APPENDIX G PRELIMINARY NOISE REPORT

PRELIMINARY NOISE REPORT

University Boulevard Extension
Extension of University Boulevard (Route 840) from
Devlin Road to Wellington Road

State Project # 0840-076-R21
UPC: 118313
Federal Number: RSTP-5B01(576)
Prince William County

Prepared for:

Prince William County Department of Transportation
Virginia Department of Transportation
Environmental Division

Prepared in compliance with the 2022 VDOT Highway Traffic Noise Guidance Manual

Prepared by:

WSP USA

October 2025

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EXECUTIVE SUMMARY

The Prince William County (County) Department of Transportation, in coordination with the Virginia Department of Transportation (VDOT) and Federal Highway Administration (FHWA), proposes to extend University Boulevard to connect two existing sections in Prince William County. The project is listed as State Project #0840-076-R21. The Build Alternative proposes to extend the University Boulevard approximately 2.5 miles, encompassing approximately 1.75 miles of new alignment roadway and reconstruction of approximately 0.75 miles of existing roadway. Per FHWA Title 23 CFR 772.5(2) and the 2022 VDOT *Highway Traffic Noise Guidance Manual*, the proposed project is "Type I" due to the addition of travel lanes on new location. A detailed description of the proposed improvements can be found in Section 1.0 and a project location map can be found on Figure 1.

A FHWA Environmental Assessment (EA) is being prepared as part of this project. VDOT considers the "Date of Public Knowledge" as the date of final National Environmental Policy Act (NEPA) approval.

Existing land use in the vicinity of the University Boulevard Extension project is predominately commercial, residential, and undeveloped lands. Other land uses in the study area include schools and their associated sport fields.

Traffic noise levels for the Existing 2024, No-Build 2048, and Build 2048 alternatives have been predicted at all receptor locations identified within the study area limit. Under existing conditions, noise levels ranged from 53 to 67 dB(A). No-Build condition noise levels ranged from 53 to 71 dB(A). Build condition noise levels ranged from 53 to 71 dB(A). The Design Year 2048 Build Alternative is predicted to result in 14 residential traffic noise impacts and 9 sports field impacts that equate to 3.3 non-residential receptors (NRRs). Four noise barriers were evaluated for these impacts. Two barriers (NW3-1/NW3-2 and NW4) were found to be feasible and not reasonable. Two barriers (NW1 and NW2) were found to be feasible and reasonable. These barriers will need to be further evaluated during final design.

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

This PNR presents a preliminary analysis of all traffic noise impacts and consideration of noise abatement measures for feasibility and reasonableness. The PNR documents the methodologies, results, and recommendations of the study in compliance with the FHWA Title 23 Code of Federal Regulations (CFR) 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise, the 2022 VDOT *Highway Traffic Noise Guidance Manual*.

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1 Introduction

The Prince William County (County) Department of Transportation, in coordination with the Virginia Department of Transportation (VDOT) and Federal Highway Administration (FHWA), proposes to extend University Boulevard to connect two existing sections in Prince William County. The project is listed as State Project #0840-076-R21. The Build Alternative proposes to extend the University Boulevard approximately 2.5 miles, encompassing approximately 1.75 miles of new alignment roadway and reconstruction of approximately 0.75 miles of existing roadway. Between Wellington Road and the Gainesville High School south entrance, the existing two-lane portion of University Boulevard will be widened to four lanes. Between the Gainesville High School south entrance and Devlin Road, University Boulevard will be extended on new location. The typical section will include two lanes in both directions separated by a raised grass median, a 10-foot-wide shared-use path, and a 5-foot-wide sidewalk.

University Boulevard is a major collector roadway that runs south to north. The section of University Boulevard included in this project extends between Devlin Road and Wellington Road and would complete an important through route connecting the eastern and western portions of Prince William County. The project location is shown in Figure 1.

The extension of University Boulevard has been included in the County’s 2040 Comprehensive Plan. The purpose of the proposed Project is to improve connection and accessibility between the western and eastern portions of Prince William County, including bicycle and pedestrian mobility, in a manner consistent with existing and planned local development and County goals.

This segment of University Boulevard for Base Year (2024) carries approximately 20,000 vehicles per day (vpd). Projected Build Design Year (2048) traffic volumes will be approximately 43,000 vpd within the project limits.

2 Methodology

This PNR represents the analysis of traffic noise impacts and the identification of recommended noise abatement measures based on preliminary design for the University Boulevard Extension project. This analysis is consistent with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, *Procedures for Abatement of Highway Traffic*

Noise and Construction Noise, and the VDOT *Highway Traffic Noise Guidance Manual*, effective July 13, 2011, and updated February 15, 2022.

2.1 CHARACTERISTICS OF NOISE

Noise is defined as unwanted sound. It is emitted from many natural and man-made sources. Highway traffic noise is usually a composite of noises from engine exhaust, drive train, and tire-roadway interaction.

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

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

The commonly accepted limitation of human hearing to detect sound frequencies is between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz – 6,000 Hz. Although people are generally not as sensitive to lower-frequency sounds as they are to higher frequencies, most people lose the ability to hear high-frequency sounds as they age. To accommodate varying receptor sensitivities, frequency sound levels are commonly adjusted, or 'filtered', before being logarithmically added and reported as a single 'sound level' magnitude of that filtering scale. The 'A-weighted' decibel filtering scale applies numerical adjustments to sound frequencies to emphasize the frequencies at which human hearing is sensitive and to minimize the frequencies to which human hearing is not as sensitive, as shown for an example truck noise level spectrum in Table 1.

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

The A-weighted scale is commonly used in highway traffic noise studies because the typical frequency spectrum of traffic noise is higher in magnitude at the frequencies at which human hearing is noise sensitive (1,000 Hz to 6,000 Hz).

Several examples of common noise levels expressed in dB(A) are listed in Table 2. A review of Table 2 indicates that many individuals can be exposed to high noise levels from multiple sources on a regular basis. In order to perceive sounds of greatly varying pressure levels, human hearing has a non-linear sensitivity to sound pressure exposure. For example, doubling the sound pressure results in a three (3) decibel change in the noise level; however, variations of three decibels (3 dB(A)) or less are commonly considered “barely perceptible” to normal human hearing. A five decibel (5 dB(A)) change is more readily noticeable. By definition, a ten-fold increase in the sound pressure level correlates to a 10 decibel (10 dB(A)) noise level increase; however, it is judged by most people as only a doubling of the loudness – sounding “twice as loud”.

Table 2: Common Indoor and Outdoor Noise Levels		
Common Outdoor Noise Levels	**Noise Level (dB(A))**	**Common Indoor Noise Levels**
	110	**Rock Band**
Jet Flyover at 1,000 feet	**100**	**Inside Subway Train (NY)**
Gas Lawn Mower at 3 feet		
Diesel Truck at 50 feet	**90**	**Food Blender at 3 feet**
Noisy Urban Daytime	**80**	**Garbage Disposal at 3 feet**
Gas Lawn Mower at 100 feet	**70**	**Vacuum Cleaner at 10 feet**
Commercial Area		**Normal Speech at 3 feet**
	60	
		Large Business Office
Quiet Urban Daytime	**50**	**Dishwasher Next Room**
Quiet Urban Nighttime	**40**	**Small Theater, Large Conference Room (Background)**
Quiet Suburban Nighttime		**Library**
	30	
Quiet Rural Nighttime		**Bedroom at Night, Concert Hall (Background)**
	20	
		Broadcast and Recording Studio
	10	
	0	**Threshold of Hearing**

Adapted from Guide on Evaluation and Attenuation of Traffic Noise, American Association of State Highway and Transportation Officials (AASHTO). 1974 (revised 1993).

The degree of disturbance or annoyance from exposure to unwanted sound (noise) depends upon three factors:

1. The amount, nature, and duration of the intruding noise.
2. The relationship between the intruding noise and the existing (ambient) sound environment; and
3. The situation in which the disturbing noise is heard.

In considering the first of these factors, it is important to note that individuals have varying sensitivity to noise. Loud noises may bother some people more than other people. The time patterns and durations of noise(s) also affect the perception of whether noise is offensive. For example, noises that occur during nighttime (sleeping) hours are typically considered to be more offensive than the same noises occurring in the daytime.

Regarding the second factor, individuals tend to judge the annoyance of an unwanted noise in terms of its relationship to noise from other sources (background noise). A car horn blowing at night when background noise levels are low would generally be more objectionable than a car horn blowing in the afternoon when background noise levels are typically higher. The response to noise stimulus is analogous to the response to turning on an interior light. During the daytime, an illuminated bulb simply adds to the ambient light, but when eyes are conditioned to the dark of night, a suddenly illuminated bulb can be temporarily blinding.

The third factor – situational noise – is related to the interference of noise with activities of individuals. In a 60 dB(A) environment, such as is commonly found in a large business office, normal conversation would be possible, while sleep might be difficult. Loud noises may easily interrupt activities that require a quiet setting for greater mental concentration or rest; however, the same loud noises may not interrupt activities requiring less mental focus or tranquility.

Over time, individuals tend to accept the noises that intrude into their lives on a regular basis. However, exposure to prolonged and/or extremely loud noise(s) can prevent use of exterior and interior spaces and has been theorized to pose health risks. Appropriately, regulations exist for noise control or mitigation from many particularly offensive sources, including airplanes, factories, railroads, and highways. For all "Type I" federal, state, or federal-aid highway projects in the State of Virginia, traffic and construction noise impact analysis and abatement assessment is dictated by Title 23 CFR Part 772 and supplemented with the 2022 Virginia Department of Transportation (VDOT) *Highway Traffic Noise Guidance Manual* when VDOT is a partner agency. The University Boulevard Extension project is a Type I project because it proposes through-traffic lanes on new location.

2.2 NOISE ABATEMENT CRITERIA

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

The FHWA has developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways. The purpose of Title 23 CFR Part 772 is, "to provide procedures for noise studies and noise abatement measures to help protect the public's health, welfare and livability, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to title 23 U.S.C."

The abatement criteria and procedures are set forth in Title 23 CFR Part 772, which also states, "In abating traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs." 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. A summary of the

NAC for various land uses is presented in Table 3. The L_{eq}, or equivalent sound level, is the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as a time-varying sound level during the same period. Regarding traffic generated noise, fluctuating sound levels of traffic noise are represented in terms of L_{eq} (A-weighted), the steady, or 'equivalent', noise level with the same energy. The NAC, listed in Table 3 for various activities, represents the upper limit of acceptable traffic noise conditions. The noise impact assessment was conducted using the guidelines listed in Table 3.

Table 3: Noise Abatement Criteria

Hourly Equivalent A-Weighted Sound Level (decibels (dB(A))

Activity Category	Activity Criteria[1] $L_{eq(h)}$[2]	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67	Exterior	Residential
C [3]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section4(f) sites, schools, television studios, trails, and trail crossings
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E [3]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A- D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

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

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

3 Includes undeveloped lands permitted for this activity category.

Source: FHWA Title 23 CFR Part 772, July 2010.

2.2.2 Virginia Department of Transportation Highway Traffic Noise Guidance Manual

The VDOT Highway Traffic Noise Guidance Manual, effective July 13, 2011, and updated February 15, 2022, establishes official policy on highway noise 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. This manual describes the VDOT process that is used in determining traffic noise impacts and abatement measures. Where the FHWA has given highway agencies flexibility in implementing the Title 23 CFR 772 standards, this policy describes the VDOT approach to implementation.

2.2.3 Virginia Department of Transportation Noise Abatement Criteria

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 3. 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.

- 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.

If traffic noise impacts are 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 benefit.

2.3 Analysis Procedure

This PNR utilized validated computer models created with FHWA's Traffic Noise Model® (FHWA TNM v.2.5) to predict Base Year 2024, No-Build Year 2048, Build Design Year 2048 hourly equivalent traffic noise levels, L_{eq}(h), for areas that are dominated by road traffic to identify impacted receptors and assess recommended noise abatement measures along the University Boulevard Extension project limits. The FHWA TNM® was developed and sponsored by the U.S. Department of Transportation and John A. Volpe National Transportation Systems Center, Acoustics facility. TNM estimates vehicle noise emissions and resulting noise levels based on reference energy mean emission levels using its acoustic algorithms to predict noise levels at the selected receptor locations by considering sound propagation variables such as, atmospheric absorption, divergence intervening ground, barriers, building rows.

Input data used to construct a three-dimensional model of the project study area within TNM included: project preliminary engineering design files modeled by WSP USA, aerial photography, USGS topographical data, and project survey data.

The existing and proposed traffic noise sources are defined within TNM by inputting the various modeling elements into each model. These include roadway alignments (horizontal and vertical geometrics), roadway widths, traffic volumes of cars, medium trucks, heavy trucks and buses, average vehicle travel speeds, pavement type, and any traffic control devices. Receptor locations, where noise level estimates will be determined, are then added to the model along with any acoustically significant shielding features in the roadway-receptor pathways such as noise barriers, buildings, retaining walls, paved ground zones, hills and other terrain features.

In addition to reporting, the procedure by which this PNR was conducted was as follows:

- *Initial project scoping*: Obtained project design, prepared field maps, project mapping, GIS data, aerial photography, traffic data, and other available pertinent information.

- *Monitoring/Field work:* Ambient sound level data was collected one to two times at four 20-minute short-term measurement locations on March 19, 2025 and one 24-hour long-term measurement March 18-19, 2025 (refer to photographs in Appendix B and Figures 2-1 through 2-5). These measurements were taken in consideration of the FHWA Reports FHWA-PD-96-046 "Measurement of Highway Related Noise," FHWA-HEP-18-065 "Noise Measurement Handbook," and FHWA-HEP-18-066 "Noise Measurement Field Guide." Classified traffic volume data was obtained during each short-term measurement session by hand-counting on traffic clickers. Traffic speeds during each measurement session were determined by driving the corridor. Types of land use and property addresses were determined for all noise-sensitive receptors. Weather data was acquired using the closest weather monitoring station (KVAGAINE55) using wunderground.com. Finally, a field measurement site sketch and event log were created for each noise measurement session.

- *Baseline TNM model:* Develop the existing condition, or baseline, TNM model, which includes receptors, roadway alignments (horizontal and vertical), traffic volumes of autos, medium trucks (vehicles with 2 axles and 6 tires,) heavy trucks, average vehicle speeds, pavement type, terrain lines, ground zones, barriers (to represent structures), and any traffic control devices throughout the study area. Validate the baseline TNM models for areas directly adjacent to existing roads.

- *Design Year noise levels*: The validated baseline TNM model was modified to develop the Design Year 2048 TNM model by incorporating the build-condition roadway design elements. Build Design Year 2048 condition traffic volumes and speeds were input into the model to predict Design Year 2048 traffic noise levels. Impacts were determined based on the VDOT Noise Abatement Criteria (NAC) and

Substantial Increase criteria (refer to Section 5).

- *Impact Assessment:* VDOT Noise Abatement Criteria (NAC) and Substantial Increase criteria were applied to assess predicted traffic noise NAC and Substantial Increase impacts at all noise sensitive receptors for the Design Year 2048 Build condition; impacts for the Build Alternative were documented (refer to Table 5 and Appendix A) and locations where abatement had to be considered were identified, if applicable.

- *Noise level contours:* Design Year traffic noise level contours were evaluated to assist land use planning efforts by local governments (see Section 7).

- *Construction Noise Impact Analysis:* Project-related construction noise was considered for potential impacts to noise-sensitive receptors throughout the project corridor.

3 Existing Highway Traffic Noise Environment

3.1 Existing Land Uses

Existing land use in the vicinity of the University Boulevard Extension project is predominately commercial, residential, and undeveloped lands. Other land uses in the study area include schools and their associated sport fields.

3.2 Common Noise Environments

The noise-sensitive land uses within the project study area are primarily residential and schools, with non-noise-sensitive land uses, such as commercial, business, and undeveloped land. To group noise-sensitive land uses that are geographically close to one another and exposed to similar noise sources, the project study area was segmented into two (2) discrete Common Noise Environments (CNEs).

The locations of the two CNEs identified along the project corridor and the locations of noise-sensitive receptors within the CNEs are shown in the Detailed Study Area Maps, Figures 2-1 through 2-5, and described below.

- **CNE 1** (Figures 2-3 through 2-5) is located northwest of Devlin Drive to southeast of Gainesville High School. The CNE represents 46 single-family residences.

- **CNE 2** (Figures 2-1 through 2-3) is located southeast of Gainesville High School to north of Wellington Road. The CNE represents seven outdoor sport fields and two indoor use areas at Gainesville High School and Park Valley Church. The CNE also includes non-noise sensitive receptors, such as commercial buildings, gas stations, and a Lifetime Fitness with no outdoor use areas.

3.3 Undeveloped Lands and Permitted Developments

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

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

Prince William County maintains an online database of all building permits (https://egcss.pwcgov.org/SelfService#/home). The database was accessed on 6/4/2025 to investigate potential building permits on undeveloped land parcels within the noise study area. No building permits were found or included in this noise analysis. Additional coordination will be conducted during the final design phase to ensure all permitted undeveloped lands are identified.

3.4 Ambient Noise Levels

Ambient noise is noise all around us caused by natural and manmade events. It includes the wind, rain, thunder, birds chirping, insects, household appliances, commercial operations, lawn mowers, airplanes, automobiles, etc. It is a combination of all noise present in an area.

Existing traffic noise exposure varies within the University Boulevard Extension Improvements project study area. University Boulevard and Devlin Road are the dominant noise sources for receptors in the study area. The purpose of noise monitoring is to gather data to compare with the output obtained from the noise prediction model. This exercise is performed to validate the traffic noise model for local conditions so that it can be used with confidence to predict future noise levels.

In addition to gathering information and making general observations about the project study area, ambient noise measurement and field work are conducted to collect noise levels and classified vehicle count data that can be used to develop a comparison between noise levels measured in the field, at locations where traffic noise is the dominant noise source, and the predicted hourly-equivalent traffic noise levels obtained from TNM. This exercise is performed to validate the model to local conditions so that it can be used with confidence to predict the future worst noise hour equivalent noise levels and assess potential traffic noise impacts. Ambient noise measurement is also used to define the minimum ambient noise level at locations where traffic noise is not the primary noise source.
For noise-sensitive receptors where traffic is not the dominant noise source, a long-term

measurement was taken to determine the loudest-hour noise level for these locations. The long-term ambient noise monitoring was conducted March 17-18, 2025. The measurement was recorded using a laboratory calibrated Larson Davis 720 sound level meter (SLM).

Short-term ambient noise monitoring was conducted on March 19, 2025. The measurements were recorded using a laboratory calibrated B&K 2250 SLM. All measurements were performed under acceptable weather and street surface conditions. 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.

This PNR includes one to two short-term noise measurements collected over 20-minute periods, with data stored in 1-minute intervals, at four locations along the project corridor. Traffic volumes were collected during measurement periods and taken on hand-held traffic clickers. Traffic speeds were observed through driving the project corridor at multiple times a day. Weather data was documented through using wunderground.com and accessing the closest weather monitoring station (KVAGAINE55) to ensure the most accurate data. The ambient noise monitoring locations are shown in Figures 2-1 through 2-5. The noise measurement results, concurrent traffic counts, observed vehicle speeds, weather information for the measurement sites and photographs of each location are included in Appendix B.

3.5 Noise Model Validation

The measured short-term ambient noise levels at the four noise measurement locations, ST1 through ST4, ranged from 53.0 dB(A) to 70.5 dB(A). For all short-term monitoring locations for which traffic was the dominant noise source, TNM model validation is performed by comparing monitored ambient equivalent sound levels to TNM-predicted traffic noise levels generated by the classified traffic volumes (normalized to 1-hour volumes) and speeds on project-area roadways during each short-term monitoring session. The ambient noise data were then used to validate the accuracy of the existing condition TNM model by comparing measured traffic noise levels to predicted traffic noise levels at each of the field measurement locations. The VDOT-accepted tolerance for TNM model validation is ±3.0 dB(A) and the TNM models were all validated at each measurement site. Validation results can be found in Table 4. This validation process was the basis upon which the TNM models for predicting existing year and design year noise levels were built. Ambient noise level monitoring and validation data is included in Appendix B.

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 Common Noise Environment (CNE) to validate the computer noise model.

Table 4: TNM Validation Results					
CNE	**Measurement Site**	**Measurement Number**	**Measured L_{eq}(h) (dBA(A))**	**Predicted L_{eq}(h) (dBA(A))**	**Difference (dBA(A))[1]**
1	ST1	1	54.6	57.5	2.9[2]
		2	55.9	57.7	1.8
2	ST2	1	53.0	50.4	-2.6[3]
2	ST3	1	62.2	60.6	-1.6
		2	59.3	58.6	-0.7
2	ST4	1	69.9	68.6	-1.3
		2	70.5	69.8	-0.7

[1]Hourly equivalent noise levels, L_{eq}, are expressed to the nearest one-tenth decibels to ensure that TNM-predicted levels validated to within +/- 3.0 dB(A) of measured noise levels without the benefits of rounding.
[2]Site ST1_1 validated at the top of the threshold due to the variation of traffic speeds in the field from the intersection of Devlin Road and University Boulevard, resulting in a higher TNM predicted noise level.
[3]Site ST2_1 validated at the bottom of the threshold due to the low traffic volumes and TNM's inability to predict background noise. This is consistent with the background noise levels recorded at LT1 of 53 dB(A).

3.6 Worst Noise Hour Determination

As required by FHWA and VDOT, the noise analysis was performed for the loudest ("worst noise") hour of the day. Noise levels have been predicted for that hour of the day when the vehicle volume, operating speed and number of heavy trucks (vehicles with 3 or more axles) combine to produce the worst-case traffic noise exposure conditions. Additionally, as per FHWA guidance, the "worst hourly traffic noise impact" occurs at a time when truck volumes and vehicle speeds are the greatest, typically when traffic is free flowing and at or near level of service (LOS) C conditions.

Traffic volumes were provided for both AM and PM peak hours, where PM volumes tended to be higher. The worst noise hour was confirmed as the PM peak from the data collected over the long-term 24-hour measurement. Long-term data is shown in Appendix B. The traffic data is included in Tables C-1 through C-3 in Appendix C.

3.7 Existing Noise Levels

Using the worst hour traffic data, the TNM model was used to predict Existing 2024 traffic noise levels at all receptor locations identified within the study area limits. The computer traffic noise prediction model uses the number and type of vehicles on the proposed roadway, vehicle speeds, the physical characteristics of the road (curves, hills, depressions, elevations, etc.), receptor location and height, building ground elevation, and building top elevations. This noise study area does contain one existing noise barrier. It should be noted that while the existing noise barrier was not yet constructed at the time of the study, it was formally approved meeting all feasibility and reasonableness criteria under a different project (UPC 118253; Devlin Road widening 2 to

4 lane), therefore, treated as an existing barrier for modeling purposes as part of this study. Under existing conditions, noise levels ranged from 43 to 69 dB(A) for all CNEs. Existing sound levels at all receptors are shown in Appendix A.

4 Future Highway Traffic Noise Environment

4.1 Prediction Methods

Future noise levels were predicted for Design Year 2048 using the FHWA TNM 2.5 model. TNM models of future No-Build and Build conditions were developed to account for the future traffic volumes and roadway design changes.

All noise-sensitive land uses potentially affected by the project are located near roads for which traffic forecasts were projected. As described in Section 3.6, traffic forecasts used for the design hour volumes were determined as the worst-case loudest traffic noise exposure at each noise sensitive receptor site. A summary of the traffic data used in the noise modeling is shown in Appendix C.

4.2 Predicted Noise Levels

Traffic noise levels were predicted for the design-year 2048 No-Build and Build conditions. All noise levels were predicted for the worst noise hour and are expressed in L_{eq}(h) dB(A). No-Build conditions noise levels ranged from 43 to 72 dB(A) for all CNEs. Build conditions outdoor noise levels ranged from 43 to 73 dB(A) for all CNEs. Appendix A shows the predicted sound levels at each receptor location.

Figures 2-1 through 2-5 show receptor noise levels for the 2048 Build condition in graphical form. The Design Year 2048 Build Alternative is predicted to result in 14 residential traffic noise impacts and 9 sports field impacts that equate to 3.3 non-residential receptors (NRRs). Non-residential receptor calculations can be found in Appendix D. A yellow receptor dot indicates a non-impacted non-benefited receptor, a blue dot indicates a non-impacted benefited receptor, a green dot indicates an impacted benefited receptor, and a red dot indicates an impacted non-benefited receptor in the Detailed Study Area Maps.

5 Highway Traffic Noise Consideration and Abatement Alternatives

Traffic noise impacts occur when the predicted future build traffic noise levels either: [a] approach or exceed the FHWA noise abatement criteria (with "approach" defined in the VDOT Noise Policy as reaching one decibel less than the NAC values listed in Table 3), or [b] substantially exceed the existing noise levels in the design year by 10 dB(A) or greater according to VDOT criteria. FHWA and VDOT require that feasible and reasonable measures be considered to abate traffic noise at all predicted traffic noise impacts.

As shown in Table 5, the Build Alternative is predicted to result in 14 residential traffic noise impacts and 9 sports field impacts that equate to 3.3 ERs. Under the Design Year 2048 noise levels are expected to approach or exceed the NAC for 14 residential receptors and 3 sport field ERs and to have a substantial noise increase above existing noise levels for 9 sport field ERs.

Table 5: Traffic Noise Impact Summary for 2048 Build Condition

Reason for Noise Impact	Summary of Impacted Receptors							
	By Activity Category							
	A	B	C	D	E	F[5]	G[6]	All Activity Categories
Based on NAC Criteria Only[1]	0	14	0	0	0	0	0	14
Based on Substantial Increase Criteria Only[2]	0	0	6	0	0	0	0	6
Based on Both Criteria[3]	0	0	3	0	0	0	0	3
Total Build Alternative Impacts[4]	0	14	9	0	0	0	0	23

[1] Predicted traffic noise level impacts due to design year worst hour build-condition noise levels approaching or exceeding the VDOT Noise Abatement Criteria (NAC).
[2] Predicted design year worst hour noise levels exceeding existing worst hour noise levels by 10 dB(A) or greater (VDOT Substantial Increase Criteria).
[3] Predicted traffic noise level impacts due to both 1 and 2 above.
[4] Only one of the Note 1 or Note 2 conditions must be met for an impact to exist.
[5] There are no impact criteria for land use facilities in this activity category and no analysis of noise impacts are required.
[6] There are no impact criteria for undeveloped lands, but information regarding noise level contours needs to be provided to local officials to aid them in future land use planning efforts.

5.1 Noise Abatement Determination

Noise Abatement Determination is a three-phased approach. The first phase of the process is to determine if highway traffic noise abatement consideration is warranted for the affected communities and impacted receptors. The warranted abatement criterion specifically pertains to traffic generated noise impacted receptors, defined in Section 4.2. Since predicted noise levels for the future design year (2048) build condition either approach or exceed the NAC or have a substantial noise increase above existing noise levels, per VDOT's State Noise Abatement Policy, noise abatement considerations are warranted for these impacted noise sensitive areas.

Determining that noise abatement is warranted is the first phase (Phase 1) of the three-phased noise abatement criteria. Phases 2 and 3 address the feasibility and reasonableness of the noise abatement measures being considered, which are discussed in Sections 5.2 and 5.3. Following the completion of all three phases, a determination can be made regarding the feasibility and reasonableness of the noise abatement options.

VDOT guidelines recommend a variety of mitigation measures that should be considered in response to traffic-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 zone lands;
- Construction of noise barriers;
- Construction of earth berms;

Additionally, Section 33.1-223.2:21 of the Code of Virginia requires VDOT to consider other mitigation measures besides noise barriers as part of the project development processes. This mandate states: 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.

5.1.1 Traffic Noise Mitigation Measures

The following are mitigation measures that can be considered for the reduction of traffic noise impacts. Note that although they are considered, their implementation and effectiveness does not always warrant use:

- *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. 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 be feasible for the roadways evaluated for this project. Current posted speed limits for the evaluated roadways are 25 – 35 mph.

- *Alteration of Horizontal and Vertical Alignments:* The alteration of the horizontal and vertical alignment has not been considered to reduce or eliminate the impacts created by the proposed project. Shifting the horizontal or vertical alignment will create undesirable impacts such as right-of-way acquisition, temporary/permanent easements, and retaining walls.

- *Insulation:* This noise abatement measure option applies only to public and institutional use buildings. Since no public use or institutional structures were identified as impacts, this noise abatement option will not be applied.

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

- *Construction of Noise Barriers / Berms:* Construction of noise barriers can be an effective way to reduce noise levels in 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 continuous 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. In contrast, 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 requires four feet of horizontal width. This requirement becomes more difficult to meet in urban settings where residential properties often abut right up to the proposed roadway corridor. In these situations, the implementation of earth berms can require significant property acquisitions to accommodate noise mitigation, and the cost associated with the acquisition of property to construct a berm can significantly increase the total costs for noise mitigation and make it unreasonable.

  In addition, the availability of fill material needed to construct the berm also needs to be considered. On projects where proposed grading yields excess waste material, earth berms can often be a cost effective mitigation option. 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 are not a viable mitigation option for this proposed project area due to the urban nature of the project and minimal areas near impacted receptors for their implementation.

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 or just inside the proposed right-of-way. In addition, engineering and safety issues have the potential to alter these typical barrier locations.

5.2 Feasibility Criteria for Noise Abatement

All impacted receptors that meet the warranted criterion must then satisfy the “feasible” phase. Phase 2 of the noise abatement criteria requires that both of the following acoustic and engineering conditions 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).

The noise abatement measure is said to be feasible if it meets both criteria.

5.3 Reasonable Criteria for Noise Abatement

All receptors that meet the feasibility criterion must progress to the reasonableness phase. Phase 3 of the noise abatement criteria require that all of the following conditions be considered.

- Noise Reduction Design Goals

  The design goal is a reasonableness factor indicating a specific reduction in noise levels that VDOT uses to identify that a noise abatement measure effectively reduces noise. The design goal establishes a criterion, selected by VDOT, which noise abatement must achieve. VDOT’s noise reduction design goal is defined as a 7 dB(A) of insertion loss for at least one impacted receptor, meaning that at least one impacted receptor is predicted to

achieve a 7 dB(A) or greater noise reduction with the proposed barrier in place. The design goal is not the same as acoustic feasibility, which defines the minimum level of effectiveness for a noise abatement measure. Acoustic feasibility indicates that the noise abatement measure can, at a minimum, achieve a discernible reduction in noise levels.
Noise reduction is measured by comparing the future design year build condition pre-and post-barrier noise levels. This difference between unabated and abated noise levels is known as "insertion loss" (IL). It is important to optimize the noise barrier design to achieve the most effective noise barrier in terms of both noise reduction (insertion losses) and cost. Although at least a 5 dB(A) reduction is required to meet the feasibility criteria, the following tiered noise barrier abatement goals are used to govern barrier design and optimization.

  - Reduction of future highway traffic noise by 7 dB(A) at one (1) or more of the impacted receptor sites (required criterion).
  - Reduction of future highway traffic noise levels to the low-60-decibel range when practical (desirable).
  - Reduction of future highway traffic noise levels to existing noise levels when practical (desirable).

- Cost-Effectiveness

  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 performed in order to quantify the type and duration of activity and compare to the cost effectiveness criterion. The sport fields at both Gainesville Middle School and Gainesville High School utilized VDOT manual guidance of placing gride points in 100-foot segments to adequately cover the area utilized as outdoor sports fields for the schools. The VDOT Non-Residential Receptor (NRR) calculation spreadsheet was used to assign a weighted value to be applied at each receptor based on usage of the school fields (number of days in the year the site is available for use, the hours per day the site is used, typical number of people using the site per day, etc.) all which were obtained via data on the schools websites. It was determined that a value of 0.3 non-residential receptor value would be assigned to the grid points for Gainesville Middle School and a value of 0.9 non-residential receptor value for Gainesville High School. While text and tables throughout the document refer to the total number of impacted receptors/non-impacted receptors, the NRR count is also documented. A copy of the calculation process can be found in Appendix D.

- The Viewpoints of the Benefited Receptors

  VDOT shall solicit the viewpoints of all benefited receptors through certified mailings and obtain enough responses to document a decision as to whether or not there is a desire for the proposed noise abatement measure. Fifty percent (50%) or more of the respondents shall be required to favor the noise abatement measure in determining reasonableness. Community views in and of themselves are not sufficient for a barrier to be found reasonable if one or both of the other two reasonableness criteria are not satisfied.

5.4 Abatement Evaluation

Impacted receptors were located in two CNEs. Noise abatement measures for these impacts were identified and evaluated based on the feasibility and reasonableness criteria.

CNE 1: The Build Alternative is expected to impact 14 receptors (R1-16-R1-18, R1-26, R1-28-R1-35, R1-43, R-44). Two noise barriers were evaluated for abatement to these impacts.

Note: Although receptors on the south side of University Boulevard are impacted, receptors R1-19 through R1-24 on the north side of University Boulevard are not impacted due to their distance from the edge of travel, which includes a larger right-of-way buffer zone than the opposite side, and therefore were not evaluated for a noise barrier under VDOT's Highway Traffic Noise Guidance Manual.

Noise Barrier NW1

A noise barrier (NW1) was analyzed for impacted receptors R1-16, R1-17, and R1-18 on north side of University Boulevard to the east of Devlin Road. The location of the barrier is shown on Figure 2-5. Barrier NW1 would tie into the existing noise barrier along the east side of Devlin Road. The existing noise barrier did not warrant further evaluation since no noise impacts were predicted at the noise sensitive receptors behind the barrier. Barrier NW1 has a length of approximately 603 feet with an average height of 14.0 feet. Barrier NW1 achieves a feasible (>5 dB(A)) noise reduction at three impacted receptors within CNE 1. The barrier meets the design goal of an insertion loss (IL) of 7 dB(A) for at least one impacted receptor at the evaluated height. The evaluated barrier provides benefits to seven non-impacted receptors. The total area for the barrier is 8,469 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (max sq-ft/BR) value of 847, which is below the allowable (max sq-ft/BR) value of 1,600. Barrier NW1 has been optimized to block the line-of-sight between roadway vehicles and ground floor receptors. Receptors were placed at their worst-case noise location which include elevated deck structures. Based on aerial imagery, varying deck heights of 3-4 feet were applied. Therefore, Barrier NW1 is considered acoustically feasible and reasonable and will be further evaluated during the final design phase. A summary of the abatement for Barrier NW1 is shown in **Table 6**.

Note: The feasibility of constructing Barrier NW1 will be further evaluated during the final design phase, taking into account potential constraints such as utilities and right of way. Worst-case noise receptor locations will also be reevaluated during the final design phase based on field observations to ensure proper elevated deck heights.

Noise Barrier NW2

A noise barrier (NW2) was analyzed for impacted receptors R1-26, R1-28 through R1-35, R1-43, and R1-44. The location of the barrier is shown on Figure 2-5. Barrier NW2 has a length of approximately 1,472 feet with an average height of 12.3 feet. Barrier NW2 achieves a feasible (>5 dB(A)) noise reduction at eleven impacted receptors within CNE 1. The barrier meets the design goal of an insertion loss (IL) of 7 dB(A) for at least one impacted receptor at the evaluated height. The evaluated barrier provides benefits to eight non-impacted receptors. The total area for the barrier is 17,608 square feet. It is considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (max sq-ft/BR) value of 927, which is below the allowable (max sq-ft/BR) value of 1,600. Barrier NW2 has been optimized to block the line-of-sight between roadway vehicles and ground floor receptors. Receptors were placed at their worst-case noise location which include elevated deck structures. Based on aerial imagery, a deck height of 3 feet was applied. Therefore, Barrier NW2 is considered acoustically feasible and reasonable and will be further evaluated during the final design phase. A summary of the abatement for Barrier NW2 is shown in **Table 6**.

Note: The feasibility of constructing Barrier NW2 will be further evaluated during the final design phase, taking into account potential constraints such as utilities, sidewalk, and right of way. Worst-case noise receptor locations will also be reevaluated during the final design phase based on field observations to ensure proper elevated deck heights.

CNE 2: The Build Alternative is expected to impact nine receptors representing four Non-Residential Grid (NRR) receptors (a 3.6 NRR value) associated with Gainesville Middle School (R2-5a-R2-5e, R2-7a-R2-7c) and Gainesville High School (R2-2b). Non-residential receptor calculations can be found in Appendix D.

Noise Barrier System NW3-1 and NW3-2

A noise barrier system (NW3-1 and NW3-2) was analyzed for impacted receptors R2-5a-R2-5e, R2-7a-R2-7c on the west side of University Boulevard. The barrier system consists of two individual barriers, NW3-1 and NW3-2, which have a break between them due to driveway access. The location of the barrier is shown on **Figure 2-2**. The NW3 barrier system has a length of approximately 945 feet with an average height of 15.3 feet. The NW3 barrier system achieves a feasible (>5 dB(A)) noise reduction at eight impacted receptors (2.4 NRR - see Appendix D) within CNE 2. The barrier meets the design goal of an insertion loss (IL) of 7 dB(A) for at least one impacted receptor at the evaluated height. The evaluated barrier provides benefits to six grid receptors (1.8 NRR) non-impacted receptors. The total area for the barrier is 14,418 square feet. It is not considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (max sq-ft/BR) value of 2,884, which is above the allowable (max sq-ft/BR) value of 1,600. Therefore, the NW2 barrier system is considered feasible and not reasonable and will be further evaluated during the final design phase. A summary of the abatement for the NW3 barrier system is shown in **Table 6**.

Noise Barrier NW4

A noise barrier (NW4) was analyzed for impacted receptor R2-2b on the east side of University

Boulevard. The location of the barrier is shown on **Figure 2-2**. Barrier NW4 has a length of approximately 539 feet with an average height of 12 feet. Barrier NW3 achieves a feasible (>5 dB(A)) noise reduction at one impacted receptor (0.9 NRR - see Appendix D) within CNE 2. The barrier meets the design goal of an insertion loss (IL) of 7 dB(A) for at least one impacted receptor at the evaluated height. The evaluated barrier provides benefits to 1 grid receptor (0.9 NRR) non-impacted receptors. The total area for the barrier is 6,474 square feet. It is not considered reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (max sq-ft/BR) value of 3,237, which is above the allowable (max sq-ft/BR) value of 1,600. Therefore, Barrier NW4 is considered feasible and not reasonable and will be further evaluated during the final design phase. A summary of the abatement for Barrier NW4 is shown in **Table 6**.

Table 6: Noise Abatement Acoustical Feasibility and Reasonableness Evaluation Summary

CNE	Barrier ID	Number of Benefited Receptor Units	Combined Noise Barrier Length (ft)	Average Noise Barrier Height (ft)	Square Footage (SF)	Net SF per Benefited Receptor	Feasible?	Reasonable?
1	NW1	10	603	14.0	8,469	847	Yes	Yes
1	NW2	19	1,432	12.3	17,608	927	Yes	Yes
2	NW3-1 & NW3-2	14 (4.2 NRR)	945	15.3	14,418	2,884	Yes	No
2	NW4	2	539	12.0	6,474	3,237	Yes	No

6 Construction Noise Considerations and Abatement Opportunities

FHWA and VDOT are also concerned with noise generated during the construction phase of the proposed project. While the degree of construction noise impact will vary, 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 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 2020 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.

The predominant construction activities associated with this project are expected to be earth removal, hauling, grading, paving, and pile driving for bridge construction. Temporary and localized construction noise impacts may occur as a result of these activities. During daytime hours, the predicted effects of these impacts could be temporary speech interference for passers-by and those individuals living or working near the project. During evening and nighttime hours, noise from steady-state construction activities such as paving operations could be audible and may cause impacts to activities such as sleep. Noise from sporadic evening and nighttime construction equipment such as from backup alarms, lift gate closures (“slamming” of dump truck gates), etc., will be perceived as distinctly louder than the steady-state acoustic environment, and could impact the general peace and usage of noise-sensitive areas – particularly residences.

Extremely loud construction noise activities such as usage of pile-drivers and impact- hammers (jack hammer, hoe-ram) will provide sporadic and temporary construction noise impacts in the near vicinity of those activities (refer to Table 6). Construction activities that will produce extremely loud noises should be scheduled during times of the day when such noises will create as minimal disturbance as possible.

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

While discrete construction noise level prediction is difficult for a particular receptor or group of receptors, it can be assessed in a general capacity with respect to distance from known project activities. For this project, earth removal, grading, hauling, and paving is anticipated to occur in the vicinity of noise-sensitive receptors. To mitigate the impacts of construction noise, the contractor will be required to conform to the VDOT's 2020 Road and Bridge Specifications, Section 107.16(b.3), “Noise”:

- 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.

- FHWA 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.

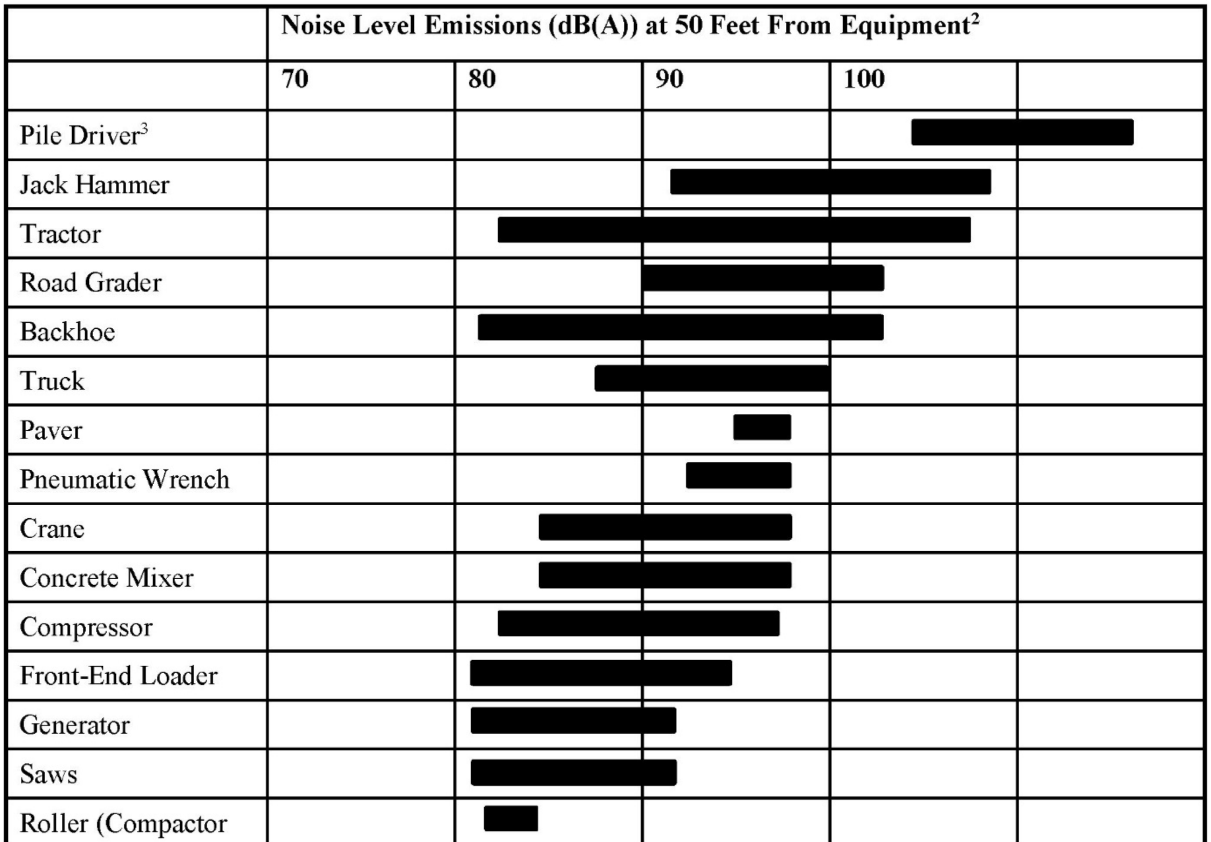
- FHWA may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 PM and 6 AM. If other hours are established by local ordinance, the local ordinance shall govern.

- 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.

Table 7: Construction Equipment Typical Noise Levels Emissions[1]



1. Adapted from Noise Construction Equipment and Operations, Building Equipment, and Home Appliances. U.S. Environmental Protection Agency. Washington D.C. 1971.
2. Cited noise level ranges are typical for the respective equipment. For point sources such as the construction equipment listed above, noise levels generally dissipate at a rate of -6 dB(A) for every doubling of distance over a hard surface or through the air. For example, if the noise level from a pile driver at a distance of 50 feet = 100 decibels (dB(A)), then at 400 feet, it will generally be 82 decibels (dB(A)) or less.
3. Due to project safety and potential construction noise concerns, pile driving activities are typically limited to daytime hours

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

7 Public Involvement Process

7.1 Noise Compatible Planning

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. A Type I project involves highway improvements which include a noise analysis. This information must include details on noise-compatible land-use planning and noise impact zones for undeveloped lands within the project corridor. The aforementioned details are provided below. Additional information about VDOT's noise abatement program has also been included in this section.

Sections 12.1 and 12.2 of VDOT's 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 public about the problem of traffic noise and effective responses to it. A link to this brochure on FHWA's website is provided: https://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/index.cfm

A wide variety of administrative strategies may potentially reduce highway noise impacts, thereby preventing costly noise abatement structures such as noise barriers. 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 https://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/index.cfm

7.2 Noise Impact Zones in Undeveloped Land along the Study Corridor

Per 23 CFR 772.9(c), traffic noise contour lines shall not be used for determining highway traffic noise impacts. However, the 71 dB(A) and 66 dB(A) noise level contour information can assist local authorities in exercising land use control over the remaining undeveloped lands (NAC "G") and to avoid development of incompatible activities in the vicinity of the University Boulevard Extension project. Therefore, 71 dB(A) and 66 dB(A) traffic noise level contours have been developed as part of this project. These contours represent the approximate distance from the proposed edge of the nearest travel lane of University Boulevard to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the NAC in the Design Year 2048. The 71 dB(A) traffic noise level contour correlates to the traffic noise impact threshold for FHWA NAC "E" land uses. The 66 dB(A) traffic noise level contour correlates to the traffic noise impact threshold for FHWA NAC "B" and "C". Table 7 provides detailed traffic noise contour estimates. All distances are based on the Build Design Year 2048 Alternative. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond these distances. It should be noted that this contour information is only for general informational purposes. Therefore, detailed traffic noise studies should be performed based on specific project locations and proposed development grading plans and survey information to determine more finite results.

Table 8: Design Year 2048 Build Alternative Traffic Noise Contours

Roadway Segment	Maximum Contour Distances (feet from edge of nearest travel lane)	
	66 dB(A)	71 dB(A)
North of University Boulevard, west of Devlin Road	70	40
South of University Boulevard, west of Hickory Hill Road	70	40
South of University Boulevard, southwest of proposed Rollins Ford Road	80	30

7.3 VDOT's Noise Abatement Program

Information on VDOT's noise abatement program is available on VDOT's Website, at https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/environmental/, and scrolling down to the noise tab. The site provides information on VDOT's noise program and policies, noise walls, and a downloadable noise wall brochure.

8 CONCLUSION

Traffic noise and temporary construction noise can result from transportation projects, especially in areas near existing steady-state traffic noise sources. This PNR for the University Boulevard Extension project utilized computer models created with the FHWA Traffic Noise Model software (TNM v.2.5) that was validated with field-collected traffic noise monitoring data. The validated models were then used to predict Design Year 2048 noise levels and to define possible impacted receptors along the proposed project corridor.

The Design Year 2048 Build Alternative is predicted to result in 14 residential traffic noise impacts and 9 sports field impacts that equate to 3.3 non-residential receptors (NRRs). Four noise barriers were evaluated for these impacts. Two barriers (NW3-1/NW3-2 and NW4) were found to be feasible and not reasonable. Two barriers (NW1 and NW2) were found to be feasible and reasonable. These barriers will need to be further evaluated during final design.

Furthermore, construction noise impacts may occur due to the proximity of noise-sensitive receptors to project construction activities. To mitigate the impacts of construction noise in the vicinity of noise-sensitive receptors, the contractor will be required to conform to the VDOT's 2020 Road and Bridge Specifications, Section 107.16(b.3), “Noise”.

The findings in this document are based on conceptual information. Thus, any conclusions derived in the report should be considered preliminary in nature and subject to change. A Final Design Noise Analysis will need to be performed for this project based on detailed engineering information.

9 REFERENCES

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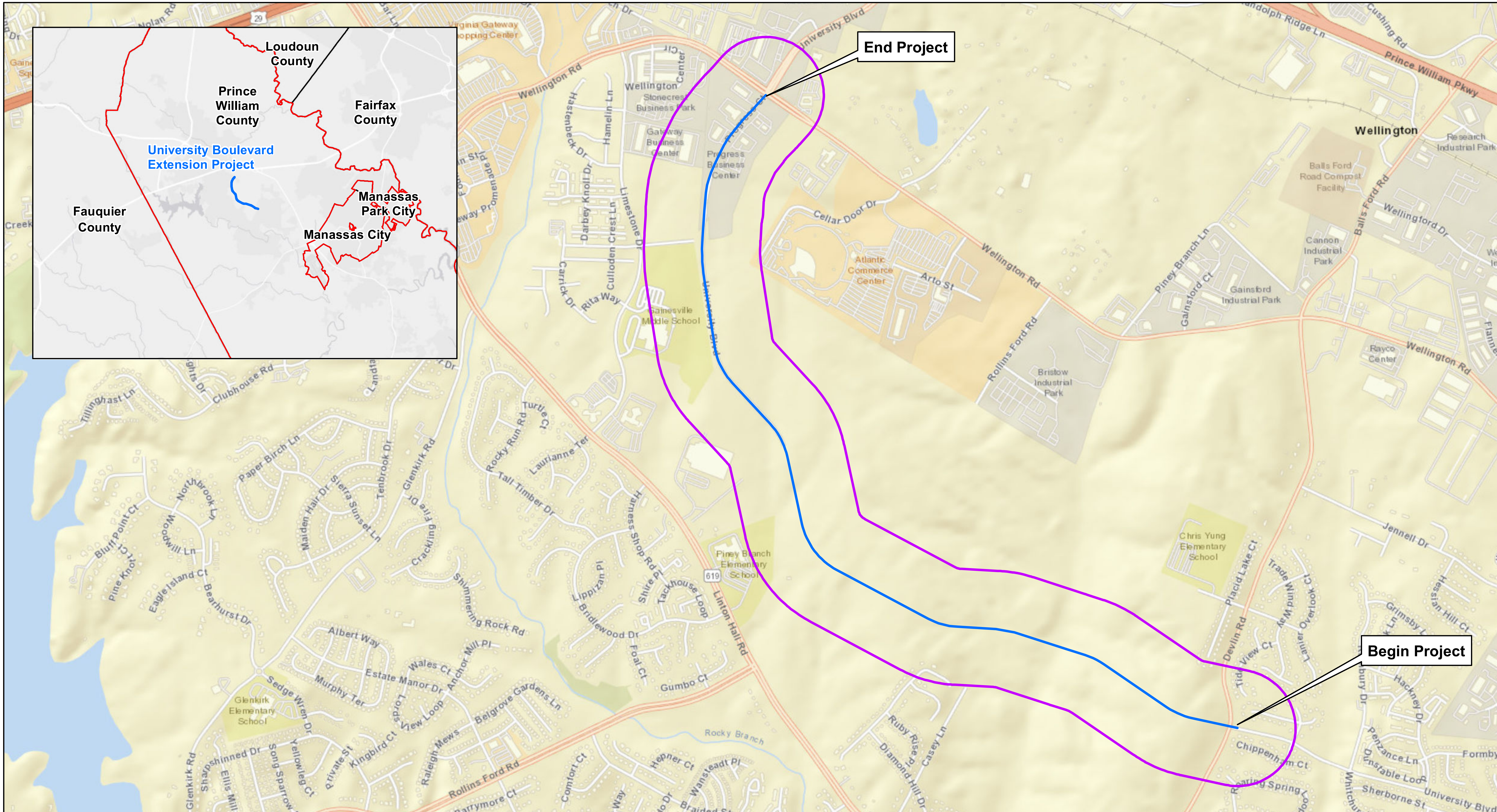


University Boulevard Extension
from Devlin Road to Wellington Road
Prince William County, VA
October 2025

Figure 1

University Boulevard Extension from Devlin Road to Wellington Road
Prince William County, VA
October 2025

VDOT
Virginia Department of Transportation

N

Legend

- Short-Term Monitoring Site
- Long-Term Monitoring Site

Receptor

- Not Impacted, Not Benefited
- Not Impacted, Benefited
- Impacted, Benefited
- Non-Noise Sensitive
- 500-ft Noise Study Area
- Barrier Feasible and Not Reasonable
- Barrier Feasible and Reasoable
- Existing Noise Barrier
- Proposed Roadway Design
- Proposed Cut
- Proposed Fill
- Proposed Right of Way
- Parcels

Figure

2-1

University Boulevard Extension from Devlin Road to Wellington Road
Prince William County, VA
October 2025

VDOT
Virginia Department of Transportation

Legend

- Short-Term Monitoring Site
- Long-Term Monitoring Site

Receptor

- Not Impacted, Not Benefited
- Not Impacted, Benefited
- Impacted, Benefited
- Non-Noise Sensitive
- 500-ft Noise Study Area
- Barrier Feasible and Not Reasonable
- Barrier Feasible and Reasoable
- Existing Noise Barrier
- Proposed Roadway Design
- Proposed Cut
- Proposed Fill
- Proposed Right of Way
- Parcels

N

Figure 2-2

University Boulevard Extension from Devlin Road to Wellington Road Prince William County, VA October 2025

VDOT Virginia Department of Transportation

Legend

- Short-Term Monitoring Site
- Long-Term Monitoring Site

Receptor

- Not Impacted, Not Benefited
- Not Impacted, Benefited
- Impacted, Benefited
- Non-Noise Sensitive
- 500-ft Noise Study Area
- Barrier Feasible and Not Reasonable
- Barrier Feasible and Reasoable
- Existing Noise Barrier
- Proposed Roadway Design
- Proposed Cut
- Proposed Fill
- Proposed Right of Way
- Parcels

N

Figure 2-3

University Boulevard Extension
from Devlin Road to Wellington Road
Prince William County, VA
October 2025

VDOT Virginia Department of Transportation

Legend

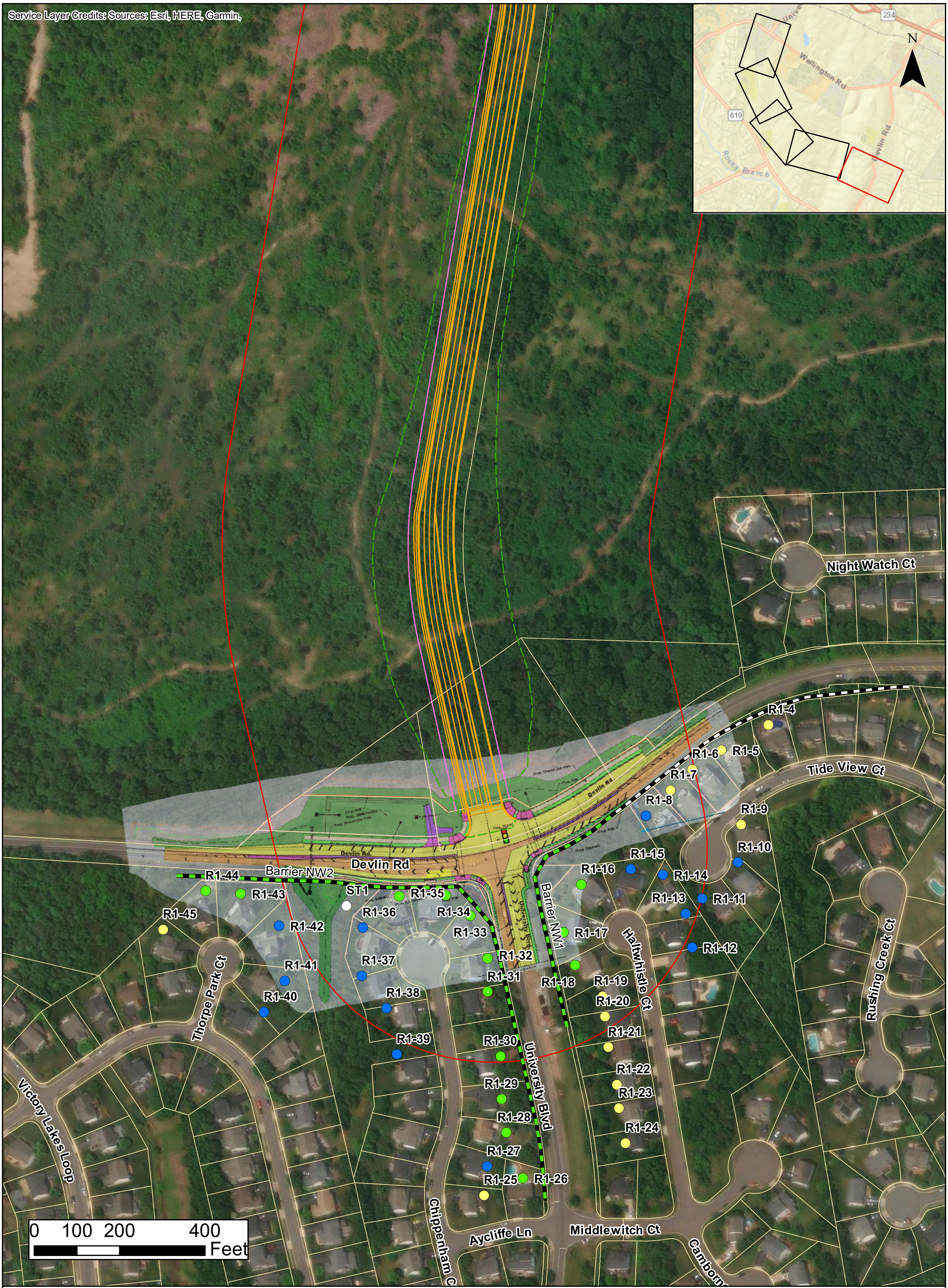
- Short-Term Monitoring Site
- Long-Term Monitoring Site

Receptor

- Not Impacted, Not Benefited
- Not Impacted, Benefited
- Impacted, Benefited
- Non-Noise Sensitive
- 500-ft Noise Study Area
- Barrier Feasible and Not Reasonable
- Barrier Feasible and Reasoable
- Existing Noise Barrier
- Proposed Roadway Design
- Proposed Cut
- Proposed Fill
- Proposed Right of Way
- Parcels

Figure

2-4



University Boulevard Extension
from Devlin Road to Wellington Road
Prince William County, VA
October 2025

VDOT Virginia Department of Transportation

Legend

- Short-Term Monitoring Site
- Long-Term Monitoring Site

Receptor

- Not Impacted, Not Benefited
- Not Impacted, Benefited
- Impacted, Benefited
- Non-Noise Sensitive
- 500-ft Noise Study Area
- Barrier Feasible and Not Reasonable
- Barrier Feasible and Reasoable
- Existing Noise Barrier
- Proposed Roadway Design
- Proposed Cut
- Proposed Fill
- Proposed Right of Way
- Parcels

N

Figure

2-5

Appendix A

HOURLY EQUIVALENT TRAFFIC NOISE LEVELS

Table A-1: University Boulevard Extension
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels

Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R1-4	Residential	B	1	1	12628 TIDE VIEW CT	54	56	56	2
R1-5	Residential	B	1	1	12636 TIDE VIEW CT	53	55	56	2
R1-6	Residential	B	1	1	12640 TIDE VIEW CT	54	57	57	2
R1-7	Residential	B	1	1	12644 TIDE VIEW CT	55	57	57	2
R1-8	Residential	B	1	1	12648 TIDE VIEW CT	60	62	62	2
R1-9	Residential	B	1	1	12641 TIDE VIEW CT	53[4]	53[4]	53[4]	0
R1-10	Residential	B	1	1	12647 TIDE VIEW CT	53[4]	55	54	1
R1-11	Residential	B	1	1	12651 TIDE VIEW CT	53[4]	53[4]	53[4]	0
R1-12	Residential	B	1	1	12530 HALTWHISTLE CT	53[4]	53[4]	53[4]	0
R1-13	Residential	B	1	1	12534 HALTWHISTLE CT	53[4]	53[4]	53[4]	0
R1-14	Residential	B	1	1	12534 HALTWHISTLE CT	54	56	56	2
R1-15	Residential	B	1	1	12538 HALTWHISTLE CT	59	61	61	2
R1-16	Residential	B	1	1	12535 HALTWHISTLE CT	63	66	**66**	3
R1-17	Residential	B	1	1	12531 HALTWHISTLE CT	61	67	**68**	7
R1-18	Residential	B	1	1	12531 HALTWHISTLE CT	58	65	**66**	8
R1-19	Residential	B	1	1	12523 HALTWHISTLE CT	56	63	64	8
R1-20	Residential	B	1	1	12519 HALTWHISTLE CT	56	63	64	8
R1-21	Residential	B	1	1	12515 HALTWHISTLE CT	56	63	64	8
R1-22	Residential	B	1	1	12511 HALTWHISTLE CT	56	63	64	8

Table A-1: University Boulevard Extension
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels

Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R1-23	Residential	B	1	1	12507 HALTWHISTLE CT	56	63	64	8
R1-24	Residential	B	1	1	12507 HALTWHISTLE CT	55	62	64	9
R1-25	Residential	B	1	1	12524 CHIPPENHAM CT	53	60	61	9
R1-26	Residential	B	1	1	8750 AYCLIFFE LN	58	66	**67**	9
R1-27	Residential	B	1	1	12530 CHIPPENHAM CT	54	61	62	9
R1-28	Residential	B	1	1	12534 CHIPPENHAM CT	58	66	**67**	8
R1-29	Residential	B	1	1	12538 CHIPPENHAM CT	58	65	**66**	9
R1-30	Residential	B	1	1	12542 CHIPPENHAM CT	60	67	**68**	8
R1-31	Residential	B	1	1	12550 CHIPPENHAM CT	61	67	**68**	8
R1-32	Residential	B	1	1	12554 CHIPPENHAM CT	63	69	**71**	8
R1-33	Residential	B	1	1	12558 CHIPPENHAM CT	64	69	**70**	5
R1-34	Residential	B	1	1	12562 CHIPPENHAM CT	67	71	**69**	3
R1-35	Residential	B	1	1	12561 CHIPPENHAM CT	67	70	**68**	1
R1-36	Residential	B	1	1	12557 CHIPPENHAM CT	61	64	61	1
R1-37	Residential	B	1	1	12553 CHIPPENHAM CT	54	57	55	1
R1-38	Residential	B	1	1	12549 CHIPPENHAM CT	53[4]	53[4]	53[4]	0
R1-39	Residential	B	1	1	12541 CHIPPENHAM CT	53[4]	53[4]	53[4]	0
R1-40	Residential	B	1	1	13000 THORPE PARK CT	53[4]	53[4]	53[4]	0
R1-41	Residential	B	1	1	13004 THORPE PARK CT	54	57	55	1

Table A-1: University Boulevard Extension
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels

Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R1-42	Residential	B	1	1	13008 THORPE PARK CT	61	64[5]	61	1
R1-43	Residential	B	1	1	13012 THORPE PARK CT	66	70[5]	**67**	1
R1-44	Residential	B	1	1	13009 THORPE PARK CT	67	70[5]	**67**	1
R1-45	Residential	B	1	1	13005 THORPE PARK CT	58	61[5]	58	0
R1-46	Residential	B	1	1	13148 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-47	Residential	B	1	1	13154 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-48	Residential	B	1	1	13158 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-49	Residential	B	1	1	13162 SAPPHIRE RIDGE PL	53[4]	53[4]	53	0
R1-50	Residential	B	1	1	13166 SAPPHIRE RIDGE PL	53[4]	53[4]	54	1
R1-51	Residential	B	1	1	13170 SAPPHIRE RIDGE PL	53[4]	53[4]	54	1
R1-52	Residential	B	1	1	13174 SAPPHIRE RIDGE PL	53[4]	53[4]	54	1
R1-53	Residential	B	1	1	13178 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-54	Residential	B	1	1	13182 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-55	Residential	B	1	1	13161 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-56	Residential	B	1	1	13165 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R1-57	Residential	B	1	1	13175 SAPPHIRE RIDGE PL	53[4]	53[4]	53[4]	0
R2-1a	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	54	1
R2-1b	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	54	1

Table A-1: University Boulevard Extension
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels

Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-1c	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53	0
R2-1d	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53	0
R2-1e	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1f	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1g	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1h	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53	0
R2-1i	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1j	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1k	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1l	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1m	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1n	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1o	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-1p	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1q	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1r	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-1s	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-2a	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	61	8
R2-2b	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	63	**10**
R2-2c	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	59	6
R2-2d	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	60	7
R2-2e	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	58	5
R2-2f	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	58	5
R2-2g	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	56	3
R2-2h	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	56	3
R2-2i	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	55	2

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-2j	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	55	2
R2-3a	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-3b	School - Outdoor Sports Field	C	0.9	2	13150 UNIVERSITY BLVD	53[4]	53[4]	53[4]	0
R2-4a	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	57	4
R2-4b	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-4c	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	54	1
R2-4d	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	55	2
R2-4e	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	56	3
R2-4f	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	53[4]	0
R2-4g	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	53	0
R2-4h	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	54	1
R2-4i	School - Outdoor Sports Field	C	1	2	8001 LIMESTONE DR	53[4]	53[4]	55	2
R2-5a	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	64	11

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-5b	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	65	**12**
R2-5c	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	65	**12**
R2-5d	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	65	**12**
R2-5e	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53	65	**12**
R2-5f	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-5g	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-5h	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	60	7
R2-5i	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	60	7
R2-5j	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	60	7
R2-7a	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53	54	**67**	**13**
R2-7b	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	55	55	**68**	**13**
R2-7c	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	54	55	**68**	**13**
R2-7d	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	61	8

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-7e	School - Outdoor Sports Field	C	1	2	8001 LIMESTONE DR	43	43	43	0
R2-7f	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	62	9
R2-7g	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	62	9
R2-7h	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	62	9
R2-7i	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	58	5
R2-7j	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	58	5
R2-7k	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-7l	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-7m	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	56	3
R2-7n	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	56	3
R2-7o	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	57	4
R2-8	School - Indoor	D	1	2	13150 UNIVERSITY BLVD	38	38	46	8
R2-9a	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53	62	9

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Land Use	NAC	NRRs[3]	CNE	Address	2021 Existing	2048 No Build	2048 Build	2048 Build - Existing Δ
R2-9b	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53	53	62	9
R2-9c	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	55	55	62	7
R2-9d	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	57	57	62	5
R2-9e	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	60	60	62	2
R2-9f	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	65	65	64	-1
R2-9g	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-9h	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	59	6
R2-9i	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53	53	59	6
R2-9j	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	56	56	59	4
R2-9k	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	60	60	60	1
R2-9l	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	65	65	63	-1
R2-9m	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	57	4
R2-9n	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53[4]	57	4

Table A-1: University Boulevard Extension Noise-Sensitive Receptors and Hourly Equivalent Noise Levels									
Receptors						**Predicted Noise Levels, $L_{eq(h)}$ (dB(A))**			
Rec. No.	**Land Use**	**NAC**	**NRRs[3]**	**CNE**	**Address**	**2021 Existing**	**2048 No Build**	**2048 Build**	**2048 Build - Existing** **Δ**
R2-9o	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	53[4]	53	57	4
R2-9p	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	55	55	58	2
R2-9q	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	60	60	59	-1
R2-9r	School - Outdoor Sports Field	C	0.3	2	8001 LIMESTONE DR	64	64	62	-2
Predicted Traffic Noise Impacts[1]								**17[1]**	**9[2]**

Impact = (red)

1. Predicted traffic noise impact due to approaching or exceeding NAC.
2. Predicted traffic noise impact due to a "substantial increase" above existing noise levels of 10 dB(A) or more.
3. The number of non-residential receptors (NRRs) are determined by evaluating the person-hours-of-use-per-year associated with a non-residential land use. For residential (NAC B) locations, one equivalent receptor is equal to one dwelling unit (DU).
4. Where traffic may not be the dominant noise source and TNM predicts a noise level less than ambient noise level floor, the measured ambient noise level of 53 dB(A) is reported.
5. A reduction is noise levels from No Build to Build is accounted by the shift in traffic patterns away from Devlin Road due to the opening of the new alignment University Boulevard.

Appendix B

AMBIENT NOISE LEVEL MONITORING AND VALIDATION

Table B-1: Project Ambient Hourly-Equivalent Sound Levels, L_{eq}(h)[1]

Monitoring Site	Measurement Number	Land Use	Roadway Noise Source	Date	Start/Stop Time	L_{eq}(h) dB(A)
ST1	1	Residential	Devlin Road	3/19/25	12:07-12:27	54.6
	2	Residential	Devlin Road	3/19/25	12:28-12:48	55.9
ST2	1	High School	University Boulevard	3/19/25	9:11-9:31	53.0
ST3	1	Commercial	University Boulevard	3/19/25	9:48-10:08	62.2
	2	Commercial	University Boulevard	3/19/25	11:17-11:37	59.3
ST4	1	Commercial	Wellington Road	3/19/25	10:28-10:48	69.9
	2	Commercial	Wellington Road	3/19/25	10:50-11:10	70.5

[1]In accordance with FHWA guidance and accepted industry standards, hourly equivalent sounds levels, $L_{eq(h)}$ were extrapolated from short-term data collection monitoring sessions and are expressed in units of A-weighted decibels (dB(A)).

Table B-2: Project Noise Monitoring Sessions Weather Data

Site	Date	Time	Temp (F)	Wind Speed (mph) and Direction	Relative Humidity (%)	Station ID[1]
1	3/19/25	12:07	59	7 N	35	KVAGAINE55
2	3/19/25	12:28	46	2 N	63	KVAGAINE55
3	3/19/25	9:48	46	2 N	63	KVAGAINE55
4	3/19/25	10:28	53	2 N	63	KVAGAINE55

[1]Weather Underground (http://www.wunderground.com) for the local weather station.

Table B-3: Short-Term Measurements 20-Minute Traffic Counts

Monitoring Site	Measurement Number	Date	Start/Stop Time	Roadway	Cars	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Speed (mph)
ST1	1	3/19/25	12:07-12:27	Devlin Road	198	5	1	0	0	45
	2	3/19/25	12:28-12:48	Devlin Road	183	7	1	0	2	45
ST2	1	3/19/25	9:11-9:31	University Boulevard	28	0	2	0	0	30
ST3	1	3/19/25	9:48-10:08	University Boulevard	113	2	2	15	0	30
	2	3/19/25	11:17-11:37	University Boulevard	51	5	0	9	1	30
ST4	1	3/19/25	10:28-10:48	Wellington Road	242	28	6	7	0	50
	2	3/19/25	10:50-11:10	Wellington Road	331	38	7	7	0	50

Table B-4: TNM Validation Results

CNE	Monitoring Site	Measurement Number	Measured L_{eq}(h) (dBA(A))	Predicted L_{eq}(h) (dBA(A))	Difference (dBA(A))[1]
1	ST1	1	54.6	57.5	2.9[2]
		2	55.9	57.7	1.8
2	ST2	1	53.0	50.4	-2.6[3]
2	ST3	1	62.2	60.6	-1.6
		2	59.3	58.6	-0.7
2	ST4	1	69.9	68.6	-1.3
		2	70.5	69.8	-0.7

[1]Hourly equivalent noise levels, Leq, are expressed to the nearest one-tenth decibels to ensure that TNM-predicted levels validated to within +/- 3.0 dB(A) of measured noise levels without the benefits of rounding.
[2]Site ST1_1 validated at the top of the threshold due to the variation of traffic speeds in the field from the intersection of Devlin Road and University Boulevard, resulting in a higher TNM predicted noise level.
[3]Site ST2_1 validated at the bottom of the threshold due to the low traffic volumes and TNM's inability to predict background noise. This is consistent with the background noise levels recorded at LT1 of 53 dB(A).

Table B-5: Worst Noise Hour Measurement Results		
Date	**Hour**	**Average Hourly Noise Level (Leq(h) (dB(A)))**
17-Mar	14:00	50.6
17-Mar	15:00	52.9
17-Mar	16:00	51.7
17-Mar	17:00	49.5
17-Mar	18:00	49.6
17-Mar	19:00	44.7
17-Mar	20:00	51.0
17-Mar	21:00	44.0
17-Mar	22:00	43.4
17-Mar	23:00	45.8
18-Mar	0:00	42.6
18-Mar	1:00	42.0
18-Mar	2:00	40.7
18-Mar	3:00	40.2
18-Mar	4:00	44.3
18-Mar	5:00	44.7
18-Mar	6:00	47.6
18-Mar	7:00	49.2
18-Mar	8:00	49.4
18-Mar	9:00	49.2
18-Mar	10:00	47.0
18-Mar	11:00	47.1
18-Mar	12:00	45.8
18-Mar	13:00	45.7

Noise Monitoring Site ST1 – Field Data Sheet

PROJECT: University Blvd. Ext

MEAS SITE: ST1

DATE: 3/19/25 STAFF: KS

MEAS NO	1	2	
START TIME	12:07pm	12:28PM	
END TIME	12:27PM	12:48PM	
INSTRUMENT	3002633	"	
BATTERY	4590	"	
LEQ	54.63	55.94	
FILE NAME	Project010	Project011	
CALIBRATION	✓ /	✓ /	/

TRAFFIC

ROADWAY	Devlin Rd.		
VEH SPEED	Posted: 45 Actual: 45-50		
AUTO	198	183	
MT	5	7	
HT	1	1	
BUS	—	0	
MOTO	—	2	
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

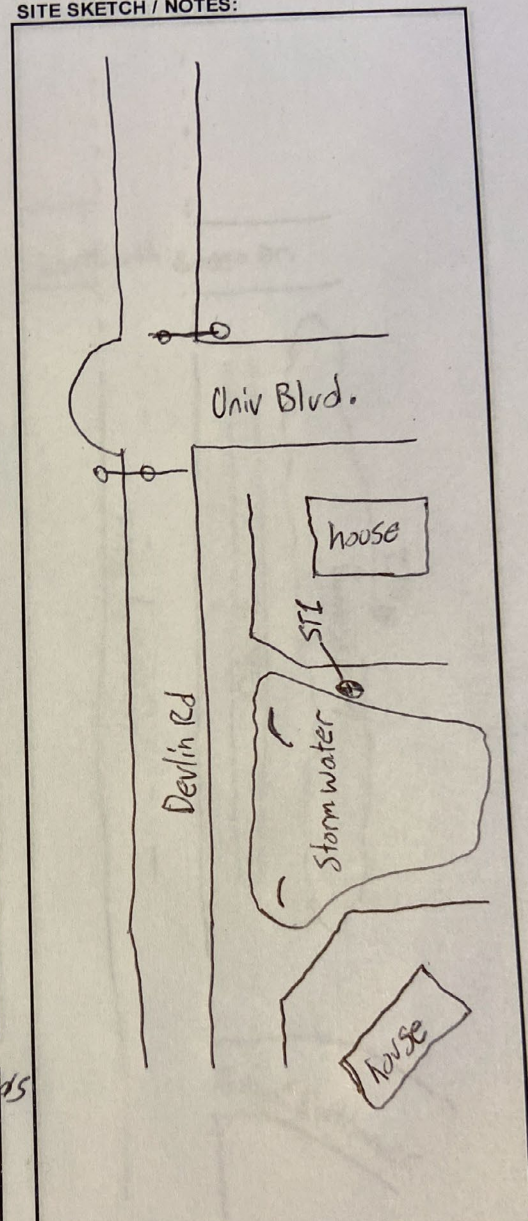
WEATHER

GENERAL	Clear Sunny day w/minimal Clouds
TEMP	59°F
% RH	35%
WIND SPD/DIR	7 mph / North
ROAD COND.	Dry

SITE

LATITUDE	38.7667667	"	
LONGITUDE	-77.5700572	"	
PICTURES			

SITE SKETCH / NOTES:



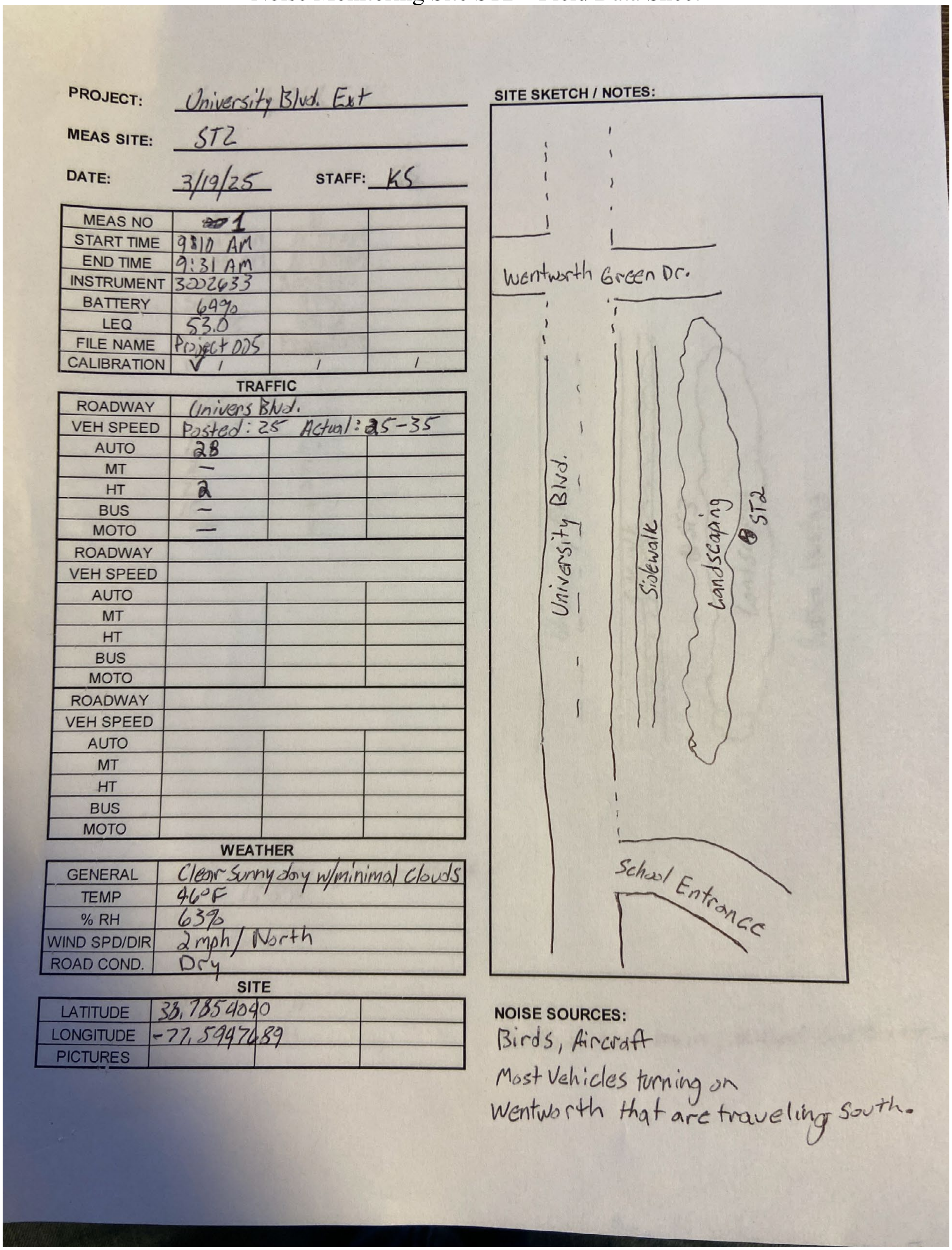
NOISE SOURCES:

Bugs, leaves, traffic ATR

Frogs

Noise Monitoring Site ST1
Devlin Road – Single Family Residential
Short-Term Measurement

Noise Monitoring Site ST2 – Field Data Sheet



PROJECT: University Blvd. Ext

MEAS SITE: ST2

DATE: 3/19/25 STAFF: KS

MEAS NO	1		
START TIME	9:10 AM		
END TIME	9:31 AM		
INSTRUMENT	3002633		
BATTERY	69%		
LEQ	53.0		
FILE NAME	Project 005		
CALIBRATION	✓ /	/	/

TRAFFIC

ROADWAY	Univers Blvd.		
VEH SPEED	Posted: 25 Actual: 25-35		
AUTO	28		
MT	—		
HT	2		
BUS	—		
MOTO	—		
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

WEATHER

GENERAL	Clear Sunny day w/minimal clouds
TEMP	46°F
% RH	63%
WIND SPD/DIR	2 mph / North
ROAD COND.	Dry

SITE

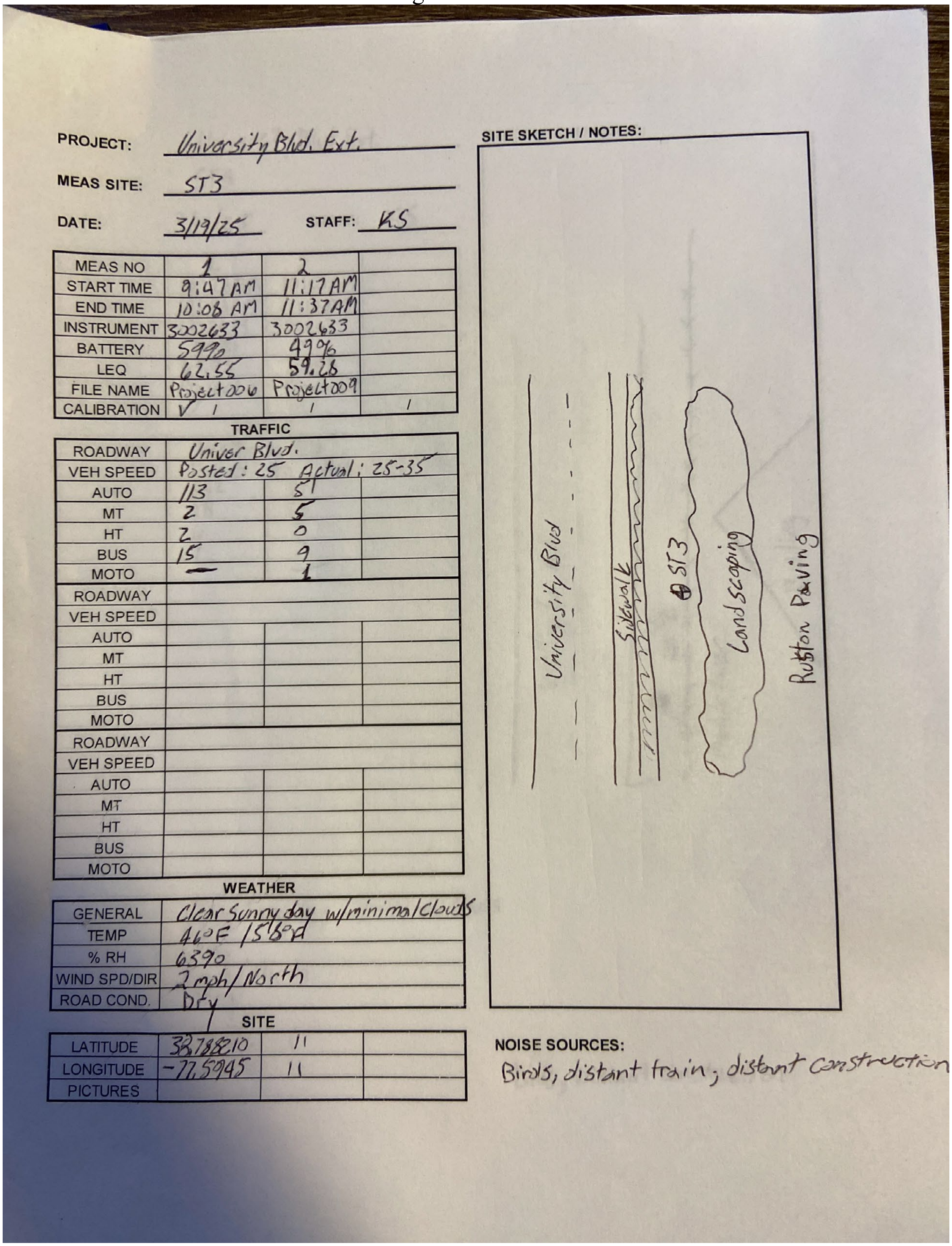
LATITUDE	38.7854040		
LONGITUDE	-77.5947489		
PICTURES			

SITE SKETCH / NOTES:

NOISE SOURCES:
Birds, Aircraft
Most Vehicles turning on Wentworth that are traveling South.

Noise Monitoring Site ST2
University Boulevard – High School
Short-Term Measurement

Noise Monitoring Site ST3 – Field Data Sheet



PROJECT: University Blvd. Ext.

MEAS SITE: ST3

DATE: 3/19/25 STAFF: KS

MEAS NO	1	2	
START TIME	9:47AM	11:17AM	
END TIME	10:08 AM	11:37AM	
INSTRUMENT	3002633	3002633	
BATTERY	59%	49%	
LEQ	62.55	59.28	
FILE NAME	Project006	Project009	
CALIBRATION	✓ /	/	/

TRAFFIC

ROADWAY	Univer Blvd.		
VEH SPEED	Posted: 25	Actual: 25-35	
AUTO	113	51	
MT	2	5	
HT	2	0	
BUS	15	9	
MOTO	—	1	
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

WEATHER

GENERAL	Clear Sunny day w/minimal clouds
TEMP	46°F / 15.8°C
% RH	63%
WIND SPD/DIR	2 mph/North
ROAD COND.	Dry

SITE

LATITUDE	38.788210	//	
LONGITUDE	-77.5945	//	
PICTURES			

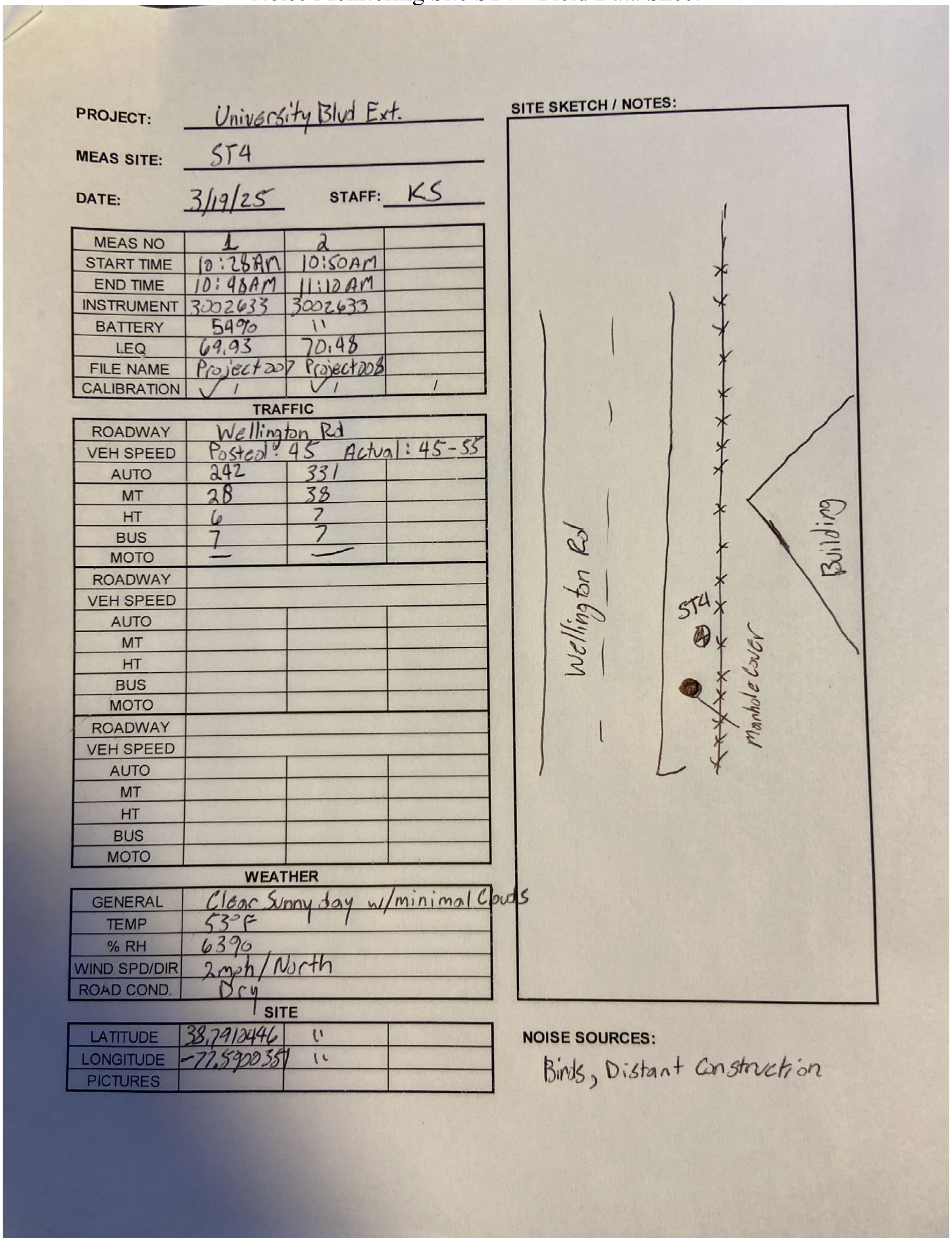
SITE SKETCH / NOTES:

NOISE SOURCES:

Birds, distant train, distant construction

Noise Monitoring Site ST3
University Boulevard – Commercial
Short-Term Measurement

Noise Monitoring Site ST4 – Field Data Sheet



PROJECT: University Blvd Ext.

MEAS SITE: ST4

DATE: 3/19/25 STAFF: KS

MEAS NO	1	2	
START TIME	10:28AM	10:50AM	
END TIME	10:48AM	11:10AM	
INSTRUMENT	3002633	3002633	
BATTERY	54%	"	
LEQ	69.93	70.48	
FILE NAME	Project007	Project008	
CALIBRATION	✓ /	✓ /	/

TRAFFIC

ROADWAY	Wellington Rd		
VEH SPEED	Posted: 45 Actual: 45-55		
AUTO	242	331	
MT	28	38	
HT	6	7	
BUS	7	7	
MOTO	—	—	
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

WEATHER

GENERAL	Clear Sunny day w/minimal Clouds
TEMP	53°F
% RH	63%
WIND SPD/DIR	2mph/North
ROAD COND.	Dry

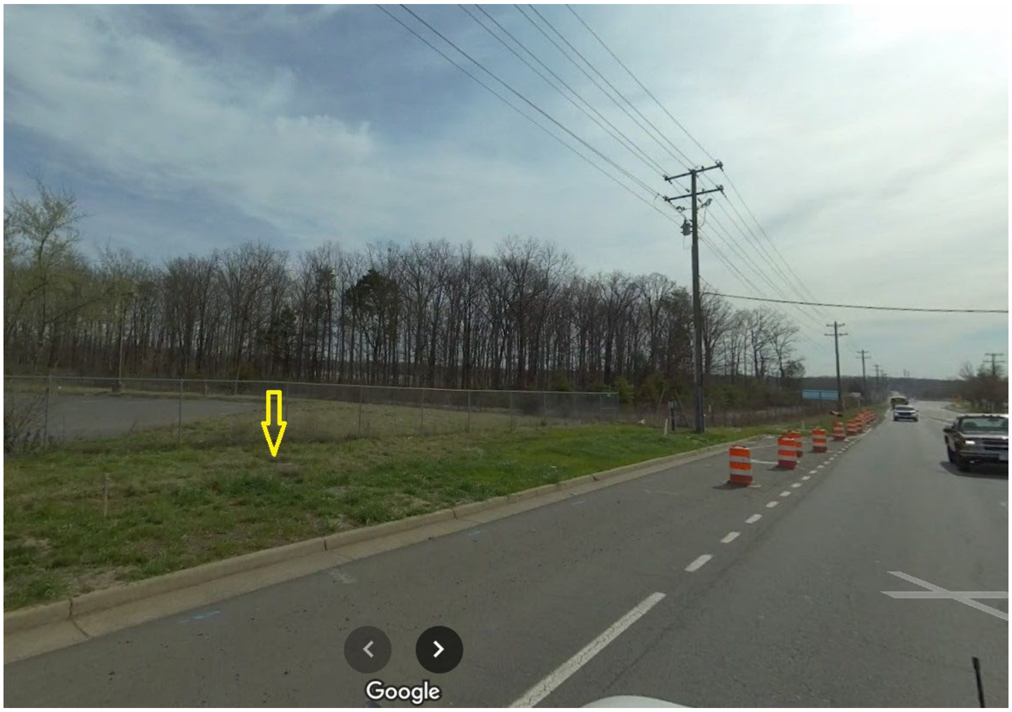
SITE

LATITUDE	38.7912446	"	
LONGITUDE	-77.5900351	"	
PICTURES			

SITE SKETCH / NOTES:

NOISE SOURCES: Birds, Distant Construction

Noise Monitoring Site ST4
Wellington Road - Commercial
Short-Term Measurement



Noise Monitoring Site LT1
Casey Lane - Residential
Long-Term Measurement

Appendix C

TRAFFIC DATA

Traffic Data

Traffic data used for this assessment is based on information provided in the *University Boulevard (Route 0840) Extension Operational Analysis* prepared by WSP for the Prince William County, dated April 2025. The final traffic report provides design hour volumes for the sections of roadway evaluated in this Preliminary Noise Report. Truck percentages were utilized from the turning movement counts collected by Peggy Malone & Associates. Though the counted truck percentages were not differentiated between medium and heavy trucks, the assumption was made from the WSP traffic engineering team that the percentages would be split evenly between medium and heavy trucks to accurately depict truck usage on the roadways. All data used for this noise assessment was provided by the WSP traffic engineering team.

Table C-1: Base Year 2024 Traffic Volumes – Existing Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
University Blvd	SB	2	North of Wellington Rd	1,294	95	2.5	2.5	40
University Blvd	SB	1	Wellington Rd to Wentworth Green	379	95.5	2.25	2.25	40
University Blvd	SB	1	Wentworth Green Dr to Gainesville HS N Ent	253	98.8	0.6	0.6	40
University Blvd	SB	1	Gainesville HS N Ent to Gainesville HS S Ent	226	98.3	0.85	0.85	40
University Blvd	SB	1	South of Gainesville HS S Ent	24	100	0	0	40
University Blvd	SB	1	South of Devlin Rd	261	97.3	1.35	1.35	40
University Blvd	NB	1	South of Devlin Rd	160	97.3	1.35	1.35	40
University Blvd	NB	1	South of Gainesville HS S Ent	25	100	0	0	40
University Blvd	NB	1	Gainesville HS S Ent to Gainesville HS N Ent	129	98.3	0.85	0.85	40
University Blvd	NB	1	Gainesville HS N Ent to Wentworth Green Dr	210	98.8	0.6	0.6	40
University Blvd	NB	1	Wentworth Green Dr to Wellington Rd	323	95.5	2.25	2.25	40
University Blvd	NB	2	North of Wellington Rd	709	95	2.5	2.5	40
Wellington Rd	EB	2	West of University Blvd	661	97.6	1.2	1.2	50
Wellington Rd	EB	2	East of University Blvd	1,070	97.6	1.2	1.2	50
Wellington Rd	WB	2	West of University Blvd	821	94.5	2.75	2.75	50
Wellington Rd	WB	2	East of University Blvd	701	94.5	2.75	2.75	50
Wentworth Green Dr	EB	1	West of University Blvd	329	94	3	3	35
Wentworth Green Dr	EB	1	East of University Blvd	82	94	3	3	35
Wentworth Green Dr	WB	1	West of University Blvd	344	90.7	4.65	4.65	35
Wentworth Green Dr	WB	1	East of University Blvd	84	90.7	4.65	4.65	35
Gainesville HS N Ent	EB	1	East of University Blvd	33	98.7	0.65	0.65	35
Gainesville HS N Ent	WB	1	East of University Blvd	87	98.7	0.65	0.65	35
Gainesville HS S Ent	EB	1	East of University Blvd	211	98.9	0.55	0.55	35
Gainesville HS S Ent	WB	1	East of University Blvd	113	98.9	0.55	0.55	35
Devlin Rd	NB	1	North of University Blvd	543	98.3	0.85	0.85	50

Table C-1: Base Year 2024 Traffic Volumes – Existing Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
Devlin Rd	NB	1	South of University Blvd	497	98.3	0.85	0.85	50
Devlin Rd	NB	1	North of University Blvd	1,059	99.1	0.45	0.45	50
Devlin Rd	NB	1	South of University Blvd	912	99.1	0.45	0.45	50

Table C-2: Design Year 2048 Traffic Volumes – No-Build Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
University Blvd	SB	2	North of Wellington Rd	1,620	95	2.5	2.5	40
University Blvd	SB	1	Wellington Rd to Wentworth Green	525	95.5	2.25	2.25	40
University Blvd	SB	1	Wentworth Green Dr to Gainesville HS N Ent	262	98.8	0.6	0.6	40
University Blvd	SB	1	Gainesville HS N Ent to Gainesville HS S Ent	233	98.3	0.85	0.85	40
University Blvd	SB	1	South of Gainesville HS S Ent	27	100	0	0	40
University Blvd	SB	1	South of Devlin Rd	1,200	97.3	1.35	1.35	40
University Blvd	NB	1	South of Devlin Rd	1,242	97.3	1.35	1.35	40
University Blvd	NB	1	South of Gainesville HS S Ent	30	100	0	0	40
University Blvd	NB	1	Gainesville HS S Ent to Gainesville HS N Ent	127	98.3	0.85	0.85	40
University Blvd	NB	1	Gainesville HS N Ent to Wentworth Green Dr	207	98.8	0.6	0.6	40
University Blvd	NB	1	Wentworth Green Dr to Wellington Rd	497	95.5	2.25	2.25	40
University Blvd	NB	2	North of Wellington Rd	1,074	95	2.5	2.5	40
Wellington Rd	EB	2	West of University Blvd	1,258	97.6	1.2	1.2	50
Wellington Rd	EB	2	East of University Blvd	1,529	97.6	1.2	1.2	50
Wellington Rd	WB	2	West of University Blvd	1,661	94.5	2.75	2.75	50

Table C-2: Design Year 2048 Traffic Volumes – No-Build Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
Wellington Rd	WB	2	East of University Blvd	1,414	94.5	2.75	2.75	50
Wentworth Green Dr	EB	1	West of University Blvd	500	94	3	3	35
Wentworth Green Dr	EB	1	East of University Blvd	109	94	3	3	35
Wentworth Green Dr	WB	1	West of University Blvd	476	90.7	4.65	4.65	35
Wentworth Green Dr	WB	1	East of University Blvd	112	90.7	4.65	4.65	35
Gainesville HS N Ent	EB	1	East of University Blvd	35	98.7	0.65	0.65	35
Gainesville HS N Ent	WB	1	East of University Blvd	86	98.7	0.65	0.65	35
Gainesville HS S Ent	EB	1	East of University Blvd	216	98.9	0.55	0.55	35
Gainesville HS S Ent	WB	1	East of University Blvd	107	98.9	0.55	0.55	35
Devlin Rd	NB	1	North of University Blvd	1,251	98.3	0.85	0.85	50
Devlin Rd	NB	1	South of University Blvd	1,454	98.3	0.85	0.85	50
Devlin Rd	NB	1	North of University Blvd	1,194	99.1	0.45	0.45	50
Devlin Rd	NB	1	South of University Blvd	1,419	99.1	0.45	0.45	50

Table C-3: Design Year 2048 Traffic Volumes – Build Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
University Blvd	SB	2	North of Wellington Rd	1,620	95	2.5	2.5	40
University Blvd	SB	2	Wellington Rd to Wentworth Green	525	95.5	2.25	2.25	40
University Blvd	SB	2	Wentworth Green Dr to Gainesville HS N Ent	262	98.8	0.6	0.6	40
University Blvd	SB	2	Gainesville HS N Ent to Gainesville HS S Ent	233	98.3	0.85	0.85	40
University Blvd	SB	2	Gainesville HS S Ent to Rollins Ford Rd	736	98.3	0.85	0.85	40

Table C-3: Design Year 2048 Traffic Volumes – Build Condition								
Roadway	**Direction**	**Lanes**	**Segment**	**Design Hour Volume (PM)**	**TNM Vehicle Percentages**			
					Auto	**Medium Trucks**	**Heavy Trucks**	**Design Speed (mph)**
University Blvd	SB	2	Rollins Ford Rd to Devlin Rd	1,634	98.3	0.85	0.85	40
University Blvd	SB	2	South of Devlin Rd	983	97.3	1.35	1.35	40
University Blvd	NB	2	South of Devlin Rd	954	98.3	1.35	1.35	40
University Blvd	NB	2	Devlin Rd to Rollins Ford Rd	736	98.3	0.85	0.85	40
University Blvd	NB	2	Rollins Ford Rd to Gainesville HS S Ent	1,032	98.3	0.85	0.85	40
University Blvd	NB	2	Gainesville HS S Ent to Gainesville HS N Ent	1,650	95.5	0.85	0.85	50
University Blvd	NB	2	Gainesville HS N Ent to Wentworth Green Dr	1,174	95	0.6	0.6	50
University Blvd	NB	2	Wentworth Green Dr to Wellington Rd	784	97.6	2.25	2.25	50
University Blvd	NB	2	North of Wellington Rd	896	97.6	2.5	2.5	50
Wellington Rd	EB	2	West of University Blvd	983	94.5	1.2	1.2	35
Wellington Rd	EB	2	East of University Blvd	1,335	94.5	1.2	1.2	35
Wellington Rd	WB	2	West of University Blvd	1,330	94	2.75	2.75	35
Wellington Rd	WB	2	East of University Blvd	1,148	94	2.75	2.75	35
Wentworth Green Dr	EB	1	West of University Blvd	963	90.7	3	3	35
Wentworth Green Dr	EB	1	East of University Blvd	1,315	90.7	3	3	35
Wentworth Green Dr	WB	1	West of University Blvd	899	98.7	4.65	4.65	35
Wentworth Green Dr	WB	1	East of University Blvd	584	98.7	4.65	4.65	35
Gainesville HS N Ent	EB	1	East of University Blvd	89	98.9	0.65	0.65	40
Gainesville HS N Ent	WB	1	East of University Blvd	659	98.9	0.65	0.65	40
Gainesville HS S Ent	EB	1	East of University Blvd	91	95	0.55	0.55	40
Gainesville HS S Ent	WB	1	East of University Blvd	35	95.5	0.55	0.55	40
Devlin Rd	NB	1	North of University Blvd	855	98.3	0.85	0.85	50
Devlin Rd	NB	1	South of University Blvd	757	98.3	0.85	0.85	50
Devlin Rd	NB	1	North of University Blvd	841	99.1	0.45	0.45	50
Devlin Rd	NB	1	South of University Blvd	732	99.1	0.45	0.45	50

Appendix D

NON-RESIDENTIAL RECEPTORS (NRRs) CALCULATIONS

Gainesville Middle School: Receptors R2-4a-R2-4i, R2-5a-R2-5j, R2-7a-R2-7o, R2-9a-R2-9r		
CASE:	Baseball, football, soccer, and track fields for Gainesville Middle School. The average user is on these combined fields for 1-hour a day, and there are 1,350 students at the school who can use the fields. The fields are typically available during the school year, approximately 185 days a year.	
Park / Recreation Area (Activity Category C)		
	For an Average Single Family Residential Unit in Virginia	
A	Average Persons Per Household[1]	2.54
B	Non-Sleeping Hours Per Day Used by Average Household Occupent[2]	16.0
C	Hours Available for Use per Year	5,840
D	**Person-hours per Year Available for Use = A x C**	**14,834**
	For the Trail Area Being Evaluated	
E	Number of days in the year the site is available for use (N)	185
F	Number of hours per day the site is actively used per person (H)	1.00
G	Typical number of people per day using the site (P)	1,350
H	**Person-hours per Year Available for Use = N*H*P**	**249,750**
I	**NON RESIDENTIAL RECEPTOR (NRR) VALUE = H/D**	**16.8**
J	Number of Receptors (Using a grid of receptor points at 100-foot spacing)	52
K	**Equivalent Residence Value Assigned to Each Grid Point = I/J**	**0.3**

Gainesville High School: Receptors R2-1a-R2-1s, R2-2a-R2-2j, R2-3a, R2-3b		
CASE:	Baseball, soccer, and tennis courts for Gainesville High School. The average user is on these combined fields for 1-hour a day, and there are 2,300 students at the school who can use the fields. The fields are typically available during the school year, approximately 185 days a year.	
Park / Recreation Area (Activity Category C)		
	For an Average Single Family Residential Unit in Virginia	
A	Average Persons Per Household[1]	2.54
B	Non-Sleeping Hours Per Day Used by Average Household Occupent[2]	16.0
C	Hours Available for Use per Year	5,840
D	**Person-hours per Year Available for Use = A x C**	**14,834**
	For the Trail Area Being Evaluated	
E	Number of days in the year the site is available for use (N)	185
F	Number of hours per day the site is actively used per person (H)	1.00
G	Typical number of people per day using the site (P)	2,300
H	**Person-hours per Year Available for Use = N*H*P**	**425,500**
I	**NON RESIDENTIAL RECEPTOR (NRR) VALUE = H/D**	**28.7**
J	Number of Receptors (Using a grid of receptor points at 100-foot spacing)	31
K	**Equivalent Residence Value Assigned to Each Grid Point = I/J**	**0.9**

Appendix E

Noise Barrier Analyses

Four noise barriers, including one noise barrier system, have been evaluated for the Build Alternative using TNM.

One noise barrier and one noise barrier system (NW3-1/NW3-2 and NW4) meet VDOT feasibility criteria but do not meet the VDOT reasonability criteria. Two noise barriers (NW1 and NW2) meet both VDOT feasibility and reasonability criteria.

The heights, lengths, surface areas, noise level reductions, and benefits cited in this PNA represent a detailed assessment of noise barrier feasibility and reasonableness. An additional detailed noise study will be required during final design of the project to further evaluate and refine the proposed noise barriers.

The evaluated noise barriers are summarized below.

Noise Barrier NW1 (CNE 1)

Location: East of Devlin Road/North of University Boulevard. The barrier would provide abatement for the homes on Haltwhistle Court.

NW1 meets VDOT noise abatement feasibility and reasonableness criteria.

TNM Run: “4_Univ_NW1_101025” / SBA: “NW1_D3”

Table E.1-1: University Boulevard Extension Noise Barrier NW1 CNE 1	
-NW1- Acoustical Performance Summary	
Impacts: 3	Benefited Receptors @ ≥ 7 dB(A) NLR: 6
Impacted Receptors Benefited: 3	Total Benefits: 10
Non-Impacted Receptors Benefited: 7	
-NW1- Parameters	
Length: 603 ft.	Area / Benefit: 847 sq. ft.
Average Height: 14.0 ft.	Allowable Area / Benefit: 1,600 sq. ft.
Area: 8,469 sq. ft.	

Table E.1-2: Noise Barrier NW1 Performance								
CNE 1 – East of Devlin Road/North of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R1-4	Residential	B	1.0	12628 TIDE VIEW CT	54	56	56	0
R1-5	Residential	B	1.0	12636 TIDE VIEW CT	53	56	55	1
R1-6	Residential	B	1.0	12640 TIDE VIEW CT	54	57	56	1
R1-7	Residential	B	1.0	12644 TIDE VIEW CT	55	57	57	0
R1-8	Residential	B	1.0	12648 TIDE VIEW CT	60	62	56	6
R1-9	Residential	B	1.0	12641 TIDE VIEW CT	53	53	50	3
R1-10	Residential	B	1.0	12647 TIDE VIEW CT	53	54	49	5
R1-11	Residential	B	1.0	12651 TIDE VIEW CT	53	53	48	5
R1-12	Residential	B	1.0	12530 HALTWHISTLE CT	53	53	43	10
R1-13	Residential	B	1.0	12534 HALTWHISTLE CT	53	53	46	7
R1-14	Residential	B	1.0	12534 HALTWHISTLE CT	54	56	51	5
R1-15	Residential	B	1.0	12538 HALTWHISTLE CT	59	61	53	8
R1-16	Residential	B	1.0	12535 HALTWHISTLE CT	63	66	56	10
R1-17	Residential	B	1.0	12531 HALTWHISTLE CT	61	68	57	11
R1-18	Residential	B	1.0	12531 HALTWHISTLE CT	58	66	57	9
R1-19	Residential	B	1.0	12523 HALTWHISTLE CT	56	64	60	4
R1-20	Residential	B	1.0	12519 HALTWHISTLE CT	56	64	61	3
R1-21	Residential	B	1.0	12515 HALTWHISTLE CT	56	64	63	1
R1-22	Residential	B	1.0	12511 HALTWHISTLE CT	56	64	64	0
R1-23	Residential	B	1.0	12507 HALTWHISTLE CT	56	64	64	0
R1-24	Residential	B	1.0	12507 HALTWHISTLE CT	55	64	63	1

Table E.1-2: Noise Barrier NW1 Performance								
CNE 1 – East of Devlin Road/North of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
NW 1 - Predicted "Build-Condition" With-Barrier Benefits:[2]							10	
Impact[3] =			5 to 6 dB(A) NLR =			≥ 7 dB(A) NLR =		

1. Equivalent receptor (ER) calculations for non-residential land uses are included in Appendix G.
2. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
3. See Section 4.3 for the definition of "Impact".

Warranted, Feasible, and Reasonable Worksheet

Note: the answers provided in the worksheet may differ between preliminary and final design. This worksheet is available in a protected digital format upon request.

Date:	10-14-25
Project No. and UPC:	State #: 0840-076-R21 UPC: 118313
County:	Prince William County
Facility:	University Boulevard
Barrier System ID:	NW1
Noise Abatement Category(s)	Noise Barrier
Community Name and/or CNE#	CNE 1

Design phase: ☑ Preliminary Design ☐ Final Design

Warranted

1. Community Documentation (if applicable)
   a. Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued): 1995
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): N/A
   c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." ☑ Yes ☐ No

2. Criteria requiring consideration of noise abatement
   a. Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? ☑ Yes ☐ No
   b. Project causes a substantial noise increase of 10 dB(A) or more? ☑ Yes ☐ No

Feasibility

1. Impacted receptor units
   a. Number of impacted receptor units: 3
   b. Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): 3
   c. Percentage of impacted receptor units receiving 5 dB(A) or more IL: 100%
   d. Is the percentage 50 or greater? ☑ Yes ☐ No

2 Will placement of the noise barrier cause engineering or safety conflicts, e.g. drainage or site distance issues? ☐ Yes ☑ No

3 Will placement of the noise barrier restrict access to vehicular or pedestrian travel? ☐ Yes ☑ No

4 Will placement of the noise barrier conflict with existing utility locations? ☐ Yes ☑ No

Reasonableness

1. Cost-Benefit Factors
   a. Surface Area (Total square foot) of the proposed noise barrier. (ft²) — 8,469
   b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. — 3
   c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. — 7
   d. Total number of benefited receptors. — 10
   e. Surface Area per benefited receptor unit. (ft²/BR) — 847
   f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? — Yes
   g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? — Yes

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

3. Additional Noise Barrier Details
   a. Length of the proposed noise barrier — 603 ft
   b Height range of the proposed noise barrier — 14 ft
   c. Average height of the proposed noise barrier — 14 ft
   d Cost per square foot. ($/ft²) —
   e. Total Barrier Cost ($) —
   f. Additional comments (if applicable) —
   g. Barrier material — ☐ Absorptive ☐ Reflective

Decision

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

Additional Reasons for Decision:

Noise Barrier NW2 (CNE 1)

Location: East of Devlin Road/South of University Boulevard. The barrier would provide abatement for the homes on Chippenham Court and Thorpe Park Court.

NW2 meets VDOT noise abatement feasibility and reasonableness criteria.

TNM Run: "4_Univ_NW2_101025" / SBA: "NW2_D3"

Table E.2-1: University Boulevard Extension Noise Barrier NW2 CNE 1	
-NW2- Acoustical Performance Summary	
Impacts: 11	Benefited Receptors @ ≥ 7 dB(A) NLR: 15
Impacted Receptors Benefited: 11	Total Benefits: 19
Non-Impacted Receptors Benefited: 8	
-NW2- Parameters	
Length: 1,432 ft.	Area / Benefit: 927 sq. ft.
Average Height: 12.3 ft.	Allowable Area / Benefit: 1,600 sq. ft.
Area: 17,608 sq. ft.	

Table E.2-2: Noise Barrier NW1 Performance								
CNE 1 – East of Devlin Road/South of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R1-25	Residential	B	1.0	12524 CHIPPENHAM CT	53	61	58	3
R1-26	Residential	B	1.0	8750 AYCLIFFE LN	58	67	55	12
R1-27	Residential	B	1.0	12530 CHIPPENHAM CT	54	62	55	7
R1-28	Residential	B	1.0	12534 CHIPPENHAM CT	58	67	56	11
R1-29	Residential	B	1.0	12538 CHIPPENHAM CT	58	66	56	10
R1-30	Residential	B	1.0	12542 CHIPPENHAM CT	60	68	57	11
R1-31	Residential	B	1.0	12550 CHIPPENHAM CT	61	68	57	11
R1-32	Residential	B	1.0	12554 CHIPPENHAM CT	63	71	58	13
R1-33	Residential	B	1.0	12558 CHIPPENHAM CT	64	70	57	13
R1-34	Residential	B	1.0	12562 CHIPPENHAM CT	67	69	56	13
R1-35	Residential	B	1.0	12561 CHIPPENHAM CT	67	68	55	13
R1-36	Residential	B	1.0	12557 CHIPPENHAM CT	61	61	52	9
R1-37	Residential	B	1.0	12553 CHIPPENHAM CT	54	55	49	6
R1-38	Residential	B	1.0	12549 CHIPPENHAM CT	53	53	48	5
R1-39	Residential	B	1.0	12541 CHIPPENHAM CT	53	53	46	7
R1-40	Residential	B	1.0	13000 THORPE PARK CT	53	53	47	6
R1-41	Residential	B	1.0	13004 THORPE PARK CT	54	55	49	6
R1-42	Residential	B	1.0	13008 THORPE PARK CT	61	61	53	8
R1-43	Residential	B	1.0	13012 THORPE PARK CT	66	67	56	11
R1-44	Residential	B	1.0	13009 THORPE PARK CT	67	67	58	9
R1-45	Residential	B	1.0	13005 THORPE PARK CT	58	58	56	2
NW 2 - Predicted "Build-Condition" With-Barrier Benefits:[2]							19	

Table E.2-2: Noise Barrier NW1 Performance								
CNE 1 – East of Devlin Road/South of University Boulevard								
Receptors					**Predicted Noise Levels, $L_{eq(h)}$ (dB(A))**			
Rec. No.	**Use**	**NAC**	**ERs[1]**	**Address**	**Existing**	**Build**	**Build With-Bar**	**NLR**

Impact[3] = (red) 5 to 6 dB(A) NLR = (blue) ≥ 7 dB(A) NLR = (green)

1. Equivalent receptor (ER) calculations for non-residential land uses are included in Appendix G.
2. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
3. See Section 4.3 for the definition of "Impact".

Warranted, Feasible, and Reasonable Worksheet

Note: the answers provided in the worksheet may differ between preliminary and final design. This worksheet is available in a protected digital format upon request.

Date:	10-14-25
Project No. and UPC:	State #: 0840-076-R21 UPC: 118313
County:	Prince William County
Facility:	University Boulevard
Barrier System ID:	NW2
Noise Abatement Category(s)	Noise Barrier
Community Name and/or CNE#	CNE 1

Design phase: ☑ Preliminary Design ☐ Final Design

Warranted

1. Community Documentation (if applicable)
   a. Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). 1995
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): N/A
   c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." ☑ Yes ☐ No

2. Criteria requiring consideration of noise abatement
   a. Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? ☑ Yes ☐ No
   b. Project causes a substantial noise increase of 10 dB(A) or more? ☑ Yes ☐ No

Feasibility

1. Impacted receptor units
   a. Number of impacted receptor units: 11
   b. Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): 11
   c. Percentage of impacted receptor units receiving 5 dB(A) or more IL 100%
   d. Is the percentage 50 or greater? ☑ Yes ☐ No

2 Will placement of the noise barrier cause engineering or safety conflicts, e.g. drainage or site distance issues? ☐ Yes ☑ No

3 Will placement of the noise barrier restrict access to vehicular or pedestrian travel? ☐ Yes ☑ No

4 Will placement of the noise barrier conflict with existing utility locations? ☐ Yes ☑ No

Reasonableness

1. Cost-Benefit Factors
   a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2) — 17,608
   b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. — 11
   c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. — 8
   d. Total number of benefited receptors. — 19
   e. Surface Area per benefited receptor unit. (ft^2/BR) — 927
   f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? — Yes
   g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? — Yes

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

3. Additional Noise Barrier Details
   a. Length of the proposed noise barrier — 1,432 ft
   b Height range of the proposed noise barrier — 12-14 ft
   c. Average height of the proposed noise barrier — 12.3 ft
   d Cost per square foot. ($/$ft^2$) — ______
   e. Total Barrier Cost ($) — ______
   f. Additional comments (if applicable) — ______
   g. Barrier material — ☐ Absorptive ☐ Reflective

Decision

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

Additional Reasons for Decision: ______

Noise Barrier System NW3 (CNE 2)

Location: West of University Boulevard. The barrier would provide abatement for the sports fields of Gainesville Middle School.

System NW3 meets VDOT noise abatement feasibility but does not meet reasonableness criteria.

TNM Run: “4_Univ_NW3_update” / SBA: “NW3_D3”

Table E.3-1: University Boulevard Extension Noise Barrier System NW3 CNE 2	
-NW3- Acoustical Performance Summary	
Impacts: 8 (2.4 NRR)	Benefited Receptors @ ≥ 7 dB(A) NLR: 8 (2.4 NRR)
Impacted Receptors Benefited: 8 (2.4 NRR)	Total Benefits: 14 (4.2 NRR)
Non-Impacted Receptors Benefited: 6 (1.8 NRR)	
-NW3- Parameters	
Length: 945 ft.	Area / Benefit: 2,884 sq. ft.
Average Height: 15.3 ft.	Allowable Area / Benefit: 1,600 sq. ft.
Area: 14,418 sq. ft.	

Table E.3-2: Noise Barrier NW3 Performance								
CNE 2 – West of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R2-4a	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	57	56	1
R2-4b	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	57	2
R2-4c	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	54	53	1
R2-4d	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	55	54	1
R2-4e	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	56	54	2
R2-4f	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	53	51	2
R2-4g	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	53	52	1
R2-4h	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	54	53	1
R2-4i	School - Outdoor Sports Field	C	1.0	8001 LIMESTONE DR	53	55	53	2
R2-5a	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	64	59	5
R2-5b	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	65	57	8
R2-5c	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	65	55	10
R2-5d	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	65	55	10
R2-5e	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	65	55	10
R2-5f	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	55	4
R2-5g	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	55	4
R2-5h	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	60	54	6
R2-5i	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	60	53	7
R2-5j	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	60	54	6
R2-7a	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	67	55	12
R2-7b	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	55	68	58	10

Table E.3-2: Noise Barrier NW3 Performance								
CNE 2 – West of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R2-7c	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	54	68	62	6
R2-7d	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	61	54	7
R2-7e	School - Outdoor Sports Field	C	1.0	8001 LIMESTONE DR	53	61	56	5
R2-7f	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	62	57	5
R2-7g	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	62	59	3
R2-7h	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	62	61	1
R2-7i	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	58	54	4
R2-7j	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	58	54	4
R2-7k	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	55	4
R2-7l	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	57	2
R2-7m	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	56	53	3
R2-7n	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	56	54	2
R2-7o	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	57	55	2
R2-9a	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	62	62	0
R2-9b	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	62	62	0
R2-9c	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	55	62	62	0
R2-9d	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	57	62	62	0
R2-9e	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	60	62	62	0
R2-9f	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	65	64	64	0
R2-9g	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	59	0
R2-9h	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	59	0

Table E.3-2: Noise Barrier NW3 Performance								
CNE 2 – West of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R2-9i	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	59	59	0
R2-9j	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	56	59	59	0
R2-9k	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	60	60	60	0
R2-9l	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	65	63	63	0
R2-9m	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	57	56	1
R2-9n	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	57	57	0
R2-9o	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	53	57	57	0
R2-9p	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	55	58	57	1
R2-9q	School - Outdoor Sports Field	C	0.3	8001 LIMESTONE DR	60	59	59	0
NW 3 - Predicted "Build-Condition" With-Barrier Benefits:[2]							14	
Impact[3] =		5 to 6 dB(A) NLR =			≥ 7 dB(A) NLR =			

4. Equivalent receptor (ER) calculations for non-residential land uses are included in Appendix G.
5. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
6. See Section 4.3 for the definition of "Impact".

Warranted, Feasible, and Reasonable Worksheet

Note: the answers provided in the worksheet may differ between preliminary and final design. This worksheet is available in a protected digital format upon request.

Date:	9-12-25
Project No. and UPC:	State #: 0840-076-R21 UPC: 118313
County:	Prince William County
Facility:	University Boulevard
Barrier System ID:	NW3
Noise Abatement Category(s)	Noise Barrier System
Community Name and/or CNE#	CNE 2

Design phase: ☑ Preliminary Design ☐ Final Design

Warranted

1. Community Documentation (if applicable)
   a. Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). 2007
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): N/A
   c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." ☑ Yes ☐ No

2. Criteria requiring consideration of noise abatement
   a. Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? ☑ Yes ☐ No
   b. Project causes a substantial noise increase of 10 dB(A) or more? ☑ Yes ☐ No

Feasibility

1. Impacted receptor units
   a. Number of impacted receptor units: 8 (2.4 NRR)
   b. Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): 8 (2.4 NRR)
   c. Percentage of impacted receptor units receiving 5 dB(A) or more IL 100%
   d. Is the percentage 50 or greater? ☑ Yes ☐ No

2	Will placement of the noise barrier cause engineering or safety conflicts, e.g. drainage or site distance issues?	☐ Yes	☑ No
3	Will placement of the noise barrier restrict access to vehicular or pedestrian travel?	☐ Yes	☑ No
4	Will placement of the noise barrier conflict with existing utility locations?	☐ Yes	☑ No

Reasonableness

1. Cost-Benefit Factors

a.	Surface Area (Total square foot) of the proposed noise barrier. (ft²)	14,418
b.	Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	8 (2.4 NRR)
c.	Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more.	6 (1.8 NRR)
d.	Total number of benefited receptors.	14 (4.2 NRR)
e.	Surface Area per benefited receptor unit. (ft²/BR)	2,884
f.	Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600?	No
g.	Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year?	Yes

2. Community Desires Related to the Barrier

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

3. Additional Noise Barrier Details

a.	Length of the proposed noise barrier	
b	Height range of the proposed noise barrier	
c.	Average height of the proposed noise barrier	
d	Cost per square foot. ($/ft²)	
e.	Total Barrier Cost ($)	
f.	Additional comments (if applicable)	
g.	Barrier material	☐ Absorptive ☐ Reflective

Decision

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

Additional Reasons for Decision: ______________________

Noise Barrier NW4 (CNE 2)

Location: East of University Boulevard. The barrier would provide abatement for the sports fields of Gainesville High School.

System NW4 meets VDOT noise abatement feasibility but does not meet reasonableness criteria.

TNM Run: "4_Univ_NW4_update" / SBA: "NW4_D2"

Table E.4-1: University Boulevard Extension Noise Barrier NW4 CNE 2	
-NW4- Acoustical Performance Summary	
Impacts: 1	Benefited Receptors @ ≥ 7 dB(A) NLR: 1
Impacted Receptors Benefited: 1	Total Benefits: 2
Non-Impacted Receptors Benefited: 1	
-NW4- Parameters	
Length: 539 ft.	Area / Benefit: 3,237 sq. ft.
Average Height: 12.0 ft.	Allowable Area / Benefit: 1,600 sq. ft.
Area: 6,474 sq. ft.	

Table E.4-2: Noise Barrier NW4 Performance								
CNE 2 – East of University Boulevard								
Receptors					Predicted Noise Levels, $L_{eq(h)}$ (dB(A))			
Rec. No.	Use	NAC	ERs[1]	Address	Existing	Build	Build With-Bar	NLR
R2-2a	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	61	56	5
R2-2b	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	63	56	7
R2-2c	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	59	56	3
R2-2d	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	60	56	4
R2-2e	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	58	55	3
R2-2f	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	58	55	3
R2-2g	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	56	55	1
R2-2h	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	56	54	2
R2-2i	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	55	53	2
R2-2j	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	55	53	2
R2-3a	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	53	51	2
R2-3b	School - Outdoor Sports Field	C	0.9	13150 UNIVERSITY BLVD	53	53	51	2
NW 4 - Predicted "Build-Condition" With-Barrier Benefits:[2]								2
Impact[3] =			5 to 6 dB(A) NLR =			≥ 7 dB(A) NLR =		

1. Equivalent receptor (ER) calculations for non-residential land uses are included in Appendix G.
2. A receptor is considered benefited if the predicted Noise Level Reduction (NLR) is at least 5 dB(A).
3. See Section 4.3 for the definition of "Impact".

Warranted, Feasible, and Reasonable Worksheet

Note: the answers provided in the worksheet may differ between preliminary and final design. This worksheet is available in a protected digital format upon request.

Date:	9-12-25
Project No. and UPC:	State #: 0840-076-R21 UPC: 118313
County:	Prince William County
Facility:	University Boulevard
Barrier System ID:	NW4
Noise Abatement Category(s)	Noise Barrier
Community Name and/or CNE#	CNE 2

Design phase: ☑ Preliminary Design ☐ Final Design

Warranted

1. Community Documentation (if applicable)
   a. Date community was permitted. (Per 23CFR 772 this is the date the building permit was issued). **2021**
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): **N/A**
   c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of CE, ROD, or FONSI, as appropriate." ☑ Yes ☐ No

2. Criteria requiring consideration of noise abatement
   a. Project causes design year noise levels to approach or exceed the Noise Abatement Criteria? ☑ Yes ☐ No
   b. Project causes a substantial noise increase of 10 dB(A) or more? ☑ Yes ☐ No

Feasibility

1. Impacted receptor units
   a. Number of impacted receptor units: **1**
   b. Number of impacted receptor units receiving 5 dB(A) or more insertion loss (IL): **1**
   c. Percentage of impacted receptor units receiving 5 dB(A) or more IL **100%**
   d. Is the percentage 50 or greater? ☑ Yes ☐ No

2 Will placement of the noise barrier cause engineering or safety conflicts, e.g. drainage or site distance issues? ☐ Yes ☑ No

3 Will placement of the noise barrier restrict access to vehicular or pedestrian travel? ☐ Yes ☑ No

4 Will placement of the noise barrier conflict with existing utility locations? ☐ Yes ☑ No

Reasonableness

1. Cost-Benefit Factors
   a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2) 6,474
   b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 1
   c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 1
   d. Total number of benefited receptors. 2
   e. Surface Area per benefited receptor unit. (ft^2/BR) 3,237
   f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? No
   g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? Yes

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

3. Additional Noise Barrier Details
   a. Length of the proposed noise barrier ______
   b Height range of the proposed noise barrier ______
   c. Average height of the proposed noise barrier ______
   d Cost per square foot. ($/ft^2$) ______
   e. Total Barrier Cost ($) ______
   f. Additional comments (if applicable) ______
   g. Barrier material ☐ Absorptive ☐ Reflective

Decision

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

Additional Reasons for Decision: ______

Appendix F

LIST OF PREPARERS

The project noise study was completed by WSP USA, Inc. Staff involved in the noise study included:

- Emily Robinson – Project Manager and Noise Analyst
- Patrick Romero – Noise QA Review
- Christine Tiernan – NEPA QA Review
- Kody Snow – Noise Measurement Field Staff

Appendix G

TNM CERTIFICATION CERTIFCATES

Certificate of Continuing Education

This is to certify that

Emily Robinson

has satisfactorily completed 30 hours of training on

FHWA TRAFFIC NOISE MODEL 2.5

And 8 hours of training on

TRAFFIC NOISE FUNDAMENTALS

conducted by

Bowlby & Associates, Inc.

Franklin, Tennessee
September 26-30, 2016

William Bowlby, Ph.D., P.E.
Bowlby & Associates, Inc.

Darlene Reiter, Ph.D., P.E.
Bowlby & Associates, Inc.

Certificate of Completion

Patrick Romero

HAS SUCCESSFULLY COMPLETED
FHWA TRAFFIC NOISE MODEL TRAINING

LAWRENCE SPURGEON, INSTRUCTOR

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
FEBRUARY 25 – 27, 2002

Washington State
Department of Transportation

Certificate of Continuing Education

This is to certify that

Kody Snow

has satisfactorily completed 29 hours of training on

FHWA TRAFFIC NOISE MODEL 2.5

and 7.5 hours of training on

TRAFFIC NOISE FUNDAMENTALS

conducted by

Bowlby & Associates, Inc.

August 21 - 25, 2023

Darlene Reiter, Ph.D., P.E. | **Rennie Williamson** | **Geoff Pratt, P.E.**

Appendix H

NOISE POLICY CODE OF VIRGINIA, HB 2025

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

Stephen C. Brich, P.E.
Commissioner

1401 East Broad Street
Richmond, Virginia 23219

(804) 786-2701
Fax: (804) 786-2940

September 12, 2025

MEMORANDUM

TO: Rhoderick Undan, VDOT, Project Manager
Thomas Wasaff, VDOT, Environmental Planner
CC: LJ Muchenje PE, VDOT Noise Engineer

FROM: Emily Robinson, PE, WSP Noise Engineer

SUBJECT: UPC 118313

The 2009 General Assembly passed Chapter 120 (HB 2577, as amended by HB2025), which amends the Code of Virginia by adding in Article 15 of Chapter 1 of Title 33.1 a section numbered 33.1-223.2:21, relating to highway noise abatement.

House Bill 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.

In an effort to honor the intent of HB 2025 we are asking for your input (per Chapter VI of Materials Division's Manual of Instruction and Section 2B-3 Determination of Roadway Design of the VDOT Road Design manual (pages 2B-5 and 2B-6)). As part of the Noise Technical Report and technical files, we are seeking your professional opinion by providing comments for the project noted above. Please distribute this memorandum to the appropriate District staff and combine all responses into one response.

Should you have any questions, please contact me at (919) 376-2701. Thank you for your time and consideration regarding this request.

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

Response: Noise reducing design is not feasible due to the area constraints in the locations of the impacts. CNE 1 impacts are restricted due to the existing ROW based off the Devlin Road/University Boulevard design from VDOT Project 0840-076-R68. Horizonal or vertical adjustments will further the project impacts to adjacent properties theoretically increasing receptor sensitivities. CNE 2 impacts are restricted due to the existing ROW and impacts on both side of the roads. Horizontal adjustments would only benefit one side of impacts while increasing impacts to other side and vice versa. Vertical adjustments will further the project impacts to adjacent properties theoretically increasing receptor sensitivities.

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

Response: The Virginia Department of Transportation (VDOT) is not authorized by the Federal Highway Administration to use "quiet pavement" at this time as a form of noise mitigation. VDOT completed a quiet pavement implementation program in 2015. However, none of the quiet pavement technologies that were evaluated at the time provided sufficient noise reduction to meet VDOT, and federal noise abatement requirements.

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

Response: There is potential that landscaping could be used as a visual screen. However, any potential screening would be location specific and will depend upon design details, such as topography, adjacent features, etc. that won't be known until much closer to final design. Additionally, specific requirements or criteria would need to be added to the final design contract in order for landscaping to be installed.

Note: Please provide the name of each responder.