on **#DATE#**.

      Below are the developments that are identified as planned with an active building permit or are currently being constructed:

      - **#Example (Subdivision A)#** - The **#Town/County Planning Dept.#** accepted a construction permit for **#Example (Subdivision A)#** on **#DATE2#**. Since development is under construction with an approved building permit, this subdivision was included for the consideration of noise abatement. The development is located **#location of Subdivision A#**.

      The planned developments were identified not having an active building permit:

      - **#Example (Subdivision B)#** - Approved plats exist for the proposed development referred to as **#NAME#**, located **#location of Subdivision B#**. The **#Town/County Planning Dept.#** confirmed on **#DATE3#** that no building permit has been issued for this subdivision. Since no active building permit exists for **#Example (Subdivision B)#**, it was not considered for noise abatement for this project."

- **Receptor Identification and NAC Categorization**
  - ***Section 6.5.10 – EXAMPLE***
    FOR INTERIOR SITES
    - The **#Building1#** of is represented by **site XXX**. This outdoor area is partially shielded by the existing **#Building1#**. Indoor noise levels for **Site XXX** were evaluated under Activity Category D in ***Table X*** (FHWA Noise Abatement Criteria). Receptor **site XXX** was used to evaluate the building's interior noise levels. The **existing (#YEAR#) condition** noise level for the exterior is predicted to be **XX** dBA. Since the exterior for the **#Building1#** is composed of **#Building Type (eg. masonry material and modern air conditioning is installed #**), the reduction in noise levels in the interior as a result of the building is predicted to be **XX** dBA (FHWA "Highway Traffic Noise Analysis and Abatement Policy and Guidance," December 2011). Under the **existing (#YEAR#) condition**, this site is predicted to have an interior noise level of **XX** dBA. Therefore the indoor noise level for the **#Building 1#** (is or is not) predicted to experience noise impact (Under Activity Category D indoor NAC) in the existing condition.

      NOTE - The same paragraph (shown above) should be used in the future no-build and future design year build discussions as well.

- **Noise Abatement Determination**
  - ***Section 7.2.1 – REQUIRED***
    - 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 which have the potential to provide considerable noise reductions, under certain circumstances. Mitigation measures considered for this project include:

      • Traffic management
      • Alignment modifications;
      • Acoustical insulation of public use and non-profit facilities;
      • Buffer lands
      • Construction of noise barriers;
      • Construction of earth berms;

      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 will be given to these measures during the final design stage, where feasible. The response from project management is included in **Appendix #**.

- ***Section 7.2.1 – EXAMPLE***
  - **Traffic Control Measures (TCM):** Traffic control measures, such as speed limit restrictions, truck traffic restrictions, and other traffic control measures that may be considered for the reduction of noise emission levels are not practical for this project. These traffic control measures would be counterproductive to the project's objective of alleviating traffic and reducing congestion. Reducing speeds will not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide adequate noise reduction. Typically, a 10 mph reduction in speed will result in only a 2 dBA decrease in noise level, which would not eliminate all impacts.

    Alteration of Horizontal and Vertical Alignments: The alteration of the horizontal and vertical alignment has been considered to reduce or eliminate the impacts created by the proposed project. Shifting the horizontal alignment to the outside or inside will create undesirable impacts such as right-of-way acquisition, temporary/permanent easements, and retaining walls. Shifting the roadway alignment away from the impacted residences will increase impacts to other residences located on the opposite side of the interstate.

    Insulation: This noise abatement measure option 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.

    Acquisition of Buffering Land: The purchase of property for noise barrier construction or 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.

    Construction of Noise Barriers / Berms: Construction of noise barriers can be an effective way to reduce noise levels at areas of outdoor activity. Noise barriers can be wall structures, earthen berms, or a combination of the two. The effectiveness of a noise barrier depends on the distance and elevation difference between roadway and receptor and the available placement location for a barrier. Gaps between overlapping noise barriers

also decrease the effectiveness of the barrier, as opposed to a single connected barrier. The barrier's ability to attenuate noise decreases as the gap width increases.

Noise walls and earth berms are often implemented into the highway design in response to the identified noise impacts. The effectiveness of a freestanding (post and panel) noise barrier and an earth berm of equivalent height are relatively consistent; however an earth berm is perceived as a more aesthetically pleasing option. The use of earth berms is not always an option due to the excessive space they require adjacent to the roadway corridor. At a standard slope of 2:1, every one-foot in height would require four feet of horizontal width. This requirement becomes more complex in urban settings where residential properties often about the proposed roadway corridor. In these situations, implementation of earth berms can require significant property acquisitions to accommodate noise mitigation. The cost associated with the acquisition of property to construct a berm can significantly increase the total costs to implement this form of noise mitigation.

Availability of fill material to construct the berm also needs to be considered. On proposed projects where proposed grading yields excess waste material, earth berms are often cost effective mitigation options. On balance or borrow projects the implementation of earth berms is often an expensive solution due to the need to identify, acquire, and transport the material to the project site. Earth berms may be considered a viable mitigation option throughout the project area, and would be evaluated further where possible in the final design stage.

As a general practice, noise barriers are most effective when placed at a relatively high point between the roadway and the impacted noise sensitive land use. To achieve the greatest benefit from a potential noise barrier, the goal of the barrier should focus on breaking the line-of-sight (to the greatest degree possible) from the roadway to the receptor. In roadway fill conditions, where the highway is above the natural grade, noise barriers are typically most effective when placed on the edge of the roadway shoulder or on top of the fill slope. In roadway cut conditions, where the roadway is located below the natural grade, barriers are typically most effective when placed at the top of the cut slope. Engineering and safety issues have the potential to alter these typical barrier locations.

- ***Section 7.2.2 – SUGGESTED***
  - This first phase of the process is to determine if highway traffic noise abatement consideration is warranted for the affected communities and/or the affected receptors. In order to make a determination that a noise

impact exists, one of the following conditions must be met:

(1) Predicted highway traffic noise levels (for the design year) approach or exceed the highway traffic noise abatement criteria in **Table #**. "Approach" has been defined by VDOT as 1 dB(A) below the noise abatement criteria.

NOTE - The other condition is found in Section 7.2.5 of the checklist.

- ***Section 7.2.5 - SUGGESTED***
  - (2) A substantial noise increase has been defined by VDOT as a 10 dB(A) increase above existing noise levels for all noise-sensitive exterior activity categories. A 10 dB(A) increase in noise reflects the generally accepted range of a perceived doubling of the loudness. Receptors that satisfy this condition warrant consideration of highway traffic noise abatement.

- ***Section 7.2.6 – REQUIRED***
  - To determine feasibility of a highway traffic noise barrier, the following two conditions shall be considered:

    (1) At least a 5 dB(A) highway traffic noise reduction at impacted receptors. Per 23 CFR 772 FHWA requires the highway agency to determine the number of impacted receptors required to achieve at least 5 dB(A) of reduction. VDOT requires that fifty percent (50%) or more of the impacted receptors experience 5 dB(A) or more of insertion loss to be feasible; and;

    (2) The determination that it is possible to design and construct the noise abatement measure. The factors related to the design and construction include: safety, barrier height, topography, drainage, utilities, and maintenance of the abatement measure, maintenance access to adjacent properties, and general access to adjacent properties (i.e. arterial widening projects).

- ***Section 7.2.7 – REQUIRED***
  - Noise barrier reasonableness is determined by assessing multiple issues including:

    - The viewpoints of the benefited receptors
    - Cost effectiveness value, based on a square foot cost ceiling (maximum square footage of abatement per benefited receptor)
    - Noise reduction design goal of 7 dBA of insertion loss for at least one impacted receptor

Typically, the limiting factor related to barrier reasonableness is the cost effectiveness value, where the total surface area of the barrier is divided by the number of benefited receptors receiving at least a 5 dBA reduction in noise level. VDOT's approved cost is based on a maximum square footage of abatement per benefited receptor, a value of 1,600 square feet per benefited receptor.

For non-residential properties such as parks and public use facilities, a special calculation is preformed in order to quantify the type and duration of activity and compare to the cost effectiveness criterion. The determination is based on cost, severity of impact (both in terms of noise levels and the size of the impacted area and the activity it contains), and amount of noise reduction.

- **Construction Noise**
  - ***Section 8.1 – REQUIRED***
    - VDOT is also concerned with noise generated during the construction phase of the proposed project. While the degree of construction noise impact will vary, as it is directly related to the types and number of equipment used and the proximity to the noise-sensitive land uses within the project area. Land uses that are sensitive to traffic noise, are also potentially considered to be sensitive to construction noise. Any construction noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and will cease upon completion of the project construction phase. A method of controlling construction noise is to establish the maximum level of noise that construction operations can generate. In view of this, VDOT has developed and FHWA has approved a specification that establishes construction noise limits. This specification can be found in VDOT's 2007 Road and Bridge Specifications, Section 107.16(b.3), "Noise". The contractor will be required to conform to this specification to reduce the impact of construction noise on the surrounding community.

  - ***Section 8.1 – OPTIONAL***
    - 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.

- VDOT 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.

- VDOT 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.

- **Noise Compatible Planning**
  - ***Section 9.1.1 – REQUIRED***
    - ***Noise-Compatible Land-Use Planning***

      Sections 12.1 and 12.2 of VDOT's 2011 Highway Traffic Noise Impact Analysis Guidance Manual outline VDOT's approach to communication with local officials, and provide 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.

      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

Noise Impact Zones in Undeveloped Land along the Study Corridor
Also required under the revised 2011 FHWA and VDOT noise policies is information on the noise impact zones adjacent to project roadways in undeveloped lands. To determine these zones, noise levels are computed at various distances from the edge of the project roadways in each of the undeveloped areas of the project study area. Then, the distances from the edge of the roadway to the Noise Abatement Criteria sound levels are determined through interpolation. Distances vary in the project corridor due to changes in traffic volumes, or terrain features. Any noise sensitive sites within these zones should be considered noise impacted if no barrier is present to reduce sound levels. The graphics in Appendix # show the predicted 66 dB contours for the project.

VDOT's Noise Abatement Program
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, noise walls, and a downloadable noise wall brochure.

- **Voting Procedures**
  - ***Section 9.2.1 – SUGGESTED (Preliminary Traffic Noise Study Only)***
    - For noise barriers determined to be feasible and reasonable, the affected public that will be benefited by the proposed mitigation will be given an opportunity to decide whether they are in favor of construction of the

noise barrier. A final determination as to the construction of barriers will be made after the public hearing process. Before final decisions and approvals can be made to construct a noise barrier, a final design noise analysis will be performed. For barriers that are determined to be feasible and reasonable, input from the owners and residents of those receptor units that will be benefited by the proposed mitigation may vote by completing and returning the citizen survey that they receive in the mail. The initial citizen survey is sent out as certified mail so the disposition of the letters can be tracked. Of the votes tallied, 50% or more must be in favor of a proposed noise barrier in order for that barrier to be considered further. Upon completion of the citizen survey, the VDOT Noise Abatement staff will make recommendations to the Chief Engineer for approval. Approved barriers will be incorporated into the road project plans. A technical memorandum of the results of the public survey will be prepared and submitted to the FHWA.

- ***Section 9.2.1 – SUGGESTED (Final Design Noise Analysis and Noise Barrier Survey Addendum Report)***
  - For noise barriers determined to be feasible and reasonable, the affected public that will be benefited by the proposed mitigation will be given an opportunity to decide whether they are in favor of construction of the noise barrier. A final determination as to the construction of barriers will be made after the public hearing process. As part of the final design noise analysis, for barriers that are determined to be feasible and reasonable, input from the owners and residents of those receptor units that will be benefited by the proposed mitigation may vote by completing and returning the citizen survey that they receive in the mail. The initial citizen survey is sent out as certified mail so the disposition of the letters can be tracked. Of the votes tallied, 50% or more must be in favor of a proposed noise barrier in order for that barrier to be considered further. Upon completion of the citizen survey, the VDOT Noise Abatement staff will make recommendations to the Chief Engineer for approval. Approved barriers will be incorporated into the road project plans. A technical memorandum (noise barrier survey addendum report) will be prepared after the voting process has finished, which documents the voting results and summary of public comments of the noise barrier public survey process. This report is then submitted to the FHWA.

- ***Section 9.2.1 – EXAMPLE (Noise Barrier Survey Addendum Report Only)***

  This section documents the administration and results of the public preference surveys conducted for the recommended noise barrier(s). **Figure #** shows the summary of the barrier voting, by parcel.

- ***Public Preference Surveys (REQUIRED)***

  Property owners and residents, including tenants, of all properties that would be benefited by the recommended noise barrier were sent survey letters by certified mail, initially. Twenty-one (21) calendar days from the anticipated delivery date is required to provide the recipients ample time to review and respond to the survey. The letters and surveys, from (Consultant), 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 form 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 form for expressing their views. Only the owners and residents of those receptor units that will be benefited by the proposed mitigation may vote on whether the proposed noise barrier should be constructed. The owner/resident of each benefited receptor unit shall be entitled to one weighted vote, regardless of the number of owners of that receptor unit unless they are the owners of a rental facility or the developer of lands.

  Survey recipients were told that to register a vote for the barrier, a "YES" survey form would have to be returned. In addition, a non-response does not assume that the survey recipient is in favor of the barrier's construction. The letters and surveys were sent out during the week of DATE. For this project, ### certified letters were mailed. The disposition of all certified letters was tracked.

  Votes will be tallied on a noise barrier by noise barrier basis, so it is recommended that the project team tally the votes and summarize the results on a project map showing votes by location. Final interpretation of the voting results will be made by VDOT and its consultants, considering all feedback gained during the public involvement process.

  The weighting system is provided in tabular format below (***Table X***).

Table X Public Opinion Survey Weighting System[5]				
Impact and benefit category	**Activity Category[4]**	**Owner and Resident**	**Non-Resident Owner**	**Renter**
Impacted & Benefited	A	See note below		
Not Impacted & Benefited				
Impacted & Benefited	B[1]	5	3	2
Not Impacted & Benefited	B[1]	3	2	1
Impacted & Benefited	C[2]		5	
Not Impacted & Benefited	C[2]		3	
Impacted & Benefited	D		2	
Not Impacted & Benefited	D		1	
Impacted & Benefited	E		2	
Not Impacted & Benefited	E		1	

[1] For activity Category B Receptors only one vote per single family unit will be counted. However the owner of a multiple-family dwelling unit will be granted one vote per benefited unit. Additionally the developer of permitted lands will be granted one vote per benefited lot of the permitted phase where construction has not occurred.

[2] For activity Category C Receptors only 1 vote per facility will be granted.

[3] For activity Category G Receptors the votes will depend on the future land use. The example provided above assumes a residential development.

[4] For permitted land uses defer to the appropriate land use category.

[5] Consult the VDOT external website to obtain the decision making spreadsheet.

- ***If Second Mailing is Required (OPTIONAL)***

To ensure the public has ample opportunity to voice their opinion a second mailing is required when the outstanding votes can change the results of the initial survey. Fourteen (14) days from the anticipated delivery date is required for the second mailing to provide the recipients ample time to review and respond to the survey.

- ***Survey Responses (REQUIRED)***

VDOT's Barrier Voting Summary Worksheet

NOTE - VDOT requires the use of the Barrier Voting Summary Worksheet to determine if the proposed barrier satisfies the final reasonableness criterion. The worksheet and user guide can be found on VDOT's external website. All excel worksheets must be submitted to VDOT for review for report approval.

The "1st Mailing Summary (Read-Only)" and, if applicable, "2nd Mailing Summary (Read-Only)" worksheet tabs must be printed and included in the report for each proposed barrier that the voting process occurs.

In addition to the worksheet printouts, a discussion of the results must be included in the report. The barrier summary addendum report should also include, but not be limited to:

- *A breakdown of the return to sender letters: (Example shown below)*

Quantity	Comment
18	Letters returned to sender (RTS)
17	Unclaimed
1	Unknown

- *Additional Public Comments Regarding Barrier: (Example shown below)*

Quantity	Comment
6	Concerned about current noise levels and fully supports barrier
3	Fully supports barrier
2	Concern about barriers causing property tax increases
1	Will the barrier cost the homeowner any money?
1	Concerned that the widening will cause additional traffic backups at nearby interchange
1	Wants barrier constructed before widening project
1	Hopes barrier will be built soon
1	Would like to see trees and retained on residential side
1	Wants the residential side of barrier to look "nice"
1	Requests additional trees (in addition to the barrier) along the proposed route
1	Wants disclosure of noise levels for their property
1	Wants sound level measurements after construction
1	Concerned about barrier materials and maintenance
1	Questions about the varying barrier panel heights
1	Concern about view from second floor
1	Barrier aesthetics questions (want to vote on)
1	Would be an enhancement to the community and improve quality of life
1*	Money would be better spent on fixing roads and traffic problems
1*	Bought home because of the view of the mountains
1*	Claims that highway noise does not bother them, not necessary to build
1*	Wanted the barrier only if barrier panels weren't almost 30' high. Referred to it as "tall and ugly"
1*	Claims that highway noise does not bother them, doesn't want to lose view of trees and occasional wildlife on opposite side of road
* Vote against the proposed noise barrier	

Graphics for the barrier addendum report should follow the guidance and example shown in **Section 3.6** and **Appendix B-8** of the Noise Report Development and Guidance Document.

Appendix A - Noise Report Guidance and Accountability Checklist

VIRGINIA DEPARTMENT OF TRANSPORTATION
NOISE REPORT GUIDANCE AND ACCOUNTABILITY CHECKLIST

VERSION 1.0

This checklist is not an inclusive document that accounts for all projects. However this guidance checklist outlines the most common items that will be reviewed during VDOT's review process. This checklist follows guidance set forth in VDOT's Highway Traffic Noise Manual.

Checked Items are Required		Preliminary	Final Design				
				UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

1.0	**TITLE PAGE**			
1.1		✓	✓	- Report is Appropriately Named, with Correct Project Limits, Project Number(s), UPC(s) (Universal Project Code), and Submission Date
1.2		✓	✓	- Person Performing the Noise Analysis is Prequalified in the State of Virginia
2.0	**TABLE OF CONTENTS (TOC)**			
2.1		✓	✓	- Items listed in TOC are Accurately Numbered, Including the Report Sections, Tables, Figures, Graphics, and Appendices
3.0	**EXECUTIVE SUMMARY**			
3.1		✓	✓	- Brief Project Description provided with Project Location Information
3.2		✓	✓	- Summary of the Number (and sound level ranges) of Impacts for Existing, No-Build (if applicable), and the Future Design Year
3.3		✓	✓	- Noise Abatement Summary and Barrier Analyses Summary - (If Future Design Year Impacts are Predicted)
3.4		✓		- "Conversely . . . " Statement Added
3.5		✓	✓	- Construction Noise Summary
3.6		✓		- Discussion of Futher Noise Abatement Considerations during Final Design - eg. Rail noise, Aviation noise, Reflected Noise from Existing or Proposed Barriers / Retaining Walls, Commitments for further evaluation based on new design information, Alternatives to proposed noise barrier placement. . .
4.0	**INTRODUCTION**			
4.1		✓	✓	- Discussion of the Project Description of the Proposed Project. Should include the Project Limits, Number of Proposed Lanes and/or Proposed Modification, Lane Widths etc . . .
4.2		✓	✓	- Discussion of the History of the Project, Background, Future Design Year, Specific Pertanent Project Details, Including the Preferred Alternative and other Road Improvements.

Checked Items are Required		Preliminary	Final Design				
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				Completed By:		**N/A**	This item is "Not/Applicable" to this project
				Date:		**D**	This Item is Project Dependent

4.3		✓	✓	- Project Location Figure (See VDOT's Noise Report Development and Guidance Document)
4.4		**D**	**D**	- Additional NEPA documentation (If Necessary - Documents to support an older ROD or Date of Public Knowledge)
5.0	**METHODOLOGY**			
5.1		✓	✓	- FHWA and State Policy Discussion and Compliance Regulations
5.2		✓	✓	- Sound Level Metrics Defined
5.3		✓	✓	- NAC Defined
5.4		✓	✓	- Definiton of Noise Impact
5.5		✓	✓	- Analysis Proceedure Defined
5.6		✓	✓	- TNM Model Version Defined and Program Overview Description given
	Source of Model Inputs Documented			
5.7		✓	✓	- Discussion of the Source of Design Files / Typical Sections/ Profiles / Cross Sections, or Study Corridor Limits if Engineering is not Available
5.8		✓	✓	- Discussion of Traffic Volumes / Speeds / Truck %'s
5.9		✓	✓	- Document the Source of Survey Information
5.10		**D**	**D**	- Additional Data (Existng or Proposed Retaining Walls, Existing Noise Barriers or Berms, GIS Layers and/or Supplemental Elevation Data)
6.0	**EXISTING NOISE ENVIRONMENT**			
6.1	**NOISE MONITORING**			
6.1.1		✓	✓	- Noise Monitoring Methodology is Clearly Defined
6.1.2		✓	✓	- The Date(s) of Monitoring are Documented
6.1.3		✓	✓	- Type of Meter is Noted and Pertainent Calibration Information is Included
6.1.4		✓	✓	- Number of Sites (Short-term or Long-term) are Identified and Located on Figure

Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

6.1.5		✓	✓	- Documentation of Noise Monitoring Data Sheets and other monitoring factors such sampling interval, weather . . .
6.1.6		✓	✓	- Table and Discussion of Ambient Noise Monitoring Results and Required Sample Text Regarding Monitoring
6.1.7		✓	✓	- Table and Discussion of Noise Validation Results
6.2	**UNDEVELOPED LANDS AND PERMITTED DEVELOPMENTS**			
6.2.1		✓	✓	- "Undeveloped Lands and Permitted Developments" Sample Text Added
6.2.2		✓	✓	- Documentation of the Coordination Dates and Contact Information for the Undeveloped Lands and Permitted Developments Search
6.3	**COMMON NOISE ENVIRONMENT (CNE) DETERMINATION**			
6.3.1		✓	✓	- Are all Noise Sensitive Receptors within at least 500 feet of the Proposed Edge of Pavement Considered for Evaluation?
6.3.2		✓	✓	- Discussion of Existing Land Uses for each CNE
6.3.3		✓	✓	- Are all non noise sensitive land uses addressed in the report (reasons why they are not noise sensitive)?
6.3.4		✓	✓	- CNE's Boundaries Located on Figure
6.4	**WORST NOISE HOUR**			
6.4.1		✓	✓	- The Worst Noise Hour selected needs to be the same for ALL roadways. Review to ensure this is accurate.
6.4.2		✓	✓	- Discussion of the Selection of the Worst Noise Hour
6.4.3		✓	✓	- Was 24-Hour (Long Term Monitoring) Utilized to Determine the Worst Noise Hour
6.4.4		D	D	- State if Multiple Sets of TNM runs were Created / Modeled to Determine the Worst Noise Hour (or were there dual worst noise hours)
6.4.5		D	D	- Were other Factors Considered for the Selection of the Worst Noise Hour
6.5	**RECEPTOR IDENTIFICATION AND NAC CATEGORIZATION**			
	If NAC A's are present, is the Criteria met and the Items Listed Below are Discussed:			
6.5.1		D	D	- Are these Lands on which Serenity and Quiet are of Extraordinary Significance
6.5.2		D	D	- Do these Lands Serve an Important Public Need

Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

6.5.3		D	D	- Is the Preservation of these Qualities Essential for the Area to Continue to Serve its Intended Purpose
6.5.4		D	D	- Is the FHWA Supporting Documentation Included
	If NAC B's are present, is the Criteria met and the Items Listed Below are Discussed:			
6.5.5		D	D	- Are the Number of Receptors Equal to or Representative to a Number of Dwelling Units
6.5.6		D	D	- Are there Multi-floor Residential Units and do they have Outdoor Use Areas
6.5.7		D	D	- Are Outdoor Use Areas (Balconies) Identified and Discussed
	If NAC C's are present, is the Criteria met and the Items Listed Below are Discussed:			
6.5.8		D	D	- Are the Outdoor Use Areas Documented for Each of the Identified Receptors
6.5.9		D	D	- Was the "Grid system" Used and Shown on Figures for Recreational Areas, Trails, Campgrounds, Cemeteries, etc. . .
	If NAC D's are present, is the Criteria met and the Item Listed Below is Discussed:			
6.5.10		D	D	- Discuss the Building Materials and Interior Reduction Factor for each Identified Receptor
	If NAC E's are present, is the Criteria met and the Item Listed Below is Discussed:			
6.5.11		D	D	- Are Outdoor Use Areas Identified and Discussed
6.5.12		D	D	- If "No", Text Should be Provided that the Land Use was Identified but not Evaluated due to the Lack of Outdoor Use
	Historic Properties			
6.5.13		D	D	- Discuss if any Section 106 (Historic) Properties were Identified
6.5.14		D	D	- Discuss if any Section 4(f) Properties were Identified
6.5.15		D	D	- If Section 4(f) Properties are Identified, Does it Constitute a "Constructive Use" Determination

6.6 MODELED EXISTING ENVIRONMENT

6.6.1		✓	D	- Are Existing and Future Design Years Stated

Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

6.6.2		D	D	- Are Existing Noise Barriers Present within the Proposed Project Area
6.6.3		D	D	- If Existing Noise Barriers are Present, Does the Project Involve In-Kind Barrier Replacement
6.6.4		✓	✓	- Discussion of the Overall Numbers of Existing Condition Impacts and Sound Level Ranges (all CNEs)
6.6.5		✓	✓	- Discussion of the Determination and Identification of Noise Impacts (by CNE under Existing Condition)
6.6.6		✓	D	- Existing Noise Environment discussion

7.0 FUTURE NOISE ENVIRONMENT

7.1 MODELED FUTURE ENVIRONMENT

7.1.1		✓	✓	- Is there Documentation why a No-Build Condition evaluation was/wasn't warranted?
7.1.2		D	D	- Discussion of the Overall Numbers of No-Build Condition Impacts and Sound Level Ranges (all CNEs)
7.1.3		D	D	- Discussion of the Determination and Identification of Noise Impacts (by CNE under No-Build Condition)
7.1.4		✓	✓	- Discussion of the Overall Numbers of Build Condition Impacts and Sound Level Ranges (all CNEs)
7.1.5		✓	✓	- Discussion of the Determination and Identification of Noise Impacts (by CNE under Build Condition)
7.1.6		✓	D	- Comparison of existing and future total noise levels for all identified receptors
7.1.7		✓	✓	- Future Noise Environment Discussion
7.1.8		✓	✓	- Table of Predicted Noise Levels (By CNE)

7.2 NOISE ABATEMENT DETERMINATION

7.2.1		✓	✓	- Alternative Abatement Measures Discussion

WARRANTED CRITERIA

7.2.2		✓	✓	- NAC Impact Definition ("Approach or Exceed") Provided
7.2.3		✓	✓	- Substantial Increase Impact Definiton Provided

Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

7.2.4		✓	✓	- Has the NAC for Each Evaluated Land Use Category been Defined
	FEASIBILITY CRITERIA			
7.2.5		✓	✓	- Is Feasibility Defined
	REASONABLENESS CRITERIA			
7.2.6		✓	✓	- Is Reasonableness Defined
	NOISE REDUCTION GOALS			
7.2.7		✓	✓	- Are Noise Reduction Goals Defined
	NOISE BARRIER EVALUATION			
7.2.8		✓	✓	- Barrier Documentation should Include: Discussion of Total Number of Impacts, Benefitted Impacts, Additional Benefits, Total Benefits, Feasibility, Reasonablity, Barrier Length, Range of Panel Heights, Barrier Location, Ground or Structure Mounted, Barrier Systems, etc. . .
7.2.9		✓	✓	- Reason for Barrier Placement, Barrier Termini, Barrier Location etc. . .
7.2.10		✓	✓	- All Evaluated Barrriers shown on Figures
7.2.11			✓	- Barriers were Optimized to Maximize Benefits while Minimizing Cost (Diminishing Returns)
7.2.12		✓	✓	- Table was included that shows the Barrier name, Insertion Loss, Panel Height Range, Total Length, Total Surface Area, Total Benefits, Total sq.ft. / no. of benefits, Cost (for Planning Purposes Only)
7.2.13		✓	✓	- Table that shows the Sound Levels, Barrier Insertion Loss for each Receptor included in the Barrier Analysis
7.2.14		D	✓	- Table that shows the Approximate Stationing, Northing, Easting, Bottom and Top of barrier, Panel Heights by Segment
7.2.15		D	D	- Does the Barrier (System) Work Independently or is it Dependent on Another Barrier (Existing or Proposed)
8.0	**CONSTRUCTION NOISE**			
8.1		✓	✓	- Construction Noise Discussion

Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

9.0 PUBLIC INVOLVEMENT PROCESS

9.1 NOISE COMPATIBLE CONTOURS

9.1.1		✓	✓	- 66 dBA Contour Discussion and Shown on Figure(s)
9.1.2		D	D	- Discussion of Public Involvement Efforts (including Community Information Meetings, Individual Meetings, and Special Coordination)

9.2 VOTING PROCEEDURES

9.2.1		✓	✓	- Voting Process Defined?
9.2.2			✓	- How many / when were Certified Letters Sent?
9.2.3			✓	- What were the Voting Results Related to Desire for a Barrier?
9.2.4			✓	- Summary of Barrier Survey Results and Comments?
9.2.5			✓	- How many Surveys were Unresponsive or Undeliverable?
9.2.6			✓	- Voting Graphic showing the Results of the Barrier Survey?
9.2.7			✓	- Were there any Special Abatement Commitments / Acoustic Profiles/ Aesthetics Considerations
9.2.8			✓	- Is this an Addendum Report with Revised Impact / Barrier Results

10.0 OTHER CONSIDERATIONS

10.1		D	D	- Absorptive or Reflective Noise Barriers Proposed?
10.2		D	D	- Was Reflection Noise Considered?
10.3		D	D	- Was Structure Noise Considered?
10.4		D	D	- Was Rail or Aviation Noise Considered?

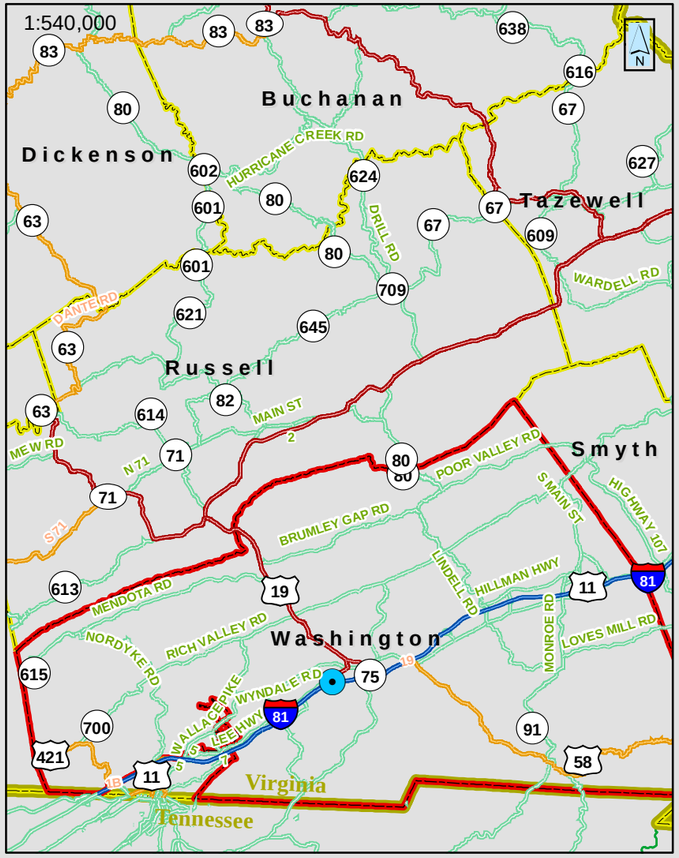
11.0 APPENDICES

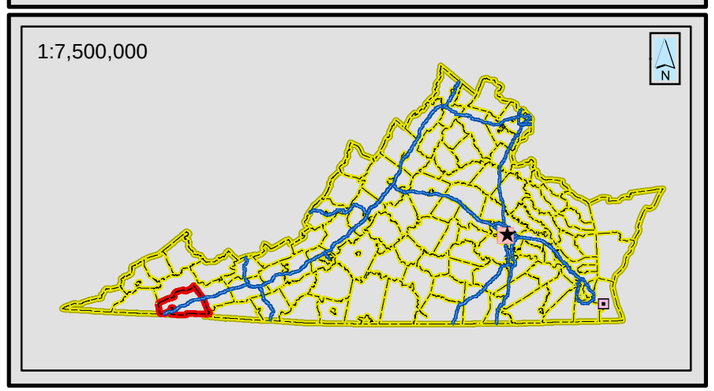
11.1		✓	✓	- List of References
11.2		✓	✓	- List of Preparers / Reviewers

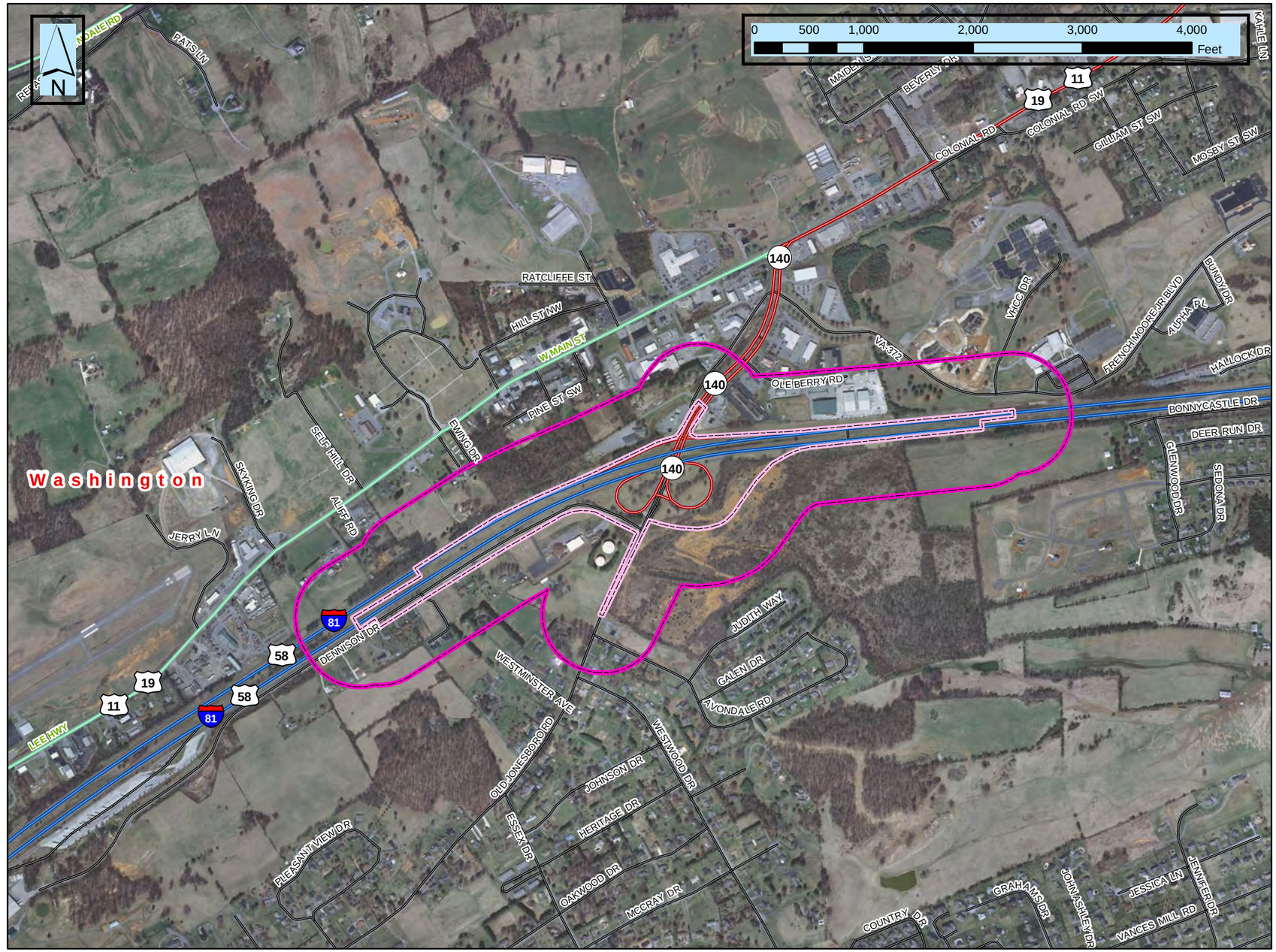
Checked Items are Required		Preliminary	Final Design	UPC:		✘	This Item has been verified by the document writer
				Completed By:		N/A	This item is "Not/Applicable" to this project
				Date:		D	This Item is Project Dependent

11.3		✓	✓	- Traffic Data
11.4		✓	✓	- Noise Monitoring Field Logs
11.5		✓	✓	- Warranted, Feasible, Reasonable, Worksheets
11.6		✓	✓	- Alternative Mitigation Measures Response Form from Project Manager
11.7		✓	✓	- Other Site Sketches of Monitored Locations, Noise Meter Printouts, Noise Meter Calibration Reports, Pertinent Correspondance
11.8		✓	✓	- TNM Certification Certificates
11.9		✓	✓	- Noise Report Guidance and Accountability Form
12.0	**TNM RUNS**			
12.1		✓	✓	- Actual TNM Runs (Electronic Files) must be Submitted for Review with Report, TNM Output Tables are Not Required for Inclusion into the Report, However a Copy of the Printed Modeling Information shall be Supplied Upon Request
13.0	**GENERAL**			
13.1		✓	✓	- Figures were Developed in Accordance with VDOT's Noise Report Development and Guidance Document

Appendix B - Noise Report Graphics Examples







Interstate 81 - Interchange Modification at Exit 14
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: #####

Virginia Department of Transportation

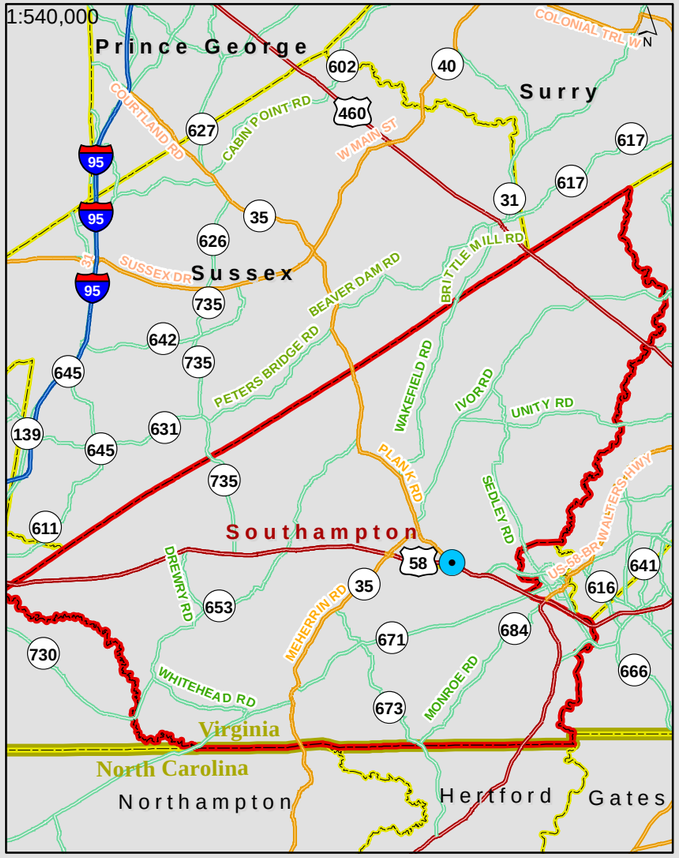
Project Location	Interstate
Project Area	Primary Highways
Noise Study Area	Secondary Highways
	US / State Routes
	Local Roads

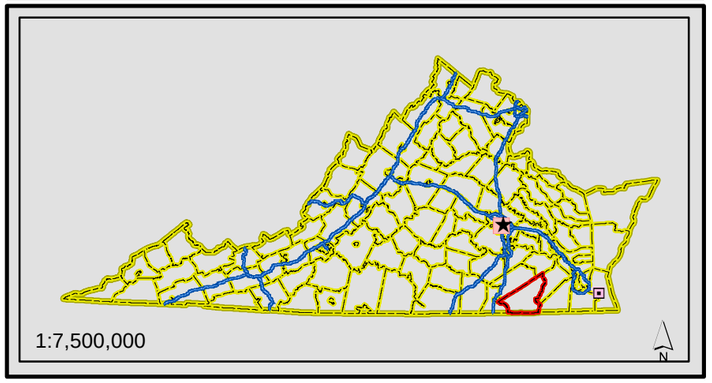
Interstate 81 - Interchange Modification at Exit 14

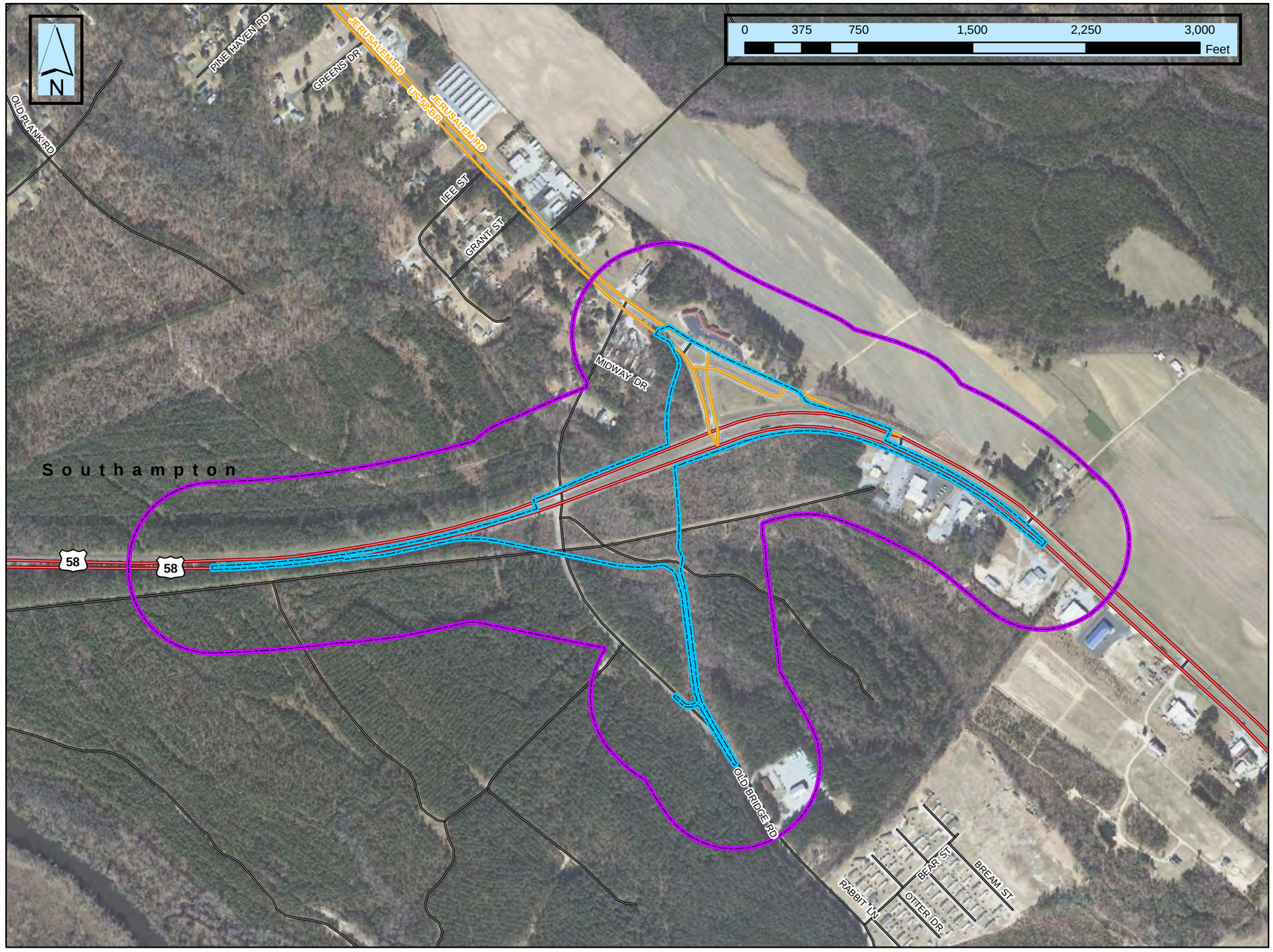
Town of Abingdon and Washington County

Figure / Appendix #
Project Location Map

B1







State Route 58 - Intersection Reconstruction
State Project: ####-###-###, P###, R###
UPC: #####

Virginia Department of Transportation

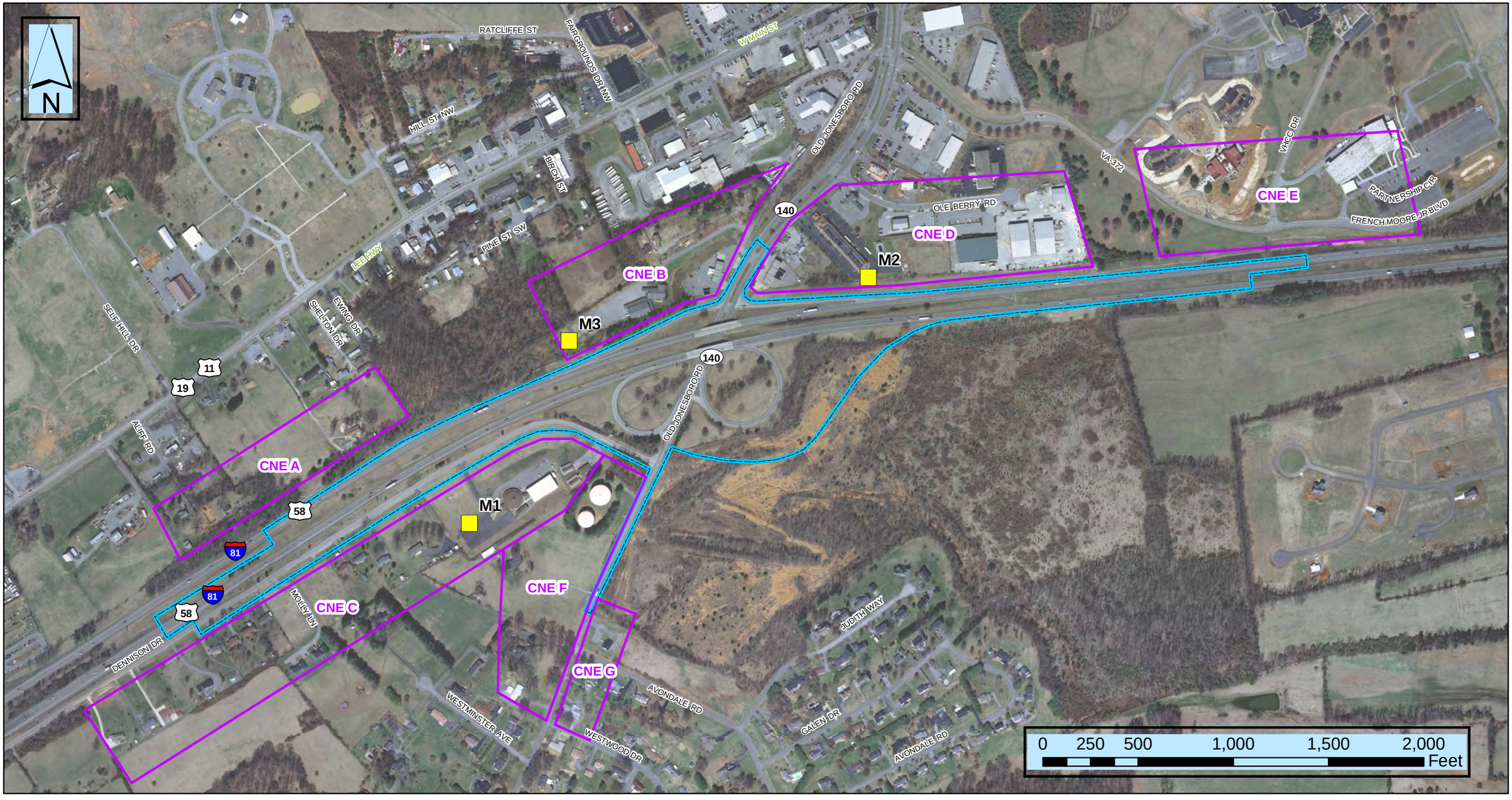
Project Location	US Interstate
Project Area	Primary Highway
Noise Study Area	Secondary Highway
	State Route
	Local Roads

US Route 58 - Courtland Interchange
Intersection Reconstruction Project

Southampton County

Figure / Appendix #
Project Location Map

B2



Interstate 81 - Interchange Modification at Exit 14
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

Virginia Department of Transportation

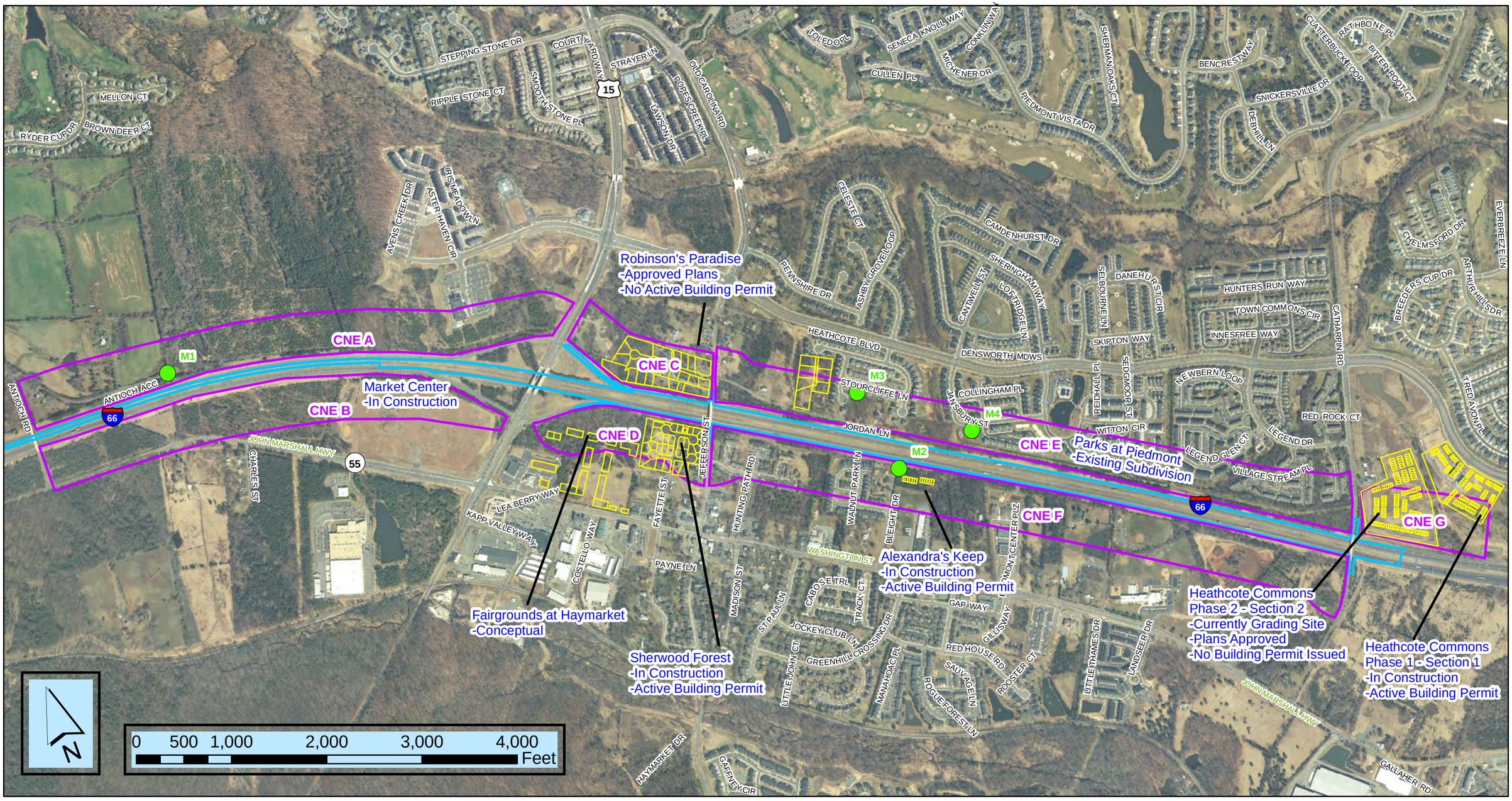
Ambient Monitoring Location
CNE - Common Noise Environment
Project Area

Interstate 81 - Interchange Modification at Exit 14

Town of Abingdon and Washington County

Figure / Appendix #
CNE's and Monitoring Locations

B3



I-66 Widening Project
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

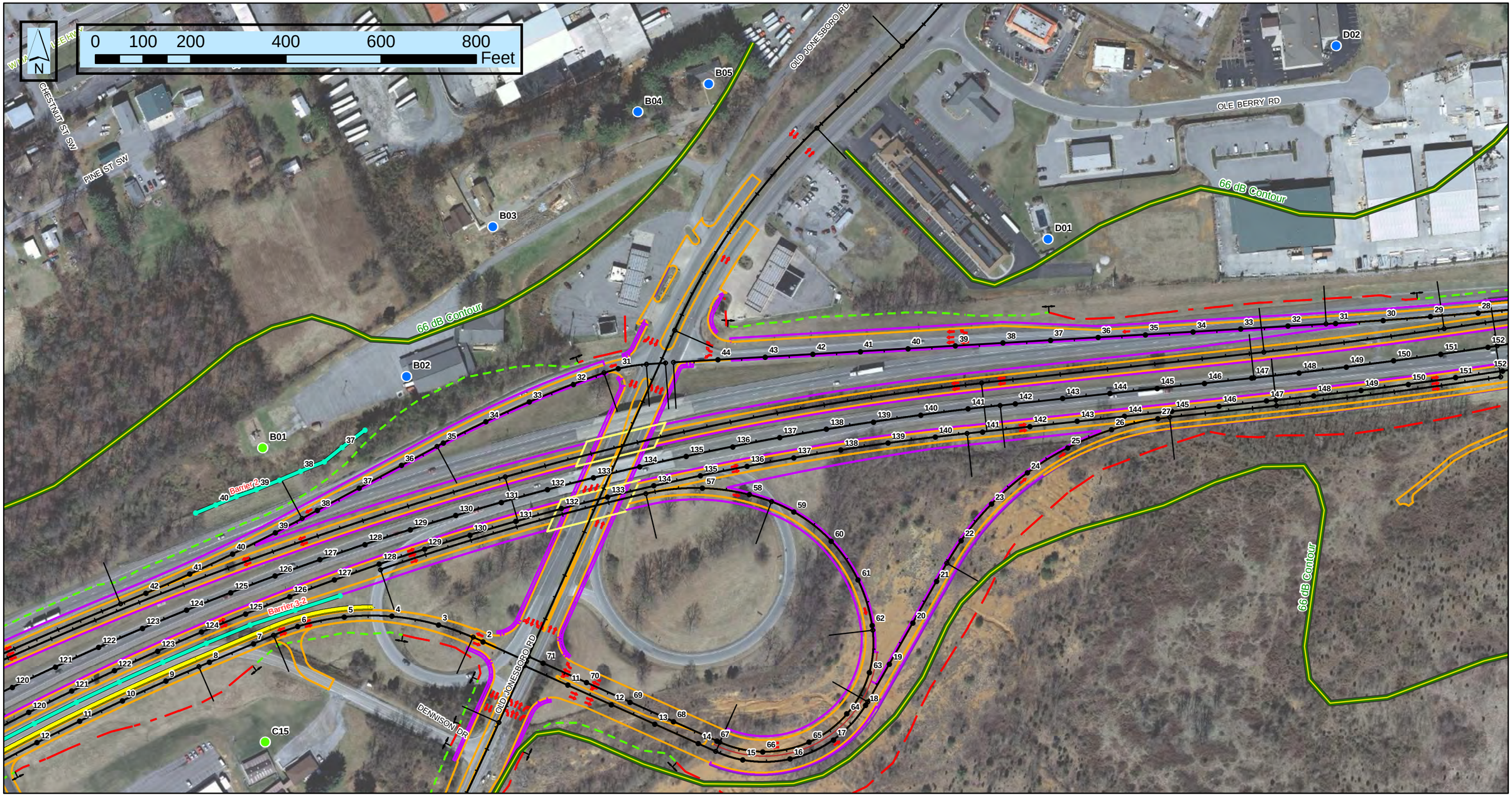
Virginia Department of Transportation

- Ambient Monitoring Locations
- CNE - Common Noise Environment
- Planned Developments / Subdivisions
- Project Area

I-66 Widening Project
From SR 15 to SR 29

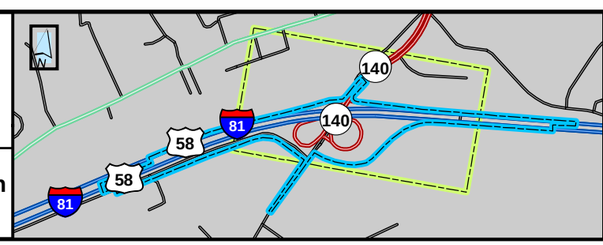
Prince William County and
the Town of Haymarket

Figure / Appendix #
CNE's, Monitoring Locations, and Planned Developments **B4**



Interstate 81 - Interchange Modification at Exit 14
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

Virginia Department of Transportation



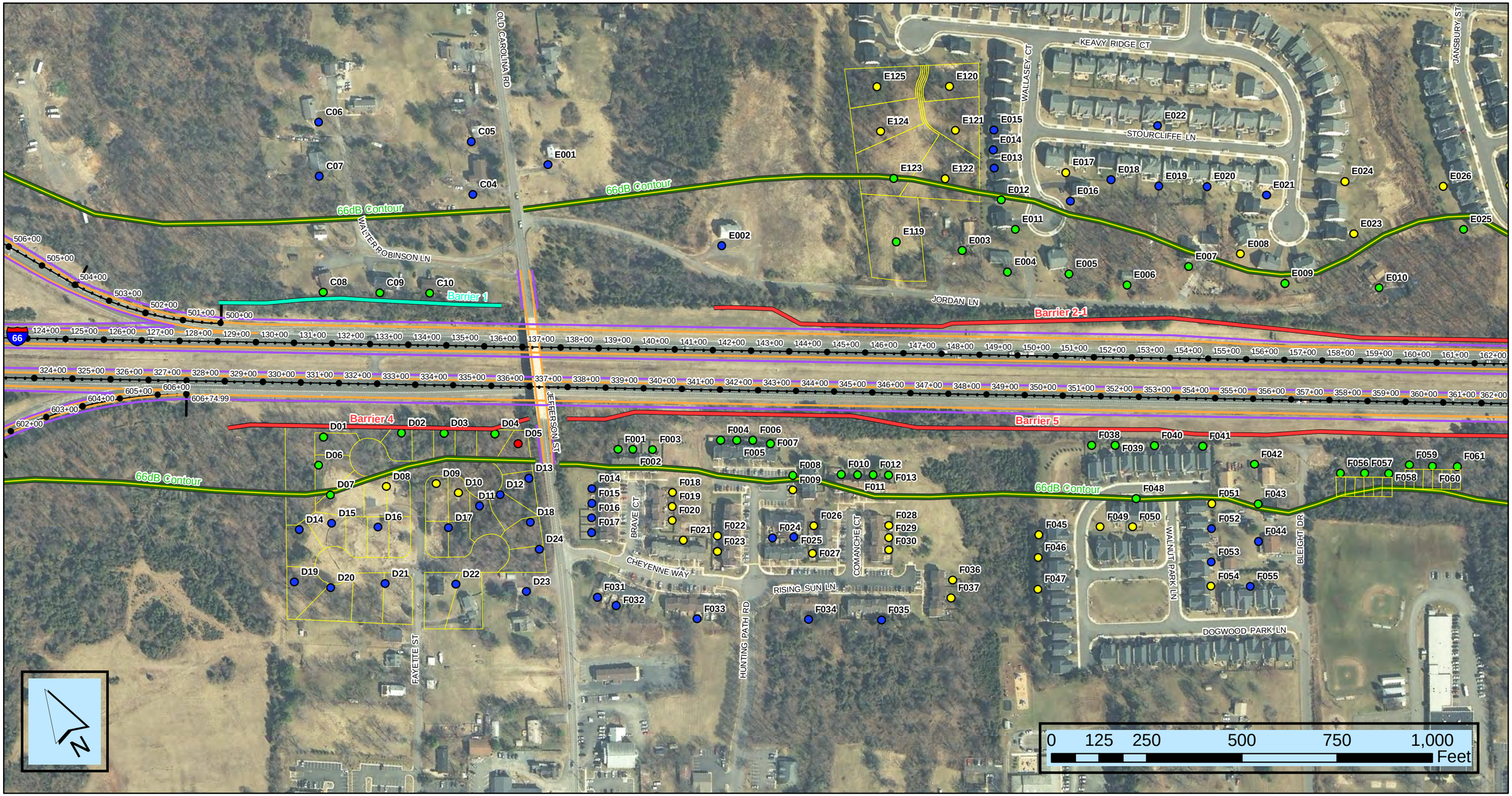
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted
- Evaluated Barrier - Feasible and Not Reasonble
- Potential Barrier - Feasible and Reasonable
- 66 dB Contour (Future Design Build - 2037)
- Proposed Retaining Wall
- Proposed Bridge Deck
- Construction Limits - Cut Section
- Construction Limits - Fill Section
- Proposed Edge of Travel Lanes
- Proposed Edge of Shoulder

Interstate 81 - Interchange Modification at Exit 14

Town of Abingdon and Washington County

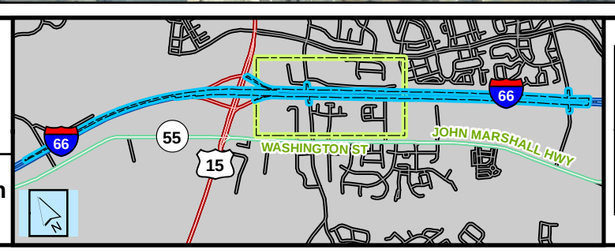
Figure / Appendix #

B5



I-66 Widening Project
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

VDOT **Virginia Department of Transportation**

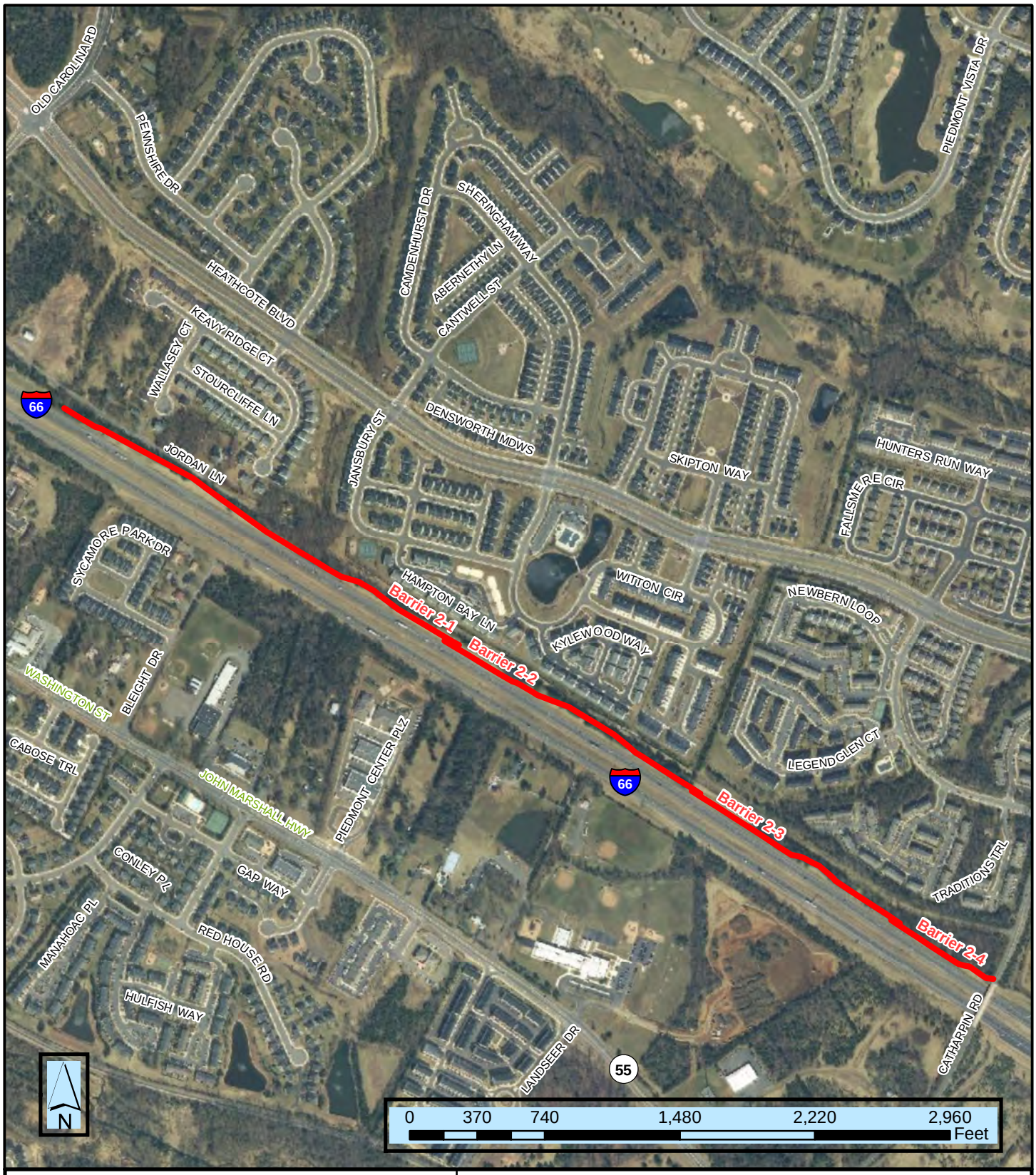


- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted
- 66 dB Contour
- Edge of Pavement
- Edge of Shoulder
- Evaluated Barrier - Feasible and Not Reasonable
- Potential Barrier - Feasible and Reasonable
- Planned Developments

I-66 Widening Project
From SR 15 to SR 29

Prince William County and
the Town of Haymarket

Figure / Appendix ###
Page #



Potential Barrier (Considered for Construction)

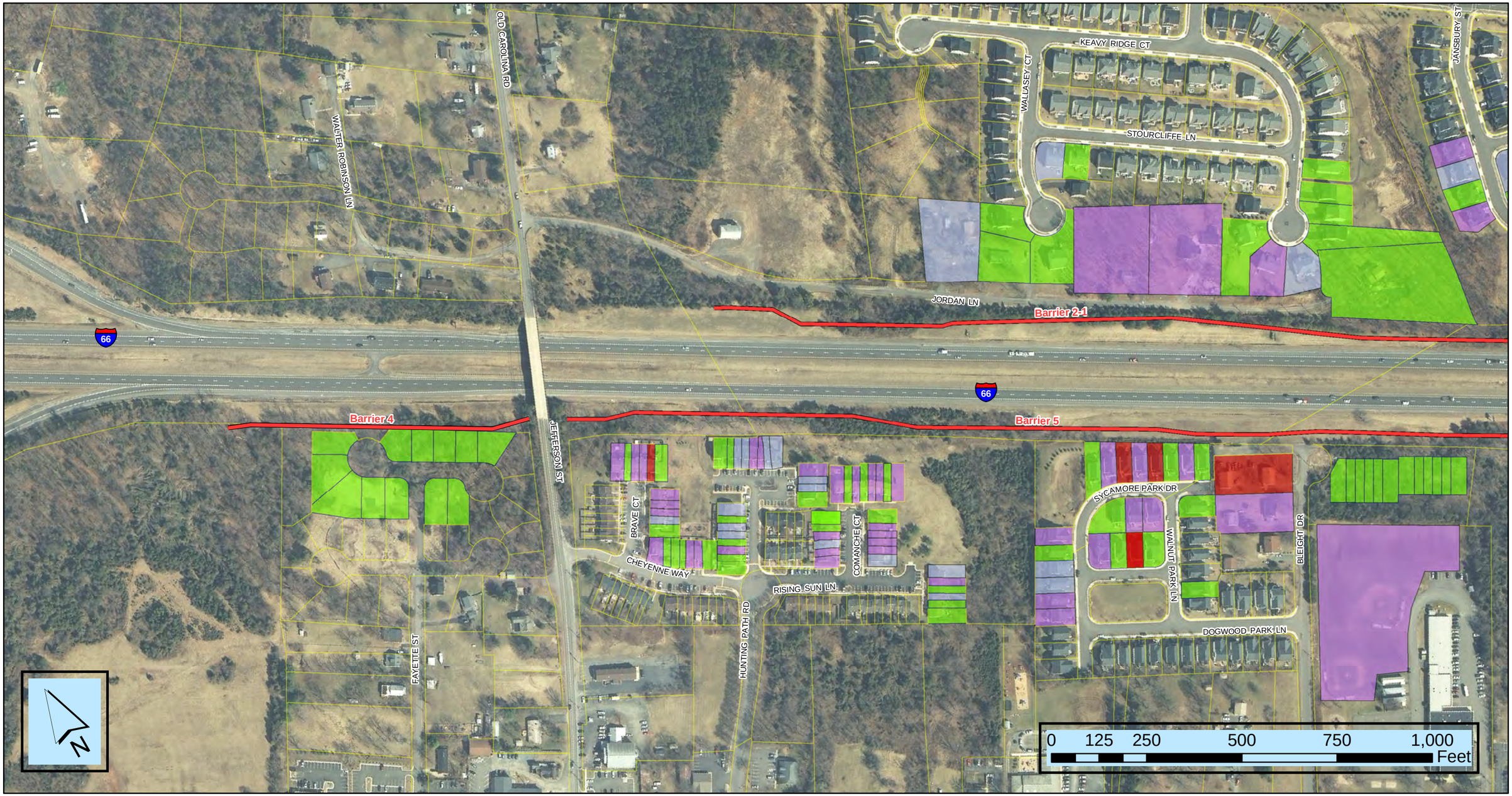
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

Virginia Department of Transportation

I-66 Widening Project
Proposed Noise Barrier Location Map

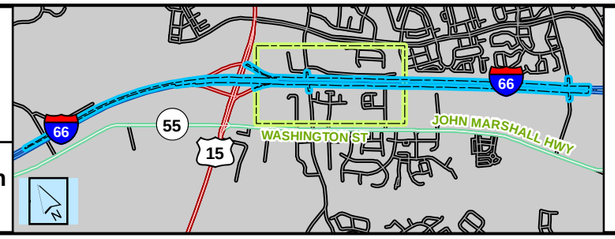
Barrier Survey Map
Barrier System 2
Towns of Haymarket and Gainesville, Virginia

Date: Month DD, YYYY



I-66 Widening Project
State Project: ####-###-###, B###, B###, C###, P###, R###
UPC: ######

VDOT **Virginia Department of Transportation**



- Proposed Noise Barrier - Considered for Construction
- VOTED YES
- VOTED NO
- RECEIVED (GREEN CARD) - SURVEY NOT RET.
- UNCLAIMED / RETURNED / UNKNOWN
- Parcel Boundary

I-66 Widening Project
From SR 15 to SR 29

Barrier Survey Results

Figure / Appendix ###
Page #