VIRGINIA DEPARTMENT OF TRANSPORTATION

FAIRFAX COUNTY PARKWAY INTERCHANGE IMPROVEMENTS

STATE PROJECT: 0095-029-890, P101; UPC 96259

FINAL REPORT
NOISE ANALYSIS

Interchanges of Fairfax County Parkway (Route 286) with Interstate 95 & Rolling Road (Route 638)/Franconia-Springfield Parkway (Route 289)
Fairfax County, Virginia

Prepared for:

Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, VA 23219

APRIL 2012

Virginia Department of Transportation

Fairfax County Parkway Interchange Improvements Project

NOISE ANALYSIS TECHNICAL REPORT

State Project 0095-029-890, PE-101;
UPC 96259

Prepared for:

Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, VA 23219

April 2012

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

I. Executive Summary

The Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) have identified two interchange improvements to promote safe and efficient traffic flow along the Fairfax County Parkway in Fairfax County, Virginia. Fairfax County Parkway is currently undergoing a route designation change. It is currently Route 7100, but will be changed to Route 286. Similarly, Franconia-Springfield Parkway is currently Route 7900, but will be changed to Route 289. This report will be using the updated route numbers for these roads. The project includes two existing interchanges that are located at the southern and northern ends of a segment of the Fairfax County Parkway (Route 286) recently constructed through the Fort Belvoir North Area in Fairfax County. The first of these is at Exit 166 in Newington on Interstate 95 and the proposed improvements would entail constructing a flyover ramp to carry traffic from northbound I-95 to westbound Fairfax County Parkway. The second interchange is at Rolling Road (Route 638) and the proposed improvements would include widening the existing single-lane loop ramp from northbound Rolling Road to westbound Fairfax County Parkway to two lanes and widening and extending the merge area to westbound Fairfax County Parkway. The locations of these improvements can be referenced in ***Figures 1, 2A, 2B,*** and ***3***.

This report documents the Existing and Design Year noise levels associated with both of the proposed interchange improvements. Noise monitoring was performed at nine locations, while noise modeling-*only* was conducted at sixteen additional sites to gain a thorough understanding of the existing noise environment. A project field view was performed to examine the project area, as well as to document major sources of acoustic shielding (e.g., terrain lines, building rows, etc.). Noise modeling was completed for Existing (2011), Design Year No-Build (2040), and Design Year Build (2040) conditions.

Existing (2011) worst-case noise levels do not approach or exceed VDOT/FHWA Noise Abatement Criteria (NAC) at any of the receptors in the project area. Design Year No-Build (2040) noise levels do not approach or exceed the NAC at any of the receptor sites in the project area. Forecasted traffic volumes under Design Year No-Build and Build (2040) conditions are nearly identical, resulting in similar noise levels.

Design year noise levels were predicted at each monitored and modeled receptor site at the sensitive receptors in the project area. As identified in **Table 2** ***Column 9***, Design Year Build (2040) noise levels are not projected to approach or exceed the NAC at any receptor sites. Because design year noise levels are not projected to exceed the NAC for any receptor sites, no noise mitigation is being considered at this time. During the Final Design Phase, all areas of the project will be reconsidered in light of more detailed designs, refined project alignments, and re-analysis of the roadway/noise receptor relationships.

II. Introduction

Impacts associated with noise are often a prime concern when evaluating roadway improvement projects. Roadway construction at a new location or improvements to the existing transportation network may cause impacts to the noise-sensitive environment located adjacent to the project area. For this reason, FHWA and VDOT have established a noise analysis methodology and associated noise level criteria to assess the potential noise impacts associated with the construction and use of transportation projects.

FHWA and VDOT have identified two interchange improvements, located approximately two miles apart, to promote safe and efficient traffic flow along the Fairfax County Parkway in Fairfax County, Virginia. Both project locations can be seen in **Figure 1-*Regional Location Map*.** The project study area consists primarily of single and multi-family residences. Two design options have been designated for the Fairfax County Parkway (Route 286) / Interstate 95 (I-95) (Exit 166) Interchange, both of which include a single-lane "flyover" ramp from northbound I-95 to westbound Fairfax County Parkway:

Option 1 would involve leaving the existing loop ramp open so that I-95 northbound traffic could continue to reach northbound Backlick Road and also access the future Boudinot Drive interchange. **Figure 2A** shows the proposed alignment and lane designations of this option.

Option 2 would involve eliminating the existing loop ramp and constructing left-turn lanes at the terminus of the existing ramp from I-95 northbound to eastbound Fairfax County Parkway and Loisdale Road. Left turns are not currently permitted at this intersection. **Figure 2B** shows the proposed alignment and lane designations of this option.

At the Rolling Road (Route 638) / Franconia-Springfield Parkway (Route 289) interchange, a new travel lane will be added to an existing single-lane loop ramp that allows traffic on the Fairfax County Parkway to continue on the westbound Fairfax County Parkway at the junction with Rolling Road and the Franconia-Springfield Parkway. Minor improvements will also be made on the Fairfax County Parkway westbound lanes in this area to provide the necessary transitions to the existing roadway network.

This report details the steps involved in the preliminary noise analysis for the Fairfax County Parkway Interchange Improvements Project, including noise monitoring/modeling methodologies, results, impact evaluation, and potential abatement consideration.

This report provides the results for the reevaluation of the project, which involves updated Design Year (2040) traffic and additional Common Noise Environments (CNE) along Tanworth Court, Jillspring Court, and Stream Way.

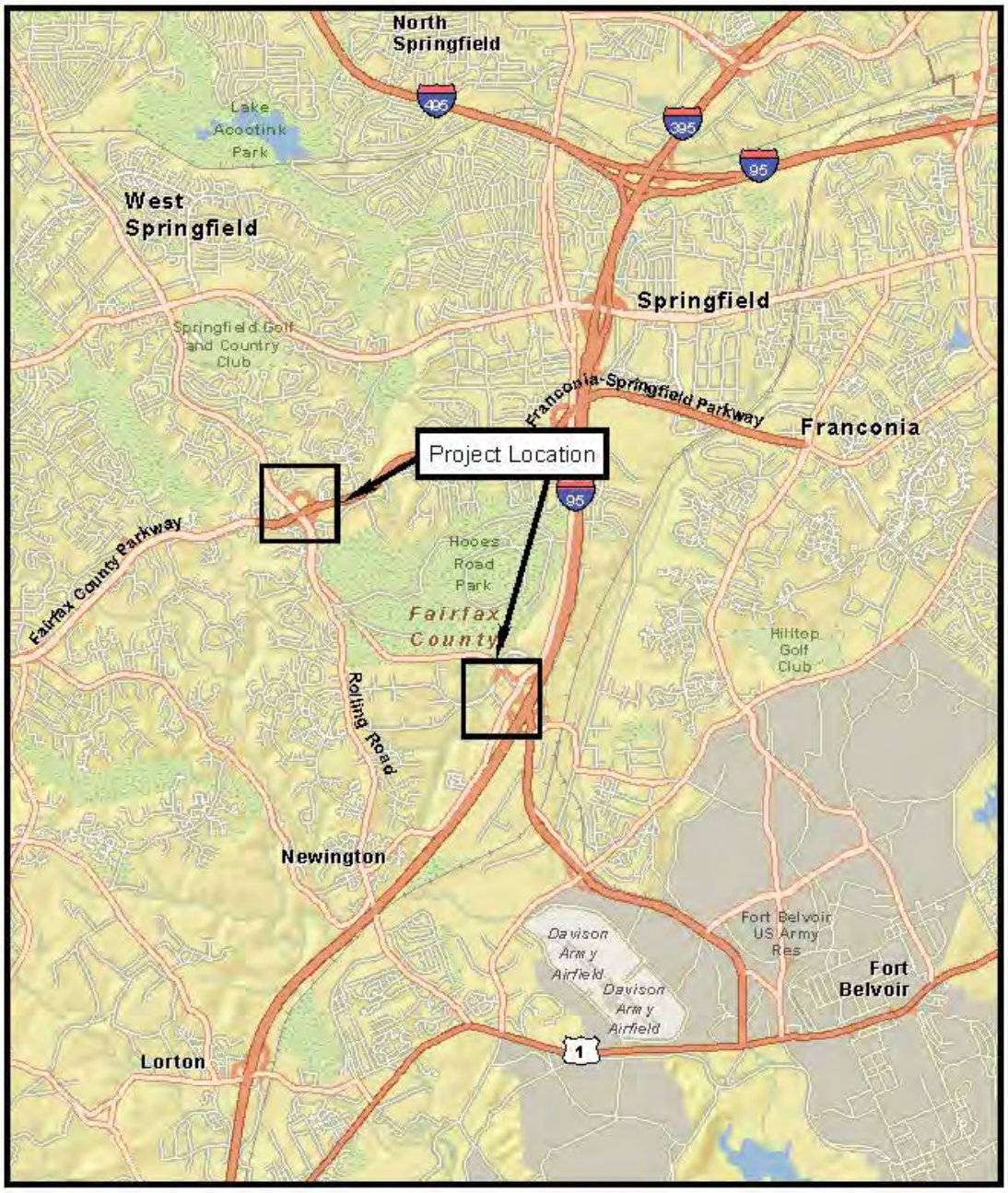
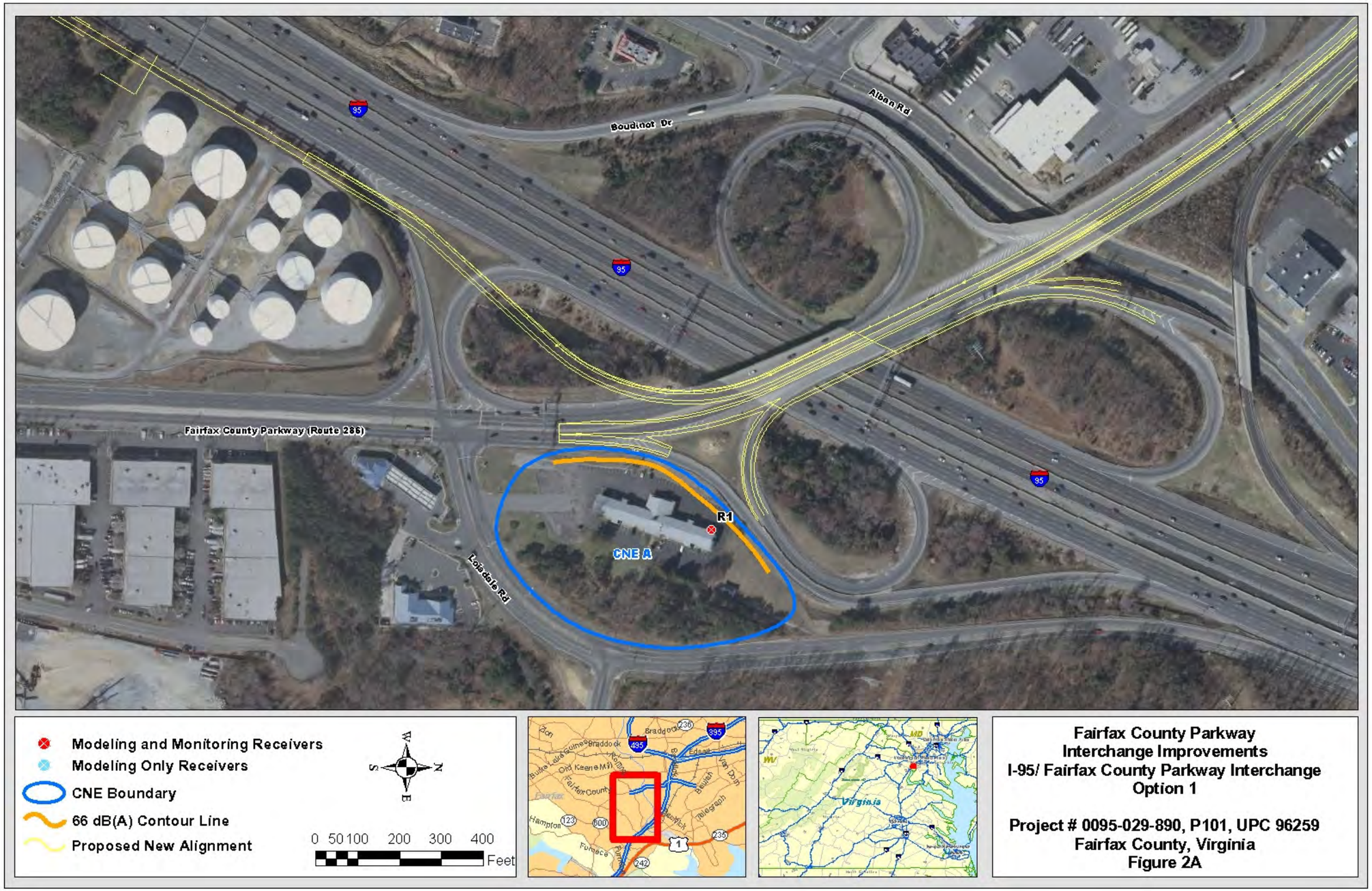
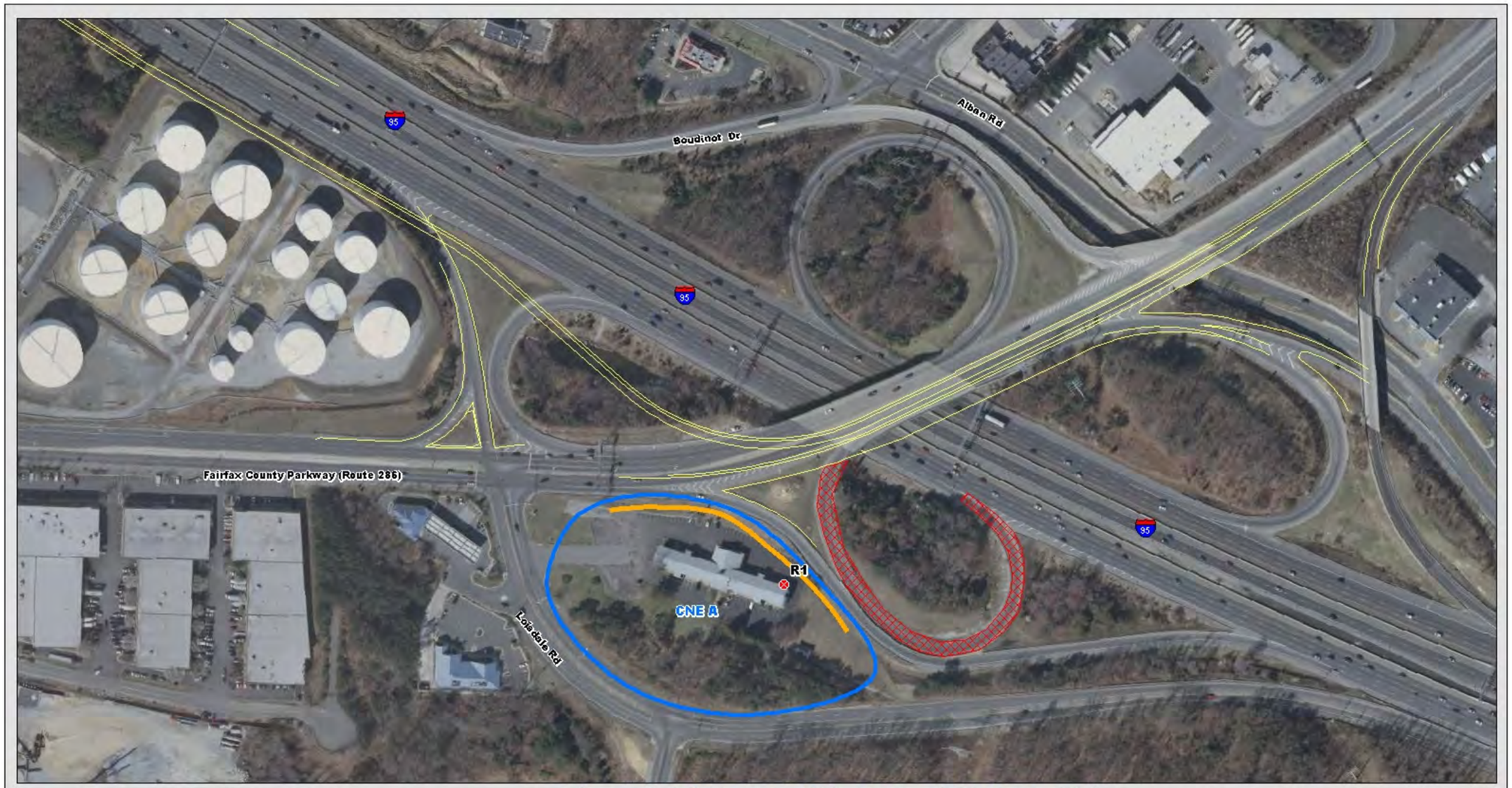
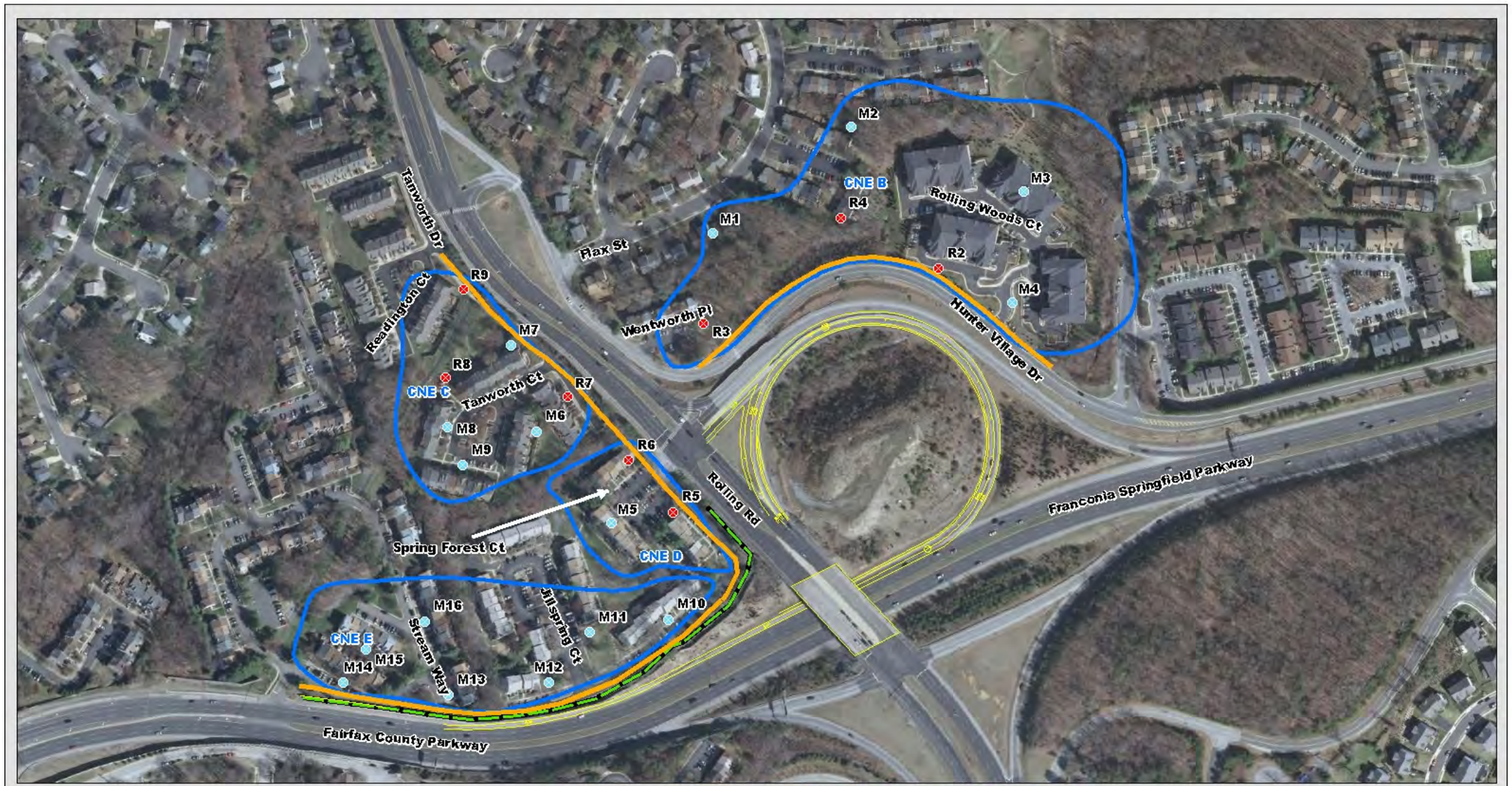


Figure 1
Regional Location Map
Fairfax County Parkway Interchange Improvements Project

Fairfax County, Virginia
Preliminary Noise Report


Boudinot Dr
Alban Rd
95
Fairfax County Parkway (Route 286)
R1
CNE A
Lobdell Rd
Modeling and Monitoring Receivers
Modeling Only Receivers
CNE Boundary
66 dB(A) Contour Line
Proposed New Alignment
0 50 100 200 300 400
Feet
Fairfax County Parkway
Interchange Improvements
I-95/ Fairfax County Parkway Interchange
Option 1
Project # 0095-029-890, P101, UPC 96259
Fairfax County, Virginia
Figure 2A


95
Boudinot Dr
Alban Rd
Fairfax County Parkway (Route 286)
95
R1
CNE A
Location R1
Modeling and Monitoring Receivers
Modeling Only Receivers
CNE Boundary
66 dB(A) Contour Line
Proposed New Alignment
Option 2 - Loop Ramp Eliminated
W
S
N
E
0 50 100 200 300 400
Feet
Fairfax County Parkway
Interchange Improvements
I-95/ Fairfax County Parkway Interchange
Option 2
Project # 0095-029-890, P101, UPC 96259
Fairfax County, Virginia
Figure 2B


M2
CNE B
M3
R4
Rolling Woods Ct
M1
Flax St
R2
M4
Tanworth Dr
R9
Readlington Ct
Wentworth Pl
R3
Hunter Village Dr
M7
R8
CNE C
Tanworth Ct
R7
M6
M8
M9
R6
Rolling Rd
R5
M5
Franconia Springfield Parkway
Spring Forest Ct
CNE D
M16
Hillspring Ct
M11
M10
CNE E
Stream Way
M14
M15
M13
M12
Fairfax County Parkway
Modeling and Monitoring Receivers
Modeling Only Receivers
CNE Boundary
66 dB(A) Contour Line
Proposed New Alignment
Existing Barrier
N
W
E
S
0 50100 200 300 400 500
Feet
Fairfax County Parkway
Interchange Improvements
Rolling Road / Fairfax County
Parkway Interchange
Project # 0095-029-890, P101, UPC 96259
Fairfax County, Virginia
Figure 3

III. Noise Analysis Methodology, Terminology and Criteria

The methodologies applied to the noise analysis for both interchange improvements are in accordance with VDOT's "*State Noise Abatement Policy",* effective July 13, 2011 and updated September 2011. VDOT guidelines are based on Title 23 of the Code of Federal Regulations, Part 772 and the Federal Highway Administration's Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772).

To determine the degree of highway noise impact, Noise Abatement Criteria (NAC) has been established for a number of different land use categories. **Table 1** documents the NAC for the associated activity land use category shown in the adjacent column. Land use adjacent to the Fairfax County Parkway (Route 286)/ I-95 (Exit 166) portion of the project consists of a hotel/motel, the former Hunter Motel, which is to be replaced with an Embassy Suites. Adjacent to the Rolling Road portion of the project are residential land uses, both single and multi-family. Therefore, land uses within the project areas are considered Category B and Category E. Category B receptors are comprised of and limited to residential areas, while Category E land uses consist of hotels, motels, restaurants, bars, and other developed lands.

The NAC are given in terms of an hourly, A-weighted, equivalent sound level. The A-weighted sound level frequency is used for human use areas because it is comprised of the sound level frequencies that are most easily distinguished by the human ear, out of the entire sound level spectrum. Highway traffic noise is categorized as a linear noise source, where varying noise levels occur at a fixed point during a single vehicle pass by. It is acceptable to characterize these fluctuating noise levels with a single number known as the equivalent noise level (L_{eq}). The L_{eq} is the value of a steady sound level that would represent the same sound energy as the actual time-varying sound evaluated over the same time period. For highway noise assessments, L_{eq} is typically evaluated over a one-hour period.

TABLE 1

Fairfax County Parkway Interchange Improvements Project
FHWA/VDOT Noise Abatement Criteria
Hourly-A-Weighted Sound Level in Decibels (dB(A))[1]

Activity Category	Activity L_{eq} (h)*	Criteria[2] L10 (h)	Evaluation Location	Description of Activity Category
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, public meeting rooms, public or non-profit 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 non-profit 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 of 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 L_{eq} (h) or L10 (h) (but not both) may be used on a project.

2 The L_{eq} (h) and L10 (h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measure.

3 Includes undeveloped lands permitted for this Activity Criteria.

* VDOT utilizes the L_{eq}(h) designation.

Noise abatement determination is based on VDOT's three-phase approach. The first phase (***Phase 1***) distinguishes if a sensitive receptor within a project area warrants highway traffic noise abatement. The following describes the ***Phase 1*** warranted criterion, as discussed in VDOT policy. Receptors that satisfy either condition warrants consideration of highway traffic noise abatement.

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

~or~

- 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.

The identification of noise-sensitive land uses and the location of the existing interchanges guided the selection of noise monitoring locations along the project area. In order to determine the existing noise conditions within the project area, noise monitoring was conducted at nine representative noise-sensitive receptor sites. **Figure 2A, Figure 2B,** and **Figure 3** identify the project area and the locations of the nine noise monitoring sites (R1 – R9).

Monitoring was performed at each of the selected noise sensitive receptors using the Metrosonics dB-3080 dosimeters. Readings were taken on the A-weighted scale and reported in decibels (dB(A)). Prior to noise monitoring, noise meters were calibrated using a Metrosonics cl-304 acoustical calibrator. The noise monitoring equipment meets all requirements of the American National Standard Specifications for Type 2 Sound Level Meters, ANSI S1.4-1983 (R1991), as defined by FHWA. Noise monitoring was conducted in accordance with the methodologies contained in FHWA-PD-96-046, *Measurement of Highway-Related Noise* (FHWA, May 1996).

By placing the meters as close to the existing roadways as practical, the monitoring site locations provided an absolute worst-case existing noise level adjacent to the existing roadway corridor and allowed for minimal influence from background noise sources. The short-term noise monitoring focused on the morning rush hour, as the field testing concluded that traffic volumes during the AM peak period represented the worst-case condition.

The AM peak period monitoring was performed between 6:00 AM and 9:00 AM on September 17, 2008. Supplemental noise monitoring was performed on December 14, 2011 to account for the Tanworth Court residences. Monitoring was conducted at each site for a 10 or 15-minute duration within each of the monitoring periods. Noise levels were recorded at 10-second intervals for the duration of each test. Data collected by the sound analyzers included time, average noise level (L_{av}), maximum noise level (L_{max}), and instantaneous peak noise level (L_{pk}) for each recorded interval. Additional data collected at each monitoring location included atmospheric conditions, wind speed, background noise sources, and unusual/atypical noise events. Traffic data (vehicle volume and speed) were also recorded on all roadways that were

visible from the monitoring sites and significantly contributed to the overall noise levels. Traffic was grouped into one of three categories: cars, medium trucks, and heavy trucks, as per VDOT procedures. Combined, all of this data is used during the noise model validation process.

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.

IV. Validation and Existing Conditions

Computer modeling is the accepted technique for predicting Existing and Design Year noise levels associated with traffic-induced noise. Currently, the FHWA Traffic Noise Model (TNM) 2.5 computer-modeling program is the approved highway noise prediction model. The TNM has been established as a reliable tool for representing noise generated by highway traffic. The information applied to the modeling effort includes the following: highway design files (existing and proposed conceptual design), traffic data, roadway cross-sections, and surveying of terrain. Base mapping, aerial photography, and field views were used to identify noise-sensitive land uses within the corridor and any terrain features that may shield roadway noise. Most of the land uses within the project area are residential, and thus will be categorized as Category B. The hotel/motel will be categorized as Category E.

The modeling process begins with model validation, as per VDOT requirements. This is accomplished by comparing the monitored noise levels with noise levels generated by the computer model, using the traffic volume, speeds, and composition that were witnessed during the monitoring effort. This comparison ensures that reported changes in noise levels between Existing and Design Year conditions are due to changes in traffic conditions and not to discrepancies between monitoring and modeling techniques. A difference of three decibels (3 dB(A)) or less between the monitored and modeled level is considered acceptable since this is the limit of change detectable by the typical human ear. **Table 2** provides a summary of the model validation for the Existing (2008 and 2011) monitored conditions. ***Column 5*** represents the difference between the monitored level (***Column 3***) and the modeled level produced by the noise model (***Column 4***). Since all nine of the analyzed receptors show a 3-dB(A) difference or less between the monitored and modeled noise levels, the model is considered to be an accurate representation of actual existing conditions throughout the project area.

The validated noise model is the base noise model for the remainder of the preliminary noise analysis. Additional modeling sites were added to the validated model to thoroughly predict existing noise levels throughout the project area. This additional noise modeling was performed for existing conditions using traffic data supplied by traffic engineers (reference ***Appendix D***). This modeling step was performed to evaluate existing "worst-case" conditions associated with existing worst-case traffic volumes and composition. ***Column 6*** of **Table 2** provides a summary of worst-case existing noise levels, based on supplied worst-case existing traffic volumes. Based on these existing noise levels, the noise impact criterion (***Column 7***) was determined at each receptor site, based on either the "absolute" criteria shown in **Table 1** or VDOT's "substantial increase" above existing conditions criterion.

Traffic noise levels were predicted at all noise-sensitive land uses with the project area, using the latest version of the FHWA TNM 2.5. Field views and noise monitoring trips were conducted on September 17, 2008 and December 14, 2011 to determine the relationship of these sensitive land uses to the existing roadway network. Existing worst-case (2011) noise levels were determined by incorporating field reconnaissance of the existing transportation network into the noise model. Major and secondary roadways in close proximity to receptor sites that carry considerable traffic volumes were added to the noise model. For the purposes of this noise analysis, it was

determined through field verification that I-95, Fairfax County Parkway, and Rolling Road are the dominant noise sources for this project area.

Traffic data supplied by traffic engineers, including volumes, speeds, and composition, were added to the noise model to predict existing noise levels for the year 2011 throughout the project corridor. Posted roadway speeds were identified during the field view and were also incorporated into the noise model. No Build and Build Design Year volumes are very similar due to the fact that one model was used and the volumes were re-distributed as appropriate to account for the new flyover or additional ramp lane. It was not anticipated that the project would create an increase in traffic.

In addition to the nine receptor sites used for monitoring purposes, sixteen additional sites were modeled to adequately cover the project area and to predict the depth of noise impact, if any. Base mapping, aerial photography, and field views were used to identify noise-sensitive land uses within the corridor and any terrain features that may shield roadway noise. The modeling-o*nly* sites that were selected represent both first and second row Category B land uses in the northern portion of the project in the vicinity of the Franconia-Springfield and Fairfax County Parkways and Rolling Road. The modeling-*only* sites are represented by an "M" and can be referenced in **Figure 3**.

The following is a discussion of the existing noise environment for each Common Noise Environment (CNE) that was evaluated for the Fairfax County Parkway Interchange Improvements Project. CNEs are groupings of receptor sites that, by location, form distinct communities within the project area and have a common noise environment. These areas are used to evaluate traffic noise impacts and potential noise abatement options to residential developments or communities as a whole, and to assess the feasibility and reasonableness of possible noise abatement measures for specific communities. Where residential communities or groupings of noise-sensitive land uses exist, both noise monitoring and noise modeling-*only* sites were grouped into CNEs. All of the residences discussed below are two-story town homes that do not have any second floor balconies, therefore no receptor heights (above ground) higher than the TNM default of 4.92 feet was used in the modeling.

CNE A

Common Noise Environment A (CNE A) contains the former Hunter Motel (represented by receptor site R1) between Loisdale Road and I-95 in the southernmost portion of the project corridor. The location of this CNE and receptor site R1 can be seen in **Figure 2A** and **2B**. The Existing (2008) monitored noise level within CNE A is 61 dB(A), as shown in ***Column 3*** of **Table 2**. ***Column 6*** of **Table 2** shows that existing (2011) worst-case modeled noise levels within CNE A is 65 dB(A).

CNE B

Common Noise Environment B (CNE B) ranges from approximately Gerardia Court to Flax Street in the northernmost portion of the project corridor. CNE B contains three noise

monitoring sites (R2, R3, and R4) and four modeling-*only* sites representing 61 residences. Monitored receptor sites R2 and R3 represent front-row residences. The locations of these sites can be seen in **Figure 3**. Existing (2008) monitored noise levels within CNE B were found to range from 50 to 57 dB(A), as shown in ***Column 3*** of **Table 2**. ***Column 6*** of **Table 2** shows that existing (2011) worst-case modeled noise levels within CNE B range from 49 to 60 dB(A).

CNE C

As a part of the reevaluation, Common Noise Environment C (CNE C) was added. CNE C is located to the west of Rolling Road, along Tanworth Court and Readington Court. CNE C contains three monitoring sites, R7, R8, and R9 and four modeling-*only* sites representing 44 residences. Sites R7 and R9 represent front row residences, while site R8 represents second-row residences. The locations of these receptor sites can be seen in **Figure 3**. Existing (2011) monitored noise levels within CNE C range from 53 to 63 dB(A), as shown in ***Column 3*** of **Table 2**. ***Column 6*** of **Table 2** shows that existing (2011) worst-case modeled noise levels within CNE C range from 54 to 65 dB(A).

CNE D

Common Noise Environment D (CNE D) is situated adjacent to the westbound lanes of the Fairfax County Parkway and the southbound lanes of Rolling Road, in the northernmost portion of the project corridor. CNE D contains two noise monitoring sites (R5 and R6) representing nine residences and one modeling-*only* site representing eight residences. The locations of these sites can be seen in **Figure 3**. Existing (2008) monitored noise levels within CNE D were found to range from 56 to 59 dB(A), as shown in ***Column 3*** of **Table 2**. ***Column 6*** of **Table 2** shows that existing (2011) worst-case modeled noise levels within CNE D range from 54 to 61 dB(A).

CNE E

As part of the reevaluation, Common Noise Environment E (CNE E) was added. CNE E is located north of the westbound lanes of Fairfax County Parkway, just west of the Rolling Road overpass. CNE E contains 7 modeling-*only* sites representing 51 residences. The locations of these sites can be seen in **Figure 3**. ***Column 6*** of **Table 2** shows that existing (2011) worst-case modeled noise levels with CNE E range from 55 to 64 dB(A).

Residences within CNE E and a portion of CNE D are currently protected by an existing noise barrier that runs adjacent to a portion of Rolling Road and transitions to the Fairfax County Parkway westbound edge of shoulder to its termination point near the entrance to Stream Way. The barrier's length is approximately 1,500 feet and it has a maximum height of 10 feet. The location of this barrier can be seen in **Figure 3**.

Table 2

Fairfax County Parkway Interchange Improvements Project

Sound Level Summary in dB(A)

	1	2	3	4	5	6	7	8	9
	Receptor Site	**Number of Residences**	**Monitored Noise Level**	**Modeled Noise Level**	**Difference (Mon. - Mod.)**	**Existing Worst-Case Noise Level**	**Onset of Criteria**	**Design Year (2040) No-Build Noise Level**	**Design Year (2040) Build Noise Level**
CNE A	R1	Hotel	61	63	-2.1	65	71	65	65* 65**
CNE B	R2	12	55	53	2.7	60	65 (1)	61	62
	R3	12	57	55	1.4	57	66	59	59
	R4	6	50	47	2.6	52	60 (1)	55	55
	M1	3	--	--	--	52	66	54	54
	M2	4	--	--	--	49	66	51	51
	M3	12	--	--	--	53	66	54	54
	M4	12	--	--	--	60	66	62	62
CNE C	R7	7	59	60	-1.4	62	66	62	63
	R8	4	53	53	-0.1	56	63 (1)	56	56
	R9	8	63	63	-0.8	65	66	65	65
	M6	7	--	--	--	57	66	57	57
	M7	4	--	--	--	64	66	64	65
	M8	6	--	--	--	54	66	54	55
	M9	8	--	--	--	54	66	54	54
CNE D	R5	6	56	58.7	-2.8	60	66	62	62
	R6	3	59	60.3	-1.6	61	66	63	63
	M5	8	--	--	--	54	66	56	56
CNE E	M10	7	--	--	--	57	66	58	58
	M11	6	--	--	--	55	66	56	56
	M12	6	--	--	--	58	66	59	58
	M13	5	--	--	--	58	66	59	59
	M14	10	--	--	--	64	66	65	65
	M15	8	--	--	--	61	66	62	62
	M16	9	--	--	--	56	66	57	57

(1) The criterion is based on the 'substantial increase' criterion, an overall increase of 10 dBA when comparing existing to future project-related noise levels.

* Option 1 - maintain existing loop ramp.

** Option 2 - eliminate existing loop ramp.

V. Evaluation of Design Year Noise Levels & Noise Impact Assessment

Following the development of the existing conditions model and the prediction of the Existing (worst-case) noise levels, the assessment continued with the projection of Design Year (2040) noise levels. This task was accomplished by accounting for the proposed improvements and applying Design Year (2040) traffic volumes and composition to the validated computer model. The proposed improvements should be considered conceptual and preliminary in nature. Design Year (2040) Build noise levels were predicted with the conceptual improvements in place and in use.

Upon coordinating with the locality, it was determined that no new construction is currently underway or permitted.

Design Year (2040) noise levels were modeled for the No-Build alternative for comparative purposes to Build conditions. The No-Build alternative was modeled with the assumption that the roadway improvements proposed as part of the VDOT project would not be in place in Design Year (2040) of the project, but the existing roadways would carry Design Year traffic volumes, speeds, and composition. The noise levels associated with the No-Build modeling analysis are summarized in ***Column 8*** of **Table 2**. No-Build noise levels are not projected to approach or exceed the FHWA/VDOT NAC in any of the CNEs.

The next step in the noise analysis was to project Design Year (2040) build noise levels and to determine if receptors will approach or exceed the NAC. If the criteria are approached or exceeded at any receptor, noise abatement would be considered and evaluated in an attempt to reduce Design Year (2040) noise levels. The noise levels associated with the Build modeling analysis are summarized in ***Column 9*** of **Table 2**. As shown, Design Year (2040) Build noise levels are not projected to approach or exceed the NAC in any of the CNEs.

The following is a discussion of the Design Year No-Build (2040) and Design Year Build (2040) noise levels for each Common Noise Environment.

CNE A

Common Noise Environment A (CNE A) contains the former Hunter Motel (represented by receptor site R1) between Loisdale Road and I-95 in the southernmost portion of the project corridor. The location of this CNE and receptor site R1 can be seen in **Figure 2A** and **2B**. The Design Year No-Build (2040) modeled noise level within CNE A is 65 dB(A), as shown in ***Column 8*** of **Table 2**. The Design Year (2040) Build modeled noise level within CNE A is 65 dB(A) for Option 1 and 65 dB(A) for Option 2, as shown in ***Column 9*** of **Table 2**.

CNE B

Common Noise Environment B (CNE B) ranges from approximately Gerardia Court to Flax Street in the northernmost portion of the project corridor. CNE B contains three noise monitoring sites (R2, R3, and R4) and four noise modeling-*only* sites (M1, M2, M3, and M4),

which combined represent 61 residences. Both monitored receptor sites R2 and R3 and modeling-*only* site M-4 represent front-row residences. The locations of these receptor sites can be seen in **Figure 3**. The Design Year No-Build (2040) modeled noise levels within CNE B range from 51 to 62 dB(A), as shown in ***Column 8*** of **Table 2**. The Design Year (2040) Build modeled noise levels within CNE B range from 51 to 62 dB(A), as shown in ***Column 9*** of **Table 2**.

CNE C

Common Noise Environment C (CNE C) is located to the west of Rolling Road, along Tanworth Court and Readington Court. CNE C contains three monitoring sites, R7, R8, and R9 and four modeling-*only* sites representing 44 residences. Sites R7 and R9 represent front-row residences, while site R8 represents second-row residences. The locations of these receptor sites can be seen in **Figure 3**. The Design Year No-Build (2040) modeled noise levels within CNE C range from 54 to 65 dB(A), as shown in ***Column 8*** of **Table 2**. The Design Year (2040) Build modeled noise levels within CNE C range from 54 to 65 dB(A), as shown in ***Column 9*** of **Table 2**.

CNE D

Common Noise Environment D (CNE D) is situated adjacent to the westbound lanes of the Fairfax County Parkway and the southbound lanes of Rolling Road, in the northernmost portion of the project corridor. CNE D contains two noise monitoring sites (R5 and R6) and one noise modeling-*only* site (M-5), which combined represent 17 residences. Both monitored receptor sites represent front-row residences. The locations of these receptor sites can be seen in **Figure 3**. The Design Year No-Build (2040) modeled noise levels within CNE D range from 56 to 63 dB(A), as shown in ***Column 8*** of **Table 2**. The Design Year (2040) Build modeled noise levels within CNE D range from 56 to 63 dB(A), as shown in ***Column 9*** of **Table 2**.

CNE E

Common Noise Environment E (CNE E) is located north of the westbound lanes of Fairfax County Parkway, just west of the Rolling Road overpass. CNE E contains seven modeling-*only* sites representing 51 residences. The locations of these sites can be seen in **Figure 3**. The Design Year No-Build (2040) modeled noise levels within CNE E range from 56 to 65 dB(A), as shown in ***Column 8*** of **Table 2**. The Design Year (2040) Build modeled noise levels within CNE E range from 56 to 65 dB(A), as shown in ***Column 9*** of **Table 2**.

There are no predicted noise impacts due to the Fairfax County Parkway Interchange Improvements Project. This finding can be explained by the existing terrain, which provides some natural shielding, and the existing barrier that protects residences within CNEs D and E. Since there were no predicted impacts, noise abatement was not warranted and therefore not examined.

VI. Construction Noise

VDOT is also concerned with noise generated during the construction phase of the proposed project. The degree of 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.

Based on a review of the project area, no considerable, long-term construction-related noise impacts are anticipated. Any 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.

The following guidelines will be utilized to help minimize potential construction-related noise impacts. A detailed discussion of VDOT's construction noise policy can be viewed in Section 107.16(b) 3 Noise, VDOT's Road and Bridge Specifications (VDOT, 2007).

- 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 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.

VII. Public Involvement/Local Officials Coordination

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. VDOT's current 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.

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 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.

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. These distances are given for this project in **Table 3**. Any noise sensitive sites within these zones should be considered noise impacted if no barrier is present to reduce sound levels.

VIII. Noise Contours

Noise level contours are lines of equal noise exposure that typically parallel roadway alignments. Highway traffic noise is considered a linear noise source and sound levels can drop considerably over distance. The degree that sound levels decrease can vary based on a number of different factors, including objects that shield the roadway noise, terrain features, and ground cover type (e.g., pavement, grass, or snow). The use of noise level contours have become increasingly popular over the last several years, as they have been implemented in planning programs for undeveloped areas with roadway noise influence. Through conscious planning efforts and noise contour generation, municipal officials can restrict future development inside the noise impact zone (i.e., the area within the 66-dB(A) noise contour). ***Figures 2A, 2B, and 3*** show the approximate 66-dB(A) noise level contours when considering the improvements made to the Fairfax County Parkway interchanges and the Design Year (2040) traffic volumes, speeds, and composition. **Table 3** shows the approximate distance of the 66 dB(A) contour line from the center line of the proposed conceptual design within each CNE throughout the project.

Table 3

CNE Specific Noise Contours

Distance from Edge-of-Shoulder (feet)

Design Year (2040) Noise Level Contours 66 dB(A)	
CNE	**Distance**
A	30
B	15
C	35
D	50
E	30

IX. Conclusion

In summary, the results of the noise analysis for the Fairfax County Interchange Improvements Project indicate that Design Year (2040) Build noise levels are not anticipated to approach or exceed the FHWA/VDOT Noise Abatement Criteria. This finding can be explained by the existing terrain, which provides some natural shielding, and the existing barrier protects residents in CNEs D and E. In addition, the reevaluation includes updated traffic volumes that show a decline in recent growth trends, thereby resulting in lower volumes than the original noise study. During the Final Design Phase, all areas of the project will be reconsidered in light of more detailed designs, refined project alignments, and re-analysis of the roadway/noise receptor relationships.