



U.S. Department
of Transportation

**Federal Highway
Administration**

PRELIMINARY NOISE REPORT

Duke Street (Route 236) at W. Taylor Run Parkway
Intersection Improvement Project

VDOT Project # 0236-100-888, P101, R201, C501
UPC # 115531
City of Alexandria

Prepared for:

City of Alexandria, Virginia
Virginia Department of Transportation
Environmental Division

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

Prepared by:

WSP USA

November 2025

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Accepted by:

VDOT Environmental Division
Highway Noise Abatement Coordinator



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EXECUTIVE SUMMARY

The City of Alexandria has identified the need to evaluate existing and future conditions for the Duke Street (VA Route 236) corridor. Duke Street functions as an important route for access to retail centers, commerce/office centers and residences. The purpose of the project is to reduce congestion, alleviate access management issues, address safety, and provide additional access to the southbound Telegraph Road from eastbound Duke Street.

The Build Alternative proposes improvements at the Duke Street and West Taylor Run Intersection and a new access connection from Duke Street Eastbound to Telegraph Road southbound. The new access connection will result in the addition of a new ramp from Duke Street eastbound to Telegraph Road southbound. Per FHWA Title 23 CFR 772.5(2) and the 2022 VDOT *Highway Traffic Noise Guidance Manual*, the proposed project requires a “Type I” analysis due to the addition of a new ramp being added to the quadrant to complete an existing partial interchange. 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.

Existing land use in the vicinity of the project is predominately single-family and multifamily residences, public recreation areas (i.e., sports fields), and commercial/business uses.

Traffic noise levels for the Existing 2018 and Build 2036 alternative have been predicted at all receptor locations identified within the study area limit. Under existing conditions, noise levels ranged from 42 to 68 dB(A). The Build condition noise levels ranged from 42 to 68 dB(A). The Design Year 2036 Build Alternative is predicted to result in thirteen (13) traffic noise impacts. Most of the impacts warrant highway traffic noise abatement consideration, but due to design/construction considerations, it would not be feasible to implement noise abatement measures. Additionally, some of the impacts are related to the railway that runs east to west within the proximity of the project. These impacts would require mitigation of railway noise which is not a requirement of VDOT or FHWA.

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 Federal Highway Administration (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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Preliminary Traffic Noise Report

Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project City of Alexandria, VA

1 Introduction

The City of Alexandria proposes to improve the Duke Street and West Taylor Run intersection and construct a new connection from Duke Street Eastbound to Telegraph Road southbound. The new connection will result in the addition of a new ramp from Duke Street eastbound to Telegraph Road southbound. The project will also include a new left turn lane along eastbound Duke Street to the new ramp at southbound Telegraph Road. The intersection improvements at Duke Street and West Taylor Run will help improve safety, reduce congestion, and decrease cut-through traffic in adjacent neighborhood streets.

Duke Street (VA Route 236) is a state route that runs east to west. The section of Duke Street included in this project extends between Roberts Lane and Roth Street, as well as portions of West Taylor Run and Telegraph Road. The project location is shown in Figure 1 at the end of the report.

During current peak hour traffic conditions, long que times occur which result in vehicles cutting through adjacent neighborhood streets to access Telegraph Road. Additionally, vehicles will bypass the southbound Telegraph Road exit and circle around at the Dove Street intersection to use the southbound Telegraph Road ramp from westbound Duke Street. The proposed improvements will help improve the traffic flow along Duke Street and reduce congestion resulting from current traffic patterns.

Within the vicinity of the project and south of Duke Street a railway runs east to west and supports commuter and freight train operations. The railway was included in the traffic noise study to determine the noise contributions associated with the railway. Due to the commuter train operations the railway is very active.

2 Methodology

This PNR represents the analysis results of traffic noise impacts, and the identification of recommended noise abatement measures based on the preliminary design for the Duke Street (Route 236) at West Taylor Run Parkway Intersection Improvement. 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 (20 μ Pa). 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, page 4. 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 and VDOT's 2020 Road and Bridge Specifications, Section 107.16(b.3)*, “Noise” when VDOT is a partner agency. The Duke Street (Route 236) at West Taylor Run Parkway Intersection Improvement project is a Type I project because the proposed design adds an additional ramp to a quadrant to complete an existing partial interchange.

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 below. The Leq, 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 Leq (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 and also a balancing of that which may be desirable with that which may be achievable. The noise impact assessment was conducted referencing the criteria listed in Table 3.

Table 3: Noise Abatement Criteria			
Hourly Equivalent A-Weighted Sound Level (decibels (dB(A)))			
Activity Category	Activity Criteria¹ Leq(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, amphitheatres, 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 Leq(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 Leq(h) being the hourly value of Leq.
- 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 Traffic Noise Policy

The VDOT Highway Traffic Noise Guidance Manual, effective July 13, 2011, and updated February 15, 2022, establishes official policy on highway noise and was developed to implement the requirements of 23 Code of Federal Regulations (CFR) Part 772 Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2011), FHWA’s Highway Traffic Noise Analysis and Abatement Policy and Guidance (December 2011), and the noise related requirements of The National Environmental Policy Act of 1969. This policy describes the VDOT process that is used in determining traffic noise impacts and abatement measures while considering the equitable and cost-effective expenditure of public funds for traffic noise abatement. 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 are met:

- The predicted traffic noise levels (future design year) approach or exceed the NAC, as shown in Table 3, page 6. The VDOT State Noise Abatement Policy defines an approach level to be used when determining traffic noise impacts. The “Approach” level has been defined by VDOT as 1 dB(A) less than the Noise Abatement Criteria for Activity Categories A through 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 generated noise impacts are identified within the project corridor, then consideration for noise abatement measures is deemed necessary. The final decision on whether or not to provide noise abatement along a proposed project corridor takes 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 the FHWA’s Traffic Noise Model[®] (FHWA TNM 2.5) to predict Base Year 2019 and Build Design Year 2036 hourly equivalent traffic noise levels, Leq(h), to identify impacted receptors and to assess recommended noise abatement measures within the 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 that calculate acoustic algorithms to predict noise levels at selected noise sensitive receptor locations by considering sound propagation

variables such as, atmospheric absorption, divergence intervening ground, barriers, and building rows.

Input data used to construct the three-dimensional model of the proposed project study area within TNM included: project engineering design files modeled by WSP USA, aerial photography, and USGS topographical 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 flow 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, depressions 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 at three 20-minute short-term measurement locations on March 25 and 28, 2025 (refer to photographs in Appendix B and Figures 2-1 through 2-2). 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.” Traffic volume data was obtained during each measurement session by counting each classification of vehicle on hand-held traffic counters. Traffic speeds during each measurement session were determined by pace driving the corridor. Types of land use and property addresses were gathered for all noise-sensitive receptors. Weather data was acquired using the closest weather monitoring station (KVAALEXA314) and wunderground.com. Finally, a field measurement site sketch and events log were created for each noise measurement session.
- *Baseline TNM model:* Develop the existing condition, or baseline, TNM model, which includes receptors, current roadway alignments (horizontal and vertical), existing 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 flow 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 2036 TNM model by incorporating the build-condition roadway design elements. Build Design Year 2036 traffic volumes and speeds were input into the model to predict Design Year 2036 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 determine predicted traffic noise NAC and Substantial Increase impacts at all noise sensitive receptors for the Design Year 2036 Build condition; impacts for the Build Alternative were documented (refer to Table 5 and Appendix A) and locations where noise abatement warranted consideration were identified, if applicable.
- *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 project is predominantly single-family and multifamily residences, and public recreation areas. Other land uses in the study area include offices and commercial uses.

3.2 Common Noise Environments

As previously noted, the noise-sensitive land uses within the project study area are primarily residential, with few non-residential land uses, such as commercial business, and public recreation areas. 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 six (6) discrete Common Noise Environments (CNEs), CNE-A through CNE-F.

The locations of the six CNEs identified along the project corridor and the locations of residential noise-sensitive receptors within the CNEs are shown in the Detailed Study Area Maps, Figures 2-1 through 2-3, and described below.

- **CNE-A** (Figures 2-1 and 2-2) is located north of the Telegraph Road southbound ramp from Duke Street westbound. The CNE represents the single-family residences (townhomes), and multifamily residences located along Roberts Lane. Note that the ramp is depressed into the grade near these residences.

- **CNE-B** (Figure 2-2) is located north of Duke Street and west of the Telegraph Road southbound ramp. The CNE represents single-family residences along Hilton Street, Moncure Drive, and East Taylor Run Parkway. These residences are located at a similar grade as Duke Street but are below the elevated ramp to southbound Telegraph Road.
- **CNE-C** (Figures 2-2 and 2-3) is located to the east of W Taylor Run Parkway and north of Duke Street. Within CNE-C, there are residences and a public recreation area (baseball field). These receptors are primarily exposed to noise from W Taylor Run Parkway.
- **CNE-D** (Figures 2-2 and 2-3) is located to the west of W Taylor Run Parkway and north of Duke Street. Within CNE-D multifamily and single-family residences are represented. The multifamily buildings within the CNE-D are set further from the roadways, while the single-family residences are along W Taylor Run Pkwy.
- **CNE-E** (Figure 2-3) is located south of Duke Street and west of Telegraph Road. Additionally, to the south of the CNE-E, a railway runs east to west. The railway supports commuter and freight operations. This CNE is primarily public athletic fields, a cemetery, and commercial/business use. Within CNE-E and fronting Duke Street is a new multifamily residential building that is permitted for construction.
- **CNE-F** (Figure 2-1) is located south of Duke Street and east of Telegraph Road. To the south of CNE-F is a railway that runs east to west and supports commuter and freight operations. This CNE consists primarily of commercial/business operations including a US Postal Office and a daycare facility.

3.3 Undeveloped Lands and Permitted Developments

Highway traffic generated noise analyses are performed for both developed lands and 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 design of land use activities evidenced by the issuance of at least one building permit.

In accordance with the VDOT Traffic Noise Policy, an undeveloped parcel 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.

Based on information provided by the City of Alexandria, a new 94-unit multifamily residential building (Witter Place) has been permitted for construction at 2712 Duke Street. This building is located within CNE-E between Duke Street and Witter Drive. The multifamily building does not have units with balconies, and the primary exterior land use is located within the interior courtyard on the rear of the building, away from Duke Street. This permitted property was

included in the traffic noise assessment and is represented by receivers E035 and E036 shown on Figure 2-3.

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 project study area. Duke Street, Telegraph Road, West Taylor Run Parkway, and the railway are the dominant noise sources for receptors in the study area. The purpose of noise monitoring is to gather data and compare with the output obtained from the noise prediction model which is then used to validate the traffic noise model for local conditions so that it can be used with confidence to predict the 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 vehicle classification count data 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 predict the future worst noise hour equivalent noise levels and assess potential traffic noise impacts.

Ambient noise monitoring was conducted on March 25 and 28, 2025. The measurements were recorded using a laboratory calibrated Bruel & Kjaer 2250 sound level meter (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 traffic noise model.

This PNR includes short-term noise measurements collected over a 20-minute period, with data stored in 1-minute intervals, at three locations along the project corridor. Traffic volumes were collected during measurement periods and taken on hand-held traffic counters. Traffic speeds were observed through pace driving the project corridor. Weather data was documented by using wunderground.com and accessing the closest weather monitoring station to ensure the most accurate data. The ambient noise monitoring locations are shown in Figures 2-1 through 2-3 at the end of the report. The noise measurement results, concurrent traffic counts, observed vehicle speeds, weather information and photographs for each measurement site location are presented in Appendix B.

3.5 Noise Model Validation

The measured short-term ambient noise levels at the noise measurement locations, ST1, ST2, and ST3 ranged from 57.5 dB(A) to 66.8 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 traffic classification 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 validated at each measurement site. Validation results can be found in Table 4, below. 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.

Table 4: TNM Validation Results			
Measurement Location	Measured Leq(h) (dB(A))	Predicted Leq(h) (dB(A))	Difference (dB(A))¹
ST1	62.4	59.9	-2.5
ST2	66.8	65.4	-1.4
ST3	57.5	56.8	-0.7

¹Hourly 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.

Although the TNM models validated within ± 3.0 dB(A), in general, TNM predicted noise levels were lower than what was recorded in the field. Due to the proximity of ST3 to the adjacent railway, traffic noise levels may not be the prominent source at this location. During the field work, noise sources other than traffic were noted on the field sheets located in Appendix B. Noise sources that TNM cannot account for that were encountered in the field include such as wildlife (birds and insects), car horns, and the squealing of car tires. Traffic was also not accounted for on some of the local roads due to their significantly lower noise contribution. However, at ST3 train events were counted during the measurement period.

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 were predicted for this 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.

Long-term noise measurement data was collected near ST1 to determine the worst noise hour.

Noise measurements were recorded using a Larson Davis Type 720 sound level meter over a period of four days (March 25 – 28, 2025). The sound monitoring equipment was set to record five-minute average noise levels (Leq(5min)) which were used to calculate the average hourly noise level (Leq(h)). The calculated average hourly noise measurement data is presented in Table 5, below.

Table 5: Worst Noise Hour Measurement Results				
Hour	Average Hourly Noise Level (Leq(h) (dB(A)))			
	25-Mar (Tuesday)	26-Mar (Wednesday)	27-Mar (Thursday)	28-Mar (Friday)
12:00:00 AM	-	58	59	60
1:00:00 AM	-	56	56	58
2:00:00 AM	-	56	56	58
3:00:00 AM	-	58	70	58
4:00:00 AM	-	61	61	62
5:00:00 AM	-	66	65	65
6:00:00 AM	-	72	67	67
7:00:00 AM	-	71	68	69
8:00:00 AM	-	68	68	69
9:00:00 AM	-	69	68	69
10:00:00 AM	-	68	70	-
11:00:00 AM	-	68	67	-
12:00:00 PM	-	70	68	-
1:00:00 PM	67	68	68	-
2:00:00 PM	69	68	68	-
3:00:00 PM	69	70	69	-
4:00:00 PM	70	70	70	-
5:00:00 PM	70	70	70	-
6:00:00 PM	69	69	69	-
7:00:00 PM	67	67	70	-
8:00:00 PM	66	66	66	-
9:00:00 PM	65	65	65	-
10:00:00 PM	63	63	64	-
11:00:00 PM	61	61	62	-

As seen by the measurement data in Table 5, the worst noise hour consistently occurred between 4:00 PM – 5:00 PM and 5:00 PM – 6:00 PM and was 70 dB(A) Leq(h). There were other hours throughout the measurement period with average hourly noise levels that equaled or exceeded 70 dB(A), but based on the five-minute data it was identified that the increase in noise level was not consistent and likely associated with instantaneous events (e.g., emergency sirens). Additionally, comparison with the same hour on other days shows that the higher noise levels did not occur over multiple days.

Traffic for this project was evaluated during the AM and PM peak hours. The AM and PM peak hours for this project were determined to be 7:30 AM – 8:30 AM and 5:00 PM – 6:00 PM, respectively. Given that the PM peak traffic period aligns with the measured worst noise hour, the PM peak traffic data was used for the traffic noise assessment. Based on feedback from the traffic engineering team, posted speeds were used for the analysis. This is due to the number of intersections with traffic lights located within the project study area, which makes it difficult for vehicles to exceed posted speeds.

3.7 Railway Noise Levels

As done for the worst noise hour determination, long-term noise measurement data was recorded using a Larson Davis Type 720 sound level meter over a period of four days (March 25 – 28, 2025) within the vicinity of ST-3 to provide a representation of noise generated by the railway. The sound monitoring equipment was set to record five-minute average noise levels (Leq(5min)). The five-minute Leqs were used to identify train events that passed by the measurement location.

Since the 5:00 PM – 6:00 PM hour was identified as the worst noise hour, train events during this time period were isolated per day to calculate the Leq(h) associated with the railway for that time period. The calculated Leq(h) was then averaged over three days to provide a reference Leq(h) at the measurement location. Table 6 presents the measured Leq(h) noise levels for the 5:00 PM – 6:00 PM hour and the averaged level attributed to the railway.

Table 6: Measured Railway Noise Levels	
Day	5:00 PM – 6:00 PM Average Hourly Noise Level (Leq(h) (dB(A)))
25-Mar (Tuesday)	65.5
26-Mar (Wednesday)	71.7
27-Mar (Thursday)	72.9
Average	70.0

The average Leq(h) was used to create a validation model for the railway. The railway was modeled as two separate roadways in TNM and a mix of autos and heavy trucks were added to the roadways until the calculated noise level at the receiver was within the VDOT-accepted tolerance of ± 3.0 dB(A) for TNM model validation. The validated TNM railway model predicted a noise level of 69.4 dB(A) at ST-3 which is -0.6 dB(A) lower than the calculated average level of 70 dB(A). The mix of auto and heavy trucks, and speed was then used in the existing and build condition models to represent railway noise.

3.8 Existing Noise Levels

Using the worst hour traffic data, the TNM model was used to predict Existing 2018 traffic noise levels at all receptor locations identified within the study area limits. The traffic noise prediction

model uses the number and type of vehicle classifications calculated for the planned roadway, vehicle speeds, the physical characteristics of the road (curves, hills, depressions, elevations, etc.), receptor location and height, barrier ground elevation, and barrier segment top elevations. There are no existing noise barriers present within the proposed project area. Under existing conditions, noise levels ranged from 42 to 68 dB(A). 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 2036 using the FHWA TNM 2.5 model. A TNM model of future Build conditions was developed to account for the future traffic volumes and roadway design changes. Future No-Build conditions were not included in this project as the study is not being completed for an environmental impact statement (EIS). As noted in VDOT's Highway Traffic Noise Guidance Manual, No-Build noise levels are typically not required for a categorical exclusion (CE) or environmental assessment (EA) unless the project is part of the interstate system or there is a 4(f) resource (i.e., of land from publicly owned parks, recreation areas, wildlife refuges, etc.) within the corridor. The Project does not meet either of these criteria; therefore, No-Build conditions are not required as part of this analysis.

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 PM 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 2036 Build condition. All noise levels were predicted for the worst noise hour and are expressed in Leq(h) dB(A). Build condition noise levels ranged from 42 to 68 dB(A). Table A-1 of Appendix A shows the predicted sound levels at each receptor location. Table A-2 of Appendix A compares the sound contributions of the railway and roadway at the CNE-E receptor locations. The comparison is only provided for CNE-E since the railway is located in the southern portion of the project study area. CNE-E is exposed to the greatest amount of railway noise and railway noise is much less significant at the other CNEs.

Figures 2-1 through 2-3 show receptor noise levels for the 2036 Build condition in graphical form. The Design Year 2036 Build Alternative is predicted to result in thirteen (13) traffic noise impacts. A yellow receptor dot indicates a non-impacted non-benefited receptor in the Detailed Study Area Maps. The traffic noise impacts occur at the following receiver locations:

- **Receivers A061-2, A061-3, A066-2, A066-3, and A079-3:** These receivers are located at 2327 Duke Street (Mason Gardens) and represent second and third floor balconies of multifamily residential buildings. These balconies are located on the south side of the buildings facing Duke Street. Predicted noise impacts for these receivers are 66 – 67 Leq(h) dB(A).
- **Receivers B001 and B009:** These receivers are located on E Taylor Run Parkway and represent duplex residences that have front and rear yards. The southern side of the residences face Duke Street Service Road and Duke Street. Predicted impacts for these receivers are 66 – 67 Leq(h) dB(A).
- **Receivers E009, E010, E011, E029, and E031:** These receivers are located at Witter Field soccer field and baseball field and are closer to the railway. Noise impacts at these receivers are attributed to the adjacent railway. Predicted impacts for these receivers are 66 – 67 Leq(h) dB(A).
- **Receiver F001:** This receiver represents an outdoor play area for a daycare facility. The play area is directly adjacent to the ramp from Telegraph Road northbound to Duke Street westbound. The predicted impact for this receiver is 66 Leq(h) dB(A).

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 Highway Traffic Noise Guidance Manual as reaching one decibel less than the NAC values listed in Table 3, page 6, 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 7 below, the Build Alternative is predicted to result in thirteen (13) traffic noise impacts. Under the Design Year 2036 conditions, noise levels are expected to approach or exceed the NAC but will not result in any substantial noise increase above existing noise levels.

FHWA and VDOT require that noise abatement measures be considered and evaluated for the benefit of all predicted Build Alternative traffic noise impacts. Noise impacts were predicted for the project; therefore, noise abatement measures are considered warranted for this project.

Table 7: Traffic Noise Impact Summary for 2036 Build Condition								
Reason for Noise Impact	Summary of Impacted Receptors							
	By Activity Category							
	A	B	C	D	E	F⁵	G⁶	All Activity Categories
Based on NAC Criteria Only¹	0	7	6	0	0	0	0	13
Based on Substantial Increase Criteria Only²	0	0	0	0	0	0	0	0
Based on Both Criteria³	0	0	0	0	0	0	0	0
Total Build Alternative Impacts⁴	0	7	6	0	0	0	0	13

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 some noise levels may need 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 (2036) build condition either approach or exceed the NAC, 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. These traffic control measures would be counterproductive to the project's objective of alleviating traffic and reducing congestion. Reducing speeds will not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide adequate noise reduction. Typically, a 10-mph reduction in speed will result in only a 2 dBA decrease in noise level, which would not 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, 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 would require 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. Based on the location of the impacted receptors, it is not feasible to design and construct noise abatement measures to mitigate traffic noise impacts that satisfy the feasible criteria. The feasibility is discussed by CNE impacts:

- **CNE-A** – Five (5) receivers (A061-2, A061-3, A066-2, A066-3, and A079-3) were identified as meeting the impact criteria within this CNE. These receivers represent multi-family residential units located near the intersection of Roberts Lane and Duke Street. To mitigate noise impacts upon these receivers, a noise barrier would either need to be constructed within the median between Duke Street and Roberts Lane or near the sidewalk area around the multi-family complex (Mason Gardens).

Constructing a noise barrier within the median between Duke Street and Roberts Lane would have possible conflicts with existing public sidewalks, roadway signs, and utilities. Additionally, the limited right of way within this area also creates a potential safety risk. Due to the limited right of way in this area, there would be no maintenance easement available to accommodate the required space for barrier maintenance. The intersection from Duke Street to Roberts Lane also limits the length of noise barrier that can be constructed

in this area. Constructing a noise barrier closer to the multi-family complex would have similar engineering constraints. A noise barrier along Roberts Lane cannot be constructed due to openings for the driveway into the multi-family complex. Existing utilities would be a possible conflict and land acquisition would be required for the construction of a noise barrier on private property.

- **CNE-B** – Two (2) receivers (B001 and B009) within CNE-B were identified as impacted and are located along Duke Street Service Road. From an engineering perspective the most feasible placement of a noise barrier for these receivers is within the median located between Duke Street Service Road and Duke Street. However, the width of this median is very limited and would cause conflicts with utilities. There is multiple stormwater drains located along the median that would conflict with a potential noise barrier. Locating a noise barrier within the median would also require safety measures to prevent vehicle impacts with the barrier. Additionally, the limited right of way in this area would not allow for a maintenance easement to accommodate the required space for barrier maintenance. The width of the median within this area is not significant enough to support such design and would require the reduction of travel lane widths.
- **CNE-E** – Five (5) receivers (E009, E010, E011, E029, and E031) within CNE-E and representing Wittier Field were identified as impacted. As shown in Figure 2-3, these receivers are located further from Duke Street, whereas the receivers located closer to Duke Street are not impacted. These impacts are due to noise generated by the adjacent railway. This can be seen by comparison of the 2036 Build noise levels in Table A-1. Predicted noise levels at the impacted receivers are up to 4 dB(A) greater than receivers located near the railway. As discussed within VDOT’s Highway Traffic Noise Guidance Manual, noise abatement is typically evaluated for noise impacts caused primarily by the proposed roadway improvements. Therefore, noise impacts generated by the adjacent railway would not be considered for abatement since non-project-related noise sources are generally not considered when determining whether project noise abatement is warranted, feasible, and/or reasonable.
- **CNE-F** – Only one (1) receiver (F001) is impacted within CNE-F. Similar to CNE-A and CNE-B, the amount of public right-of-way between the receiver and roadway is very limited. Noise abatement placement would cause conflicts with public sidewalks and accessibility to those sidewalks. Conflicts would also occur with utilities, such as stormwater drains, and roadway signs. Land acquisition would be required for the construction of a noise barrier on private property. Due to the limited right of way in this area, there would be no maintenance easement available to accommodate the required space for barrier maintenance.

5.3 Reasonable Criteria for Noise Abatement

Since none of the impacted receptors meet the feasibility criterion, determination of reasonableness

(Phase 3) was not evaluated. Phase 3 of the noise abatement criteria require that all of the following conditions be considered.

- Noise Reduction Design Goals
- Cost-effectiveness Value
- The Viewpoints of the Benefited Receptors

6 Construction Noise Considerations and Abatement Opportunities

FHWA, VDOT, and the City of Alexandria 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". Additionally, the City of Alexandria has specific noise requirements that apply to construction activity within the city. The requirements are detailed in the revised noise control ordinance, effective January 1, 2022.¹ The contractor will be required to conform to the applicable noise regulations 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, milling of the existing roadway, hauling, grading, and paving. 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 impact-hammers (jack hammer, hoe-ram) will provide sporadic and temporary construction noise impacts in the near vicinity of those activities (refer to Table 8). Construction activities that will produce extremely loud

¹ [City of Alexandria Noise Ordinance](#)

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 City of Alexandria’s noise ordinance:

- The Contractor’s operations shall be performed between the hours of 7:00 A.M. and 6:00 P.M. on Monday through Friday, and 9:00 A.M. and 6:00 P.M. on Saturdays to comply with the city’s requirements for construction. Work performed outside of these hours will be required to comply with the specified noise limits within the City of Alexandria noise ordinance. If work outside of these hours is required, the city manager may issue a permit to allow construction work to occur.
- 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 8: Construction Equipment Typical Noise Levels Emissions¹

	Noise Level Emissions (dB(A)) at 50 Feet From Equipment ²			
	70	80	90	100
Pile Driver ³				██████████
Jack Hammer			██████████	
Tractor		██████████		
Road Grader			██████████	
Backhoe		██████████		
Truck			██████████	
Paver			██	
Pneumatic Wrench			██	
Crane		██████████		
Concrete Mixer		██████████		
Compressor		██████████		
Front-End Loader		██████████		
Generator		██████████		
Saws		██████████		
Roller (Compactor)		██		
<p>1. Adapted from Noise Construction Equipment and Operations, Building Equipment, and Home Appliances. U.S. Environmental Protection Agency. Washington D.C. 1971.</p> <p>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.</p> <p>3. Due to project safety and potential construction noise concerns, pile driving activities are typically limited to daytime hours</p>				

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 here: https://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/quietzone.pdf.

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 project. There are currently no undeveloped lands within the proposed project study area. Therefore, traffic noise contour lines were not evaluated for the project.

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 Duke Street (Route 236) at West. Taylor Run Parkway Intersection Improvement project utilized computer models created with the FHWA Traffic Noise Model software (TNM v.2.5) that were validated with field-collected traffic noise monitoring data. The validated models were then used to predict Design Year 2036 noise levels and to define possible impacted receptors along the proposed project corridor.

The Build Design Year 2036 Alternative is predicted to result in thirteen (13) traffic noise impacts. As such, consideration of noise abatement measures was warranted since impacts in the Design Year Build Alternative were predicted. However, due to design and engineering considerations to implement noise abatement for the impacted receptors, it was determined that noise abatement would not be feasible. Additionally, noise impacts at receptors located within CNE-E are attributed to the railway that runs east to west. It is not FHWA or VDOT policy to provide abatement for railway generated noise.

Furthermore, construction noise impacts may occur due to the proximity of noise-sensitive residential 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”.

Based on project design, no noise barriers were shown to be feasible for this project. The findings in this document are based on 30% final design information. Thus, any conclusions derived in the report should be considered preliminary in nature and subject to change. A Final Design Noise Analysis would be performed for this project based on detailed engineering information. However, if it is determined that there are no substantial changes in design between the current design and the detailed design, and the design year traffic is consistent with the traffic used in this analysis, the Final Design Noise Analysis can be completed qualitatively.

9 References

Federal Highway Administration. CFR 23 Part 772 – Procedures for Abatement of Highway Traffic Noise and Construction Noise. [75 FR 39820-39838, July 13, 2010].

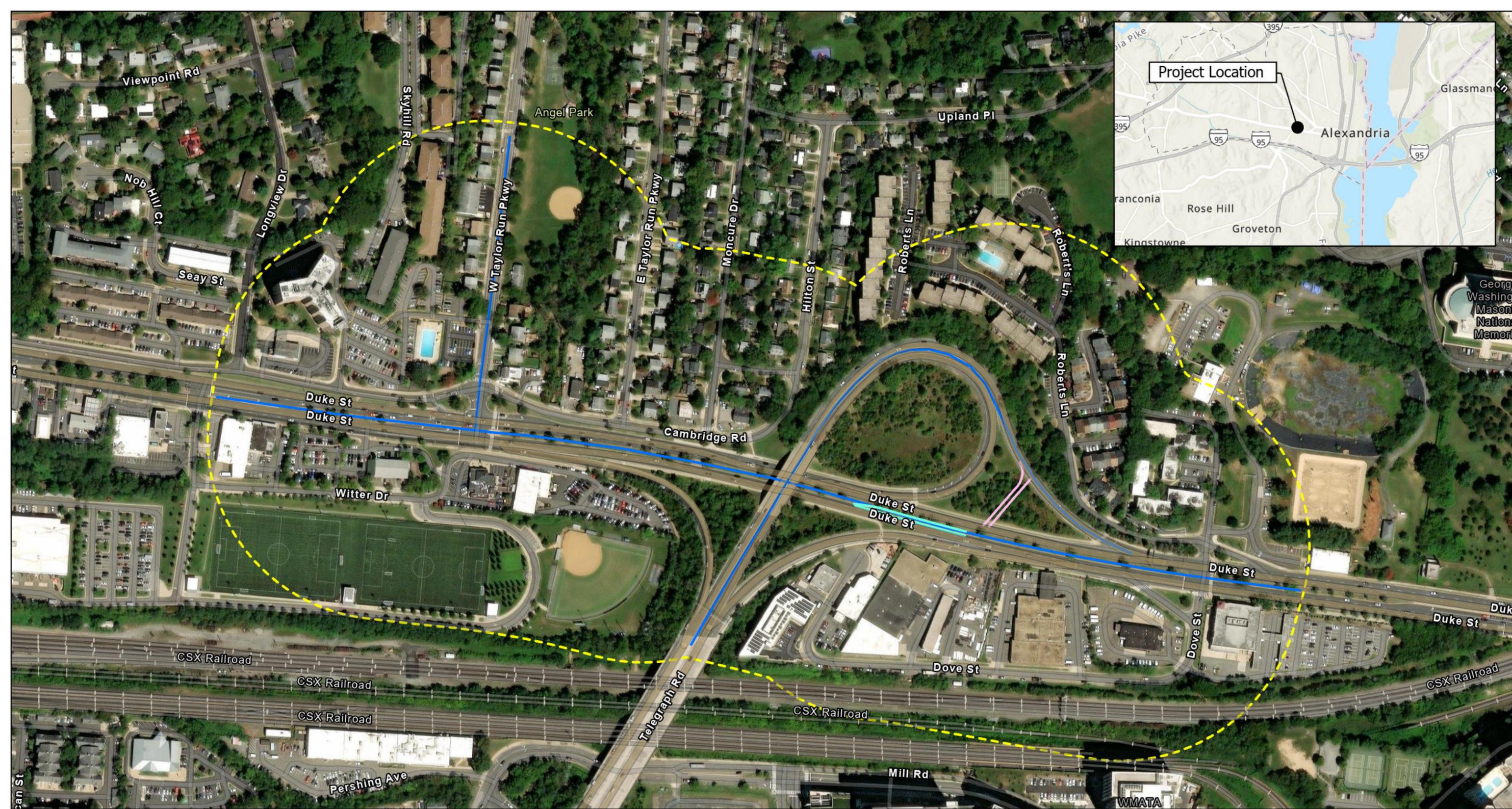
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Virginia Department of Transportation. *Highway Traffic Noise Guidance Manual*. February 2022.

Virginia Department of Transportation. *Noise Report Development and Guidance Document*. August 2015.



Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project

City of Alexandria, VA
May 2025



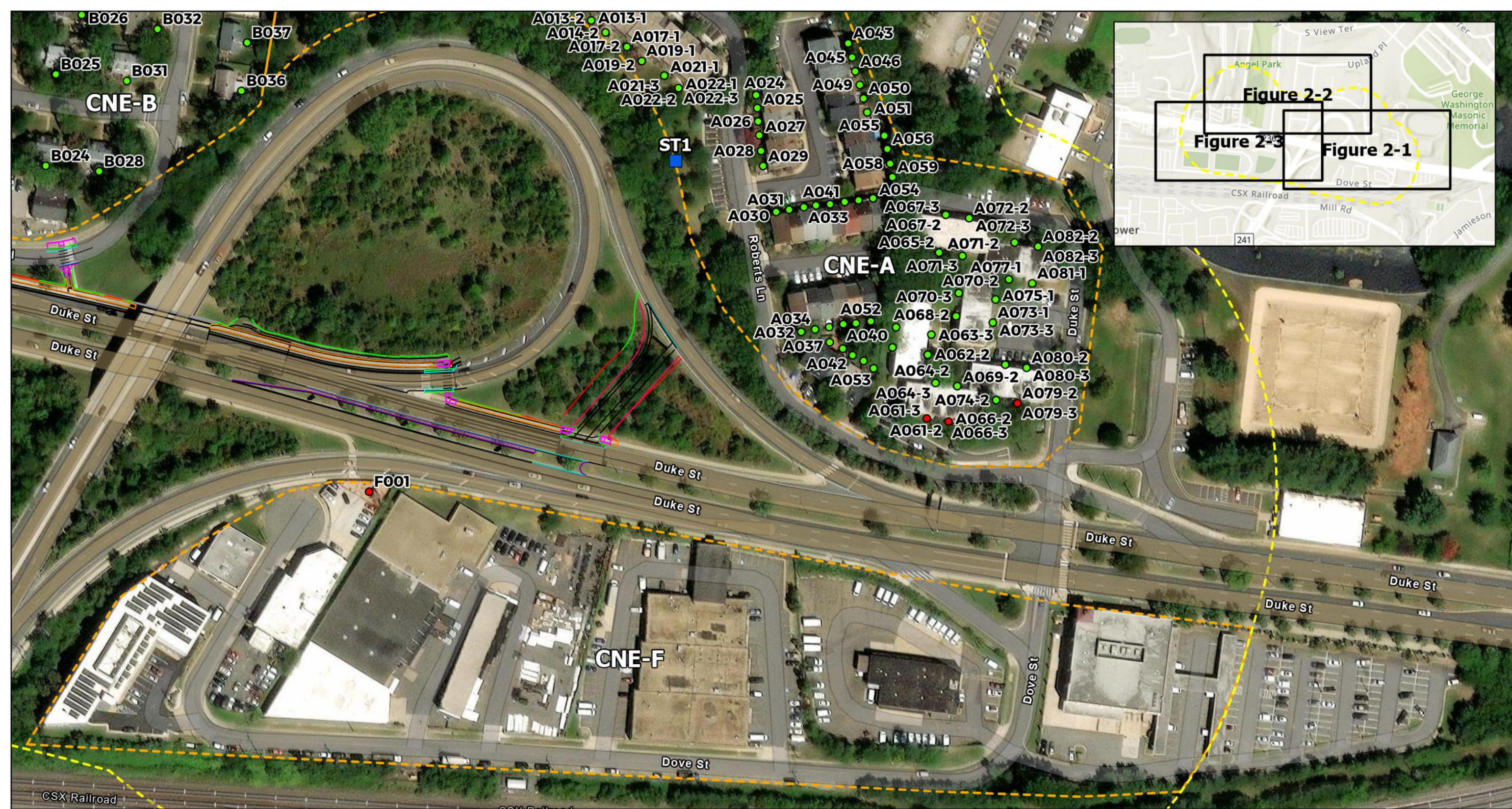
Figure 1

Legend

- Project Centerline
- Proposed On-Ramp
- Proposed Turning Lane
- Project Area



0 125 250 500 Feet



Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project

City of Alexandria, VA
May 2025

Legend

- Study Area
 - Common Noise Environment (CNE)
 - Measurement Site
- Receivers
- Non-Impacted
 - Impacted

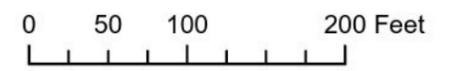
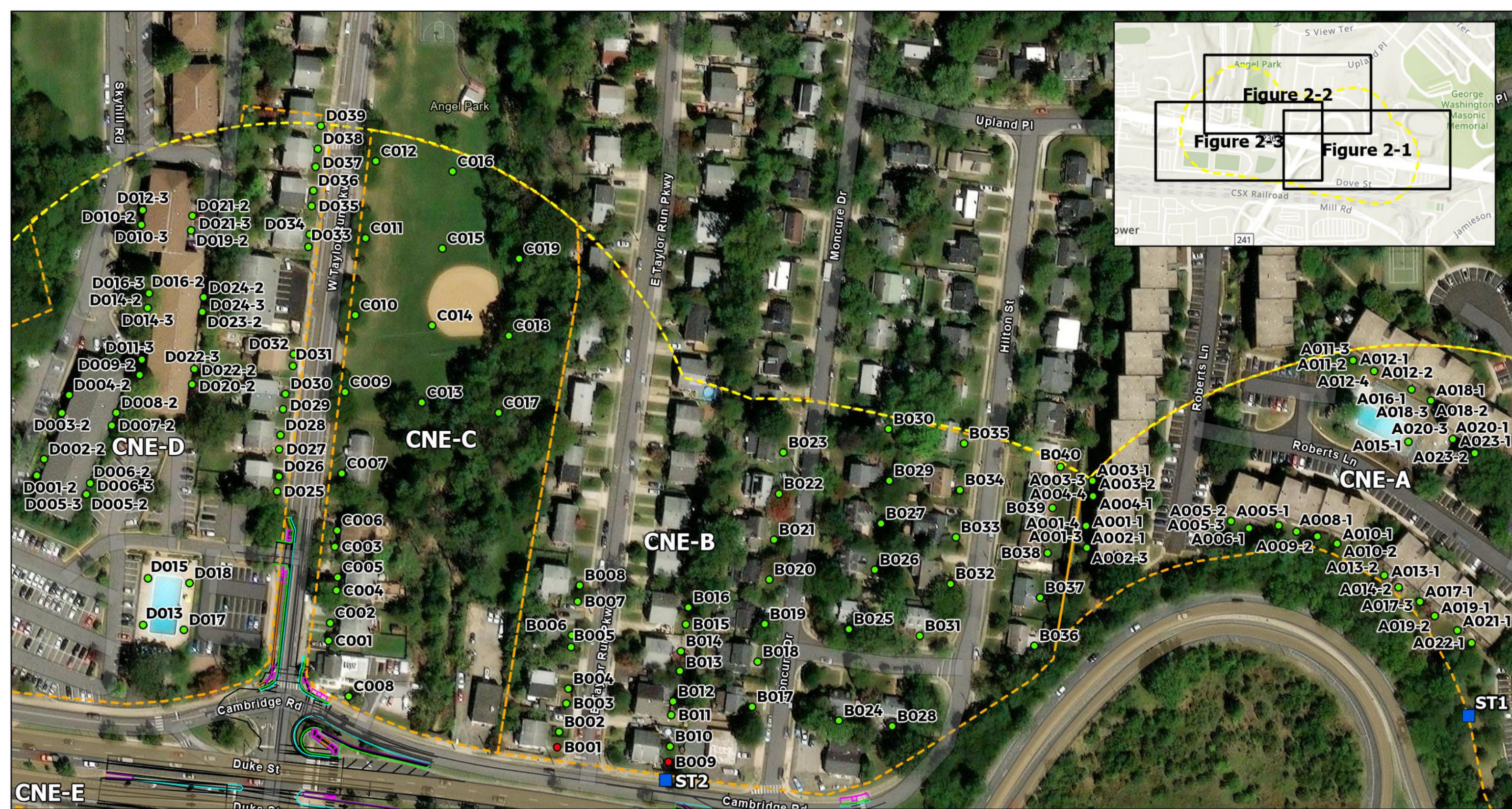


Figure 2-1



Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project

City of Alexandria, VA
May 2025

Legend

- Study Area
 - Common Noise Environment (CNE)
 - Measurement Site
- Receivers
- Non-Impacted
 - Impacted

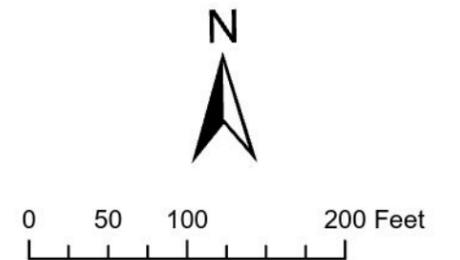
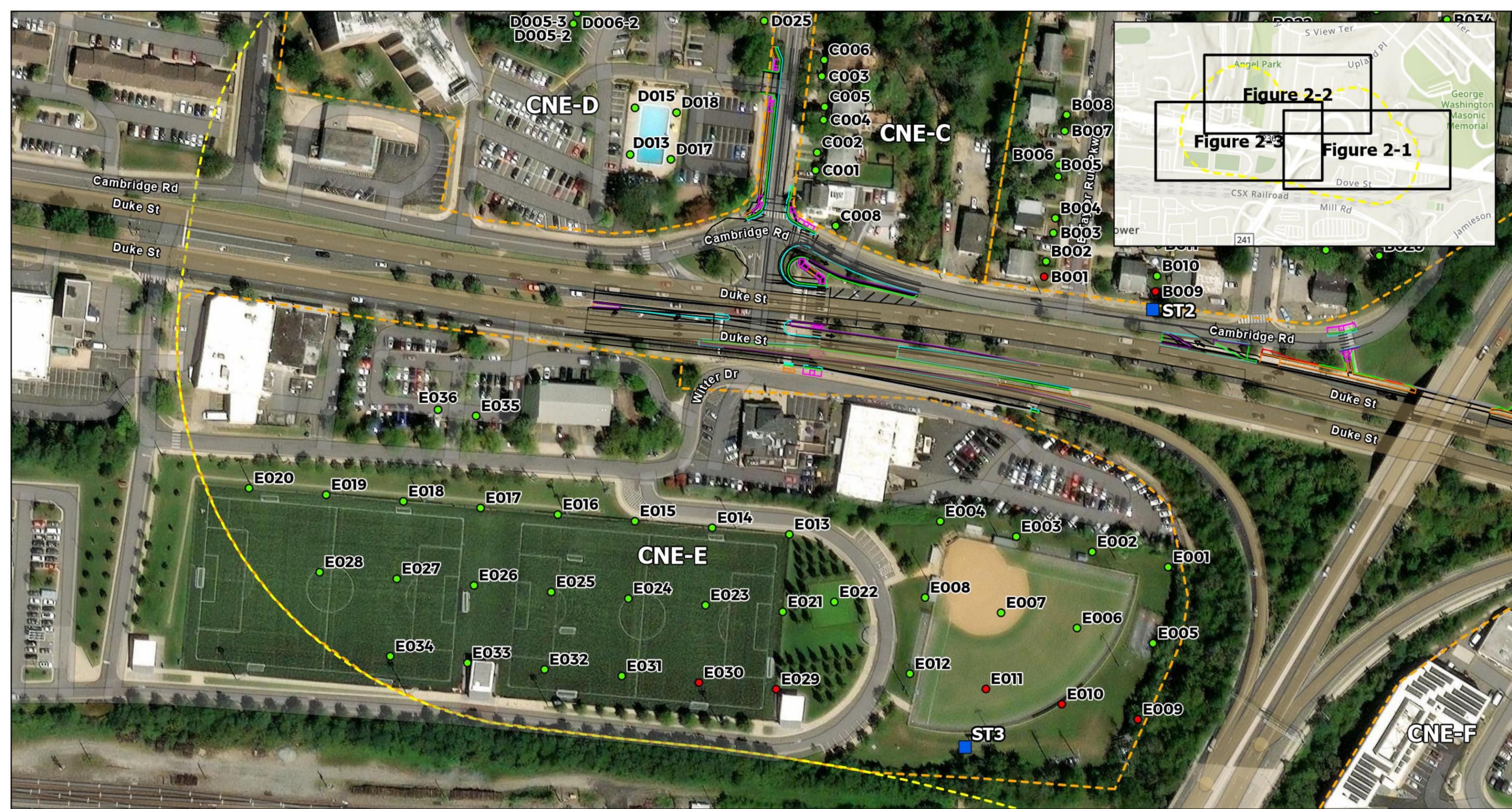


Figure 2-2



Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project

City of Alexandria, VA
May 2025

Legend

- Study Area
 - Common Noise Environment (CNE)
 - Measurement Site
- Receivers
- Non-Impacted
 - Impacted

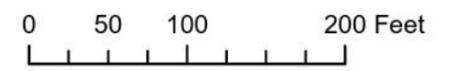


Figure 2-3

Appendix A

HOURLY EQUIVALENT TRAFFIC NOISE LEVELS

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A001-1	Residential	B	1	A	112 ROBERTS LA	58	58	0
A001-2	Residential	B	1	A	112 ROBERTS LA	59	60	1
A001-3	Residential	B	1	A	112 ROBERTS LA	60	60	0
A001-4	Residential	B	1	A	112 ROBERTS LA	61	61	0
A002-1	Residential	B	1	A	112 ROBERTS LA	59	60	1
A002-2	Residential	B	1	A	112 ROBERTS LA	61	61	0
A002-3	Residential	B	1	A	112 ROBERTS LA	62	62	0
A002-4	Residential	B	1	A	112 ROBERTS LA	62	62	0
A003-1	Residential	B	1	A	114 ROBERTS LA	56	56	0
A003-2	Residential	B	1	A	114 ROBERTS LA	58	58	0
A003-3	Residential	B	1	A	114 ROBERTS LA	59	59	0
A003-4	Residential	B	1	A	114 ROBERTS LA	59	59	0
A004-1	Residential	B	1	A	114 ROBERTS LA	56	57	1
A004-2	Residential	B	1	A	114 ROBERTS LA	58	58	0
A004-3	Residential	B	1	A	114 ROBERTS LA	59	59	0
A004-4	Residential	B	1	A	114 ROBERTS LA	59	60	1
A005-1	Residential	B	1	A	110 ROBERTS LA	62	62	0
A005-2	Residential	B	1	A	110 ROBERTS LA	63	63	0
A005-3	Residential	B	1	A	110 ROBERTS LA	63	63	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
 Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A006-1	Residential	B	1	A	110 ROBERTS LA	63	63	0
A006-2	Residential	B	1	A	110 ROBERTS LA	63	64	1
A006-3	Residential	B	1	A	110 ROBERTS LA	64	64	0
A007-1	Residential	B	1	A	108 ROBERTS LA	62	63	1
A007-2	Residential	B	1	A	108 ROBERTS LA	63	63	0
A007-3	Residential	B	1	A	108 ROBERTS LA	63	64	1
A008-1	Residential	B	1	A	108 ROBERTS LA	62	63	1
A008-2	Residential	B	1	A	108 ROBERTS LA	63	63	0
A008-3	Residential	B	1	A	108 ROBERTS LA	64	64	0
A009-1	Residential	B	1	A	106 ROBERTS LA	62	62	0
A009-2	Residential	B	1	A	106 ROBERTS LA	63	63	0
A009-3	Residential	B	1	A	106 ROBERTS LA	64	64	0
A010-1	Residential	B	1	A	106 ROBERTS LA	62	62	0
A010-2	Residential	B	1	A	106 ROBERTS LA	63	63	0
A010-3	Residential	B	1	A	106 ROBERTS LA	64	64	0
A011-1	Residential	B	1	A	132 ROBERTS LA	46	46	0
A011-2	Residential	B	1	A	132 ROBERTS LA	46	47	1
A011-3	Residential	B	1	A	132 ROBERTS LA	47	48	1
A011-4	Residential	B	1	A	132 ROBERTS LA	50	50	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A012-1	Residential	B	1	A	132 ROBERTS LA	46	47	1
A012-2	Residential	B	1	A	132 ROBERTS LA	48	48	0
A012-3	Residential	B	1	A	132 ROBERTS LA	49	49	0
A012-4	Residential	B	1	A	132 ROBERTS LA	51	51	0
A013-1	Residential	B	1	A	104 ROBERTS LA	63	63	0
A013-2	Residential	B	1	A	104 ROBERTS LA	64	64	0
A013-3	Residential	B	1	A	104 ROBERTS LA	64	64	0
A014-1	Residential	B	1	A	104 ROBERTS LA	63	63	0
A014-2	Residential	B	1	A	104 ROBERTS LA	64	64	0
A014-3	Residential	B	1	A	104 ROBERTS LA	64	64	0
A015-1	Residential	B	1	A	140 ROBERTS LA	47	47	0
A016-1	Residential	B	1	A	134 ROBERTS LA	46	46	0
A016-2	Residential	B	1	A	134 ROBERTS LA	47	47	0
A016-3	Residential	B	1	A	134 ROBERTS LA	48	48	0
A016-4	Residential	B	1	A	134 ROBERTS LA	51	51	0
A017-1	Residential	B	1	A	102 ROBERTS LA	62	63	1
A017-2	Residential	B	1	A	102 ROBERTS LA	63	64	1
A017-3	Residential	B	1	A	102 ROBERTS LA	64	64	0
A018-1	Residential	B	1	A	134 ROBERTS LA	46	47	1

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A018-2	Residential	B	1	A	134 ROBERTS LA	47	48	1
A018-3	Residential	B	1	A	134 ROBERTS LA	48	49	1
A018-4	Residential	B	1	A	134 ROBERTS LA	51	51	0
A019-1	Residential	B	1	A	102 ROBERTS LA	62	62	0
A019-2	Residential	B	1	A	102 ROBERTS LA	63	64	1
A019-3	Residential	B	1	A	102 ROBERTS LA	64	64	0
A020-1	Residential	B	1	A	136 ROBERTS LA	49	49	0
A020-2	Residential	B	1	A	136 ROBERTS LA	50	50	0
A020-3	Residential	B	1	A	136 ROBERTS LA	51	51	0
A020-4	Residential	B	1	A	136 ROBERTS LA	53	53	0
A021-1	Residential	B	1	A	100 ROBERTS LA	61	61	0
A021-2	Residential	B	1	A	100 ROBERTS LA	63	63	0
A021-3	Restaurant	B	1	A	100 ROBERTS LA	63	64	1
A022-1	Residential	B	1	A	100 ROBERTS LA	60	61	1
A022-2	Residential	B	1	A	100 ROBERTS LA	63	63	0
A022-3	Residential	B	1	A	100 ROBERTS LA	63	63	0
A023-1	Residential	B	1	A	136 ROBERTS LA	50	50	0
A023-2	Residential	B	1	A	136 ROBERTS LA	51	51	0
A023-3	Residential	B	1	A	136 ROBERTS LA	52	52	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A023-4	Residential	B	1	A	136 ROBERTS LA	54	54	0
A024	Residential	B	1	A	110 SHOOTERS CT	57	57	0
A025	Residential	B	1	A	108 SHOOTERS CT	57	57	0
A026	Residential	B	1	A	106 SHOOTERS CT	57	57	0
A027	Residential	B	1	A	104 SHOOTERS CT	57	58	1
A028	Residential	B	1	A	102 SHOOTERS CT	57	58	1
A029	Residential	B	1	A	100 SHOOTERS CT	58	58	0
A030	Residential	B	1	A	100 ROBERTS CT	54	55	1
A031	Residential	B	1	A	102 ROBERTS CT	53	53	0
A032	Residential	B	1	A	101 ROBERTS CT	60	61	1
A033	Residential	B	1	A	104 ROBERTS CT	52	52	0
A034	Residential	B	1	A	103 ROBERTS CT	59	59	0
A035	Residential	B	1	A	106 ROBERTS CT	51	52	1
A036	Residential	B	1	A	105 ROBERTS CT	56	56	0
A037	Residential	B	1	A	109 ROBERTS LA	50	50	0
A038	Residential	B	1	A	108 ROBERTS CT	51	51	0
A039	Residential	B	1	A	107 ROBERTS LA	48	48	0
A040	Residential	B	1	A	107 ROBERTS CT	55	55	0
A041	Residential	B	1	A	110 ROBERTS CT	50	51	1

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
 Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A042	Residential	B	1	A	105 ROBERTS LA	49	49	0
A043	Residential	B	1	A	119 SHOOTERS CT	44	44	0
A044	Residential	B	1	A	109 ROBERTS CT	55	56	1
A045	Residential	B	1	A	117 SHOOTERS CT	43	43	0
A046	Residential	B	1	A	115 SHOOTERS CT	43	44	1
A047	Residential	B	1	A	112 ROBERTS CT	50	50	0
A048	Residential	B	1	A	103 ROBERTS LA	53	53	0
A049	Residential	B	1	A	113 SHOOTERS CT	43	43	0
A050	Residential	B	1	A	111 SHOOTERS CT	43	43	0
A051	Residential	B	1	A	109 SHOOTERS CT	43	43	0
A052	Residential	B	1	A	111 ROBERTS CT	55	55	0
A053	Residential	B	1	A	101 ROBERTS LA	57	57	0
A054	Residential	B	1	A	114 ROBERTS CT	49	50	1
A055	Residential	B	1	A	107 SHOOTERS CT	43	43	0
A056	Residential	B	1	A	105 SHOOTERS CT	43	43	0
A057-2	Residential	B	1	A	2327 B DUKE ST	58	58	0
A057-3	Residential	B	1	A	2327 B DUKE ST	59	59	0
A058	Residential	B	1	A	103 SHOOTERS CT	44	44	0
A059	Residential	B	1	A	101 SHOOTERS CT	47	47	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A060-2	Residential	B	1	A	2327 B DUKE ST	57	57	0
A060-3	Residential	B	1	A	2327 B DUKE ST	58	58	0
A061-2	Residential	B	1	A	2327 D DUKE ST	67	67	0
A061-3	Residential	B	1	A	2327 D DUKE ST	67	67	0
A062-1	Residential	B	1	A	2327 B DUKE ST	45	45	0
A062-2	Residential	B	1	A	2327 B DUKE ST	47	47	0
A062-3	Residential	B	1	A	2327 B DUKE ST	48	49	1
A063-1	Residential	B	1	A	2327 B DUKE ST	46	46	0
A063-2	Residential	B	1	A	2327 B DUKE ST	46	46	0
A063-3	Residential	B	1	A	2327 B DUKE ST	49	49	0
A064-1	Residential	B	1	A	2327 D DUKE ST	43	44	1
A064-2	Residential	B	1	A	2327 D DUKE ST	46	46	0
A064-3	Residential	B	1	A	2327 D DUKE ST	50	50	0
A065-2	Residential	B	1	A	2327 F DUKE ST	50	50	0
A065-3	Residential	B	1	A	2327 F DUKE ST	52	53	1
A066-2	Residential	B	1	A	2327 D DUKE ST	67	67	0
A066-3	Residential	B	1	A	2327 D DUKE ST	67	67	0
A067-2	Residential	B	1	A	2327 F DUKE ST	43	43	0
A067-3	Residential	B	1	A	2327 F DUKE ST	45	45	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A068-1	Residential	B	1	A	2327 A DUKE ST	44	45	1
A068-2	Residential	B	1	A	2327 A DUKE ST	42	43	1
A068-3	Residential	B	1	A	2327 A DUKE ST	46	47	1
A069-1	Residential	B	1	A	2327 D DUKE ST	43	44	1
A069-2	Residential	B	1	A	2327 D DUKE ST	45	46	1
A069-3	Residential	B	1	A	2327 D DUKE ST	49	49	0
A070-1	Residential	B	1	A	2327 A DUKE ST	44	44	0
A070-2	Residential	B	1	A	2327 A DUKE ST	43	44	1
A070-3	Residential	B	1	A	2327 A DUKE ST	46	46	0
A071-2	Residential	B	1	A	2327 F DUKE ST	49	49	0
A071-3	Residential	B	1	A	2327 F DUKE ST	51	51	0
A072-2	Residential	B	1	A	2327 F DUKE ST	42	42	0
A072-3	Residential	B	1	A	2327 F DUKE ST	45	45	0
A073-1	Residential	B	1	A	2327 A DUKE ST	48	48	0
A073-2	Residential	B	1	A	2327 A DUKE ST	50	50	0
A073-3	Residential	B	1	A	2327 A DUKE ST	53	53	0
A074-2	Residential	B	1	A	2327 C DUKE ST	65	65	0
A074-3	Residential	B	1	A	2327 C DUKE ST	65	65	0
A075-1	Residential	B	1	A	2327 A DUKE ST	50	51	1

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A075-2	Residential	B	1	A	2327 A DUKE ST	53	53	0
A075-3	Residential	B	1	A	2327 A DUKE ST	54	55	1
A076-1	Residential	B	1	A	2327 C DUKE ST	43	43	0
A076-2	Residential	B	1	A	2327 C DUKE ST	45	45	0
A076-3	Residential	B	1	A	2327 C DUKE ST	48	48	0
A077-1	Residential	B	1	A	2327 E DUKE ST	52	52	0
A077-2	Residential	B	1	A	2327 E DUKE ST	55	55	0
A077-3	Residential	B	1	A	2327 E DUKE ST	56	56	0
A078-2	Residential	B	1	A	2327 E DUKE ST	42	42	0
A078-3	Residential	B	1	A	2327 E DUKE ST	45	45	0
A079-2	Residential	B	1	A	2327 C DUKE ST	65	65	0
A079-3	Residential	B	1	A	2327 C DUKE ST	66	66	0
A080-1	Residential	B	1	A	2327 C DUKE ST	43	43	0
A080-2	Residential	B	1	A	2327 C DUKE ST	45	45	0
A080-3	Residential	B	1	A	2327 C DUKE ST	49	49	0
A081-1	Residential	B	1	A	2327 E DUKE ST	53	54	1
A081-2	Residential	B	1	A	2327 E DUKE ST	56	56	0
A081-3	Residential	B	1	A	2327 E DUKE ST	57	57	0
A082-2	Residential	B	1	A	2327 E DUKE ST	43	43	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
A082-3	Residential	B	1	A	2327 E DUKE ST	46	46	0
B001	Residential	B	1	B	10 E TAYLOR RUN PY	67	67	0
B002	Residential	B	1	B	12 E TAYLOR RUN PY	64	64	0
B003	Residential	B	1	B	14 E TAYLOR RUN PY	61	61	0
B004	Residential	B	1	B	16 E TAYLOR RUN PY	59	60	1
B005	Residential	B	1	B	20 E TAYLOR RUN PY	58	58	0
B006	Residential	B	1	B	22 E TAYLOR RUN PY	56	56	0
B007	Residential	B	1	B	26 E TAYLOR RUN PY	55	55	0
B008	Residential	B	1	B	28 E TAYLOR RUN PY	55	55	0
B009	Residential	B	1	B	11 E TAYLOR RUN PY	66	66	0
B010	Residential	B	1	B	13 E TAYLOR RUN PY	63	64	1
B011	Residential	B	1	B	17 E TAYLOR RUN PY	60	60	0
B012	Residential	B	1	B	19 E TAYLOR RUN PY	58	59	1
B013	Residential	B	1	B	23 E TAYLOR RUN PY	57	58	1
B014	Residential	B	1	B	25 E TAYLOR RUN PY	55	55	0
B015	Residential	B	1	B	29 E TAYLOR RUN PY	54	54	0
B016	Residential	B	1	B	31 E TAYLOR RUN PY	53	54	1
B017	Residential	B	1	B	112 MONCURE DR	59	59	0
B018	Residential	B	1	B	116 MONCURE DR	57	57	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
B019	Residential	B	1	B	120 MONCURE DR	56	56	0
B020	Residential	B	1	B	124 MONCURE DR	55	55	0
B021	Residential	B	1	B	128 MONCURE DR	54	55	1
B022	Residential	B	1	B	132 MONCURE DR	54	54	0
B023	Residential	B	1	B	136 MONCURE DR	53	54	1
B024	Residential	B	1	B	115 HILTON ST	60	60	0
B025	Residential	B	1	B	119 MONCURE DR	57	57	0
B026	Residential	B	1	B	123 MONCURE DR	54	54	0
B027	Residential	B	1	B	127 MONCURE DR	53	53	0
B028	Residential	B	1	B	117 HILTON ST	61	61	0
B029	Residential	B	1	B	131 MONCURE DR	53	53	0
B030	Residential	B	1	B	135 MONCURE DR	53	53	0
B031	Residential	B	1	B	118 HILTON ST	58	58	0
B032	Residential	B	1	B	124 HILTON ST	58	57	-1
B033	Residential	B	1	B	128 HILTON ST	57	56	-1
B034	Residential	B	1	B	132 HILTON ST	56	55	-1
B035	Residential	B	1	B	136 HILTON ST	56	54	-2
B036	Residential	B	1	B	123 HILTON ST	63	63	0
B037	Residential	B	1	B	127 HILTON ST	60	60	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
 Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
B038	Residential	B	1	B	131 HILTON ST	58	58	0
B039	Residential	B	1	B	135 HILTON ST	55	55	0
B040	Residential	B	1	B	139 HILTON ST	54	54	0
C001	Residential	B	1	C	17 W TAYLOR RUN PY	63	62	-1
C002	Residential	B	1	C	19 W TAYLOR RUN PY	63	63	0
C003	Residential	B	1	C	25 W TAYLOR RUN PY	62	62	0
C004	Residential	B	1	C	21 W TAYLOR RUN PY	62	62	0
C005	Residential	B	1	C	23 W TAYLOR RUN PY	62	61	-1
C006	Residential	B	1	C	27 W TAYLOR RUN PY	61	61	0
C007	Residential	B	1	C	39 W TAYLOR RUN PY	61	60	-1
C008	Business	E	1	C	15 W TAYLOR RUN PY	68	68	0
C009	Athletic Field	C	1	C	ANGEL PARK	61	60	-1
C010	Athletic Field	C	1	C	ANGEL PARK	60	60	0
C011	Athletic Field	C	1	C	ANGEL PARK	60	59	-1
C012	Athletic Field	C	1	C	ANGEL PARK	60	59	-1
C013	Athletic Field	C	1	C	ANGEL PARK	52	53	1
C014	Athletic Field	C	1	C	ANGEL PARK	53	53	0
C015	Athletic Field	C	1	C	ANGEL PARK	52	52	0
C016	Athletic Field	C	1	C	ANGEL PARK	52	52	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
 Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
C017	Athletic Field	C	1	C	ANGEL PARK	53	53	0
C018	Athletic Field	C	1	C	ANGEL PARK	51	52	1
C019	Athletic Field	C	1	C	ANGEL PARK	51	51	0
D001-2	Residential	B	1	D	53 SKYHILL RD	54	54	0
D001-3	Residential	B	1	D	53 SKYHILL RD	55	56	1
D002-2	Residential	B	1	D	53 SKYHILL RD	53	53	0
D002-3	Residential	B	1	D	53 SKYHILL RD	54	54	0
D003-2	Residential	B	1	D	53 SKYHILL RD	50	50	0
D003-3	Residential	B	1	D	53 SKYHILL RD	52	52	0
D004-2	Residential	B	1	D	53 SKYHILL RD	49	49	0
D004-3	Residential	B	1	D	53 SKYHILL RD	51	51	0
D005-2	Residential	B	1	D	53 SKYHILL RD	61	61	0
D005-3	Residential	B	1	D	53 SKYHILL RD	62	62	0
D006-2	Residential	B	1	D	53 SKYHILL RD	61	61	0
D006-3	Residential	B	1	D	53 SKYHILL RD	61	62	1
D007-2	Residential	B	1	D	53 SKYHILL RD	59	60	1
D007-3	Residential	B	1	D	53 SKYHILL RD	60	60	0
D008-2	Residential	B	1	D	53 SKYHILL RD	59	59	0
D008-3	Residential	B	1	D	53 SKYHILL RD	60	60	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
D009-2	Residential	B	1	D	101 SKYHILL RD	52	52	0
D009-3	Residential	B	1	D	101 SKYHILL RD	53	53	0
D010-2	Residential	B	1	D	101 SKYHILL RD	46	46	0
D010-3	Residential	B	1	D	101 SKYHILL RD	47	47	0
D011-2	Residential	B	1	D	101 SKYHILL RD	51	51	0
D011-3	Residential	B	1	D	101 SKYHILL RD	52	52	0
D012-2	Residential	B	1	D	101 SKYHILL RD	45	46	1
D012-3	Residential	B	1	D	101 SKYHILL RD	47	47	0
D013	Residential	B	1	D	2711 DUKE ST	64	64	0
D014-2	Residential	B	1	D	101 SKYHILL RD	48	49	1
D014-3	Residential	B	1	D	101 SKYHILL RD	49	50	1
D015	Residential	B	1	D	2711 DUKE ST	63	63	0
D016-2	Residential	B	1	D	101 SKYHILL RD	48	48	0
D016-3	Residential	B	1	D	101 SKYHILL RD	49	49	0
D017	Residential	B	1	D	2711 DUKE ST	65	65	0
D018	Residential	B	1	D	2711 DUKE ST	64	64	0
D019-2	Residential	B	1	D	101 SKYHILL RD	48	48	0
D019-3	Residential	B	1	D	101 SKYHILL RD	51	51	0
D020-2	Residential	B	1	D	101 SKYHILL RD	58	58	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
D020-3	Residential	B	1	D	101 SKYHILL RD	59	59	0
D021-2	Residential	B	1	D	101 SKYHILL RD	49	49	0
D021-3	Residential	B	1	D	101 SKYHILL RD	52	52	0
D022-2	Residential	B	1	D	101 SKYHILL RD	58	58	0
D022-3	Residential	B	1	D	101 SKYHILL RD	59	59	0
D023-2	Residential	B	1	D	101 SKYHILL RD	57	57	0
D023-3	Residential	B	1	D	101 SKYHILL RD	58	58	0
D024-2	Residential	B	1	D	101 SKYHILL RD	56	56	0
D024-3	Residential	B	1	D	101 SKYHILL RD	57	57	0
D025	Residential	B	1	D	40 W TAYLOR RUN PY	63	62	-1
D026	Residential	B	1	D	42 W TAYLOR RUN PY	62	62	0
D027	Residential	B	1	D	44 W TAYLOR RUN PY	62	61	-1
D028	Residential	B	1	D	46 W TAYLOR RUN PY	62	61	-1
D029	Residential	B	1	D	48 W TAYLOR RUN PY	61	61	0
D030	Residential	B	1	D	50 W TAYLOR RUN PY	61	60	-1
D031	Residential	B	1	D	52 W TAYLOR RUN PY	62	61	-1
D032	Residential	B	1	D	52 W TAYLOR RUN PY	62	61	-1
D033	Residential	B	1	D	102 W TAYLOR RUN PY	61	60	-1
D034	Residential	B	1	D	104 W TAYLOR RUN PY	61	60	-1

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
D035	Residential	B	1	D	106 W TAYLOR RUN PY	61	60	-1
D036	Residential	B	1	D	108 W TAYLOR RUN PY	61	60	-1
D037	Residential	B	1	D	110 W TAYLOR RUN PY	61	60	-1
D038	Residential	B	1	D	112 W TAYLOR RUN PY	61	60	-1
D039	Residential	B	1	D	114 W TAYLOR RUN PY	61	60	-1
E001	Athletic Field	C	1	E	WITTER BASEBALL	63	64	1
E002	Athletic Field	C	1	E	WITTER BASEBALL	63	64	1
E003	Athletic Field	C	1	E	WITTER BASEBALL	63	63	0
E004	Athletic Field	C	1	E	WITTER BASEBALL	62	63	1
E005	Athletic Field	C	1	E	WITTER BASEBALL	64	64	0
E006	Athletic Field	C	1	E	WITTER BASEBALL	64	64	0
E007	Athletic Field	C	1	E	WITTER BASEBALL	64	64	0
E008	Athletic Field	C	1	E	WITTER BASEBALL	65	65	0
E009	Athletic Field	C	1	E	WITTER BASEBALL	67	67	0
E010	Athletic Field	C	1	E	WITTER BASEBALL	67	67	0
E011	Athletic Field	C	1	E	WITTER BASEBALL	66	66	0
E012	Athletic Field	C	1	E	WITTER BASEBALL	65	65	0
E013	Athletic Field	C	1	E	WITTER FIELD SOCCER	61	61	0
E014	Athletic Field	C	1	E	WITTER FIELD SOCCER	61	62	1

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing
								Δ
E015	Athletic Field	C	1	E	Witter Field Soccer	61	61	0
E016	Athletic Field	C	1	E	Witter Field Soccer	59	59	0
E017	Athletic Field	C	1	E	Witter Field Soccer	58	58	0
E018	Athletic Field	C	1	E	Witter Field Soccer	59	59	0
E019	Athletic Field	C	1	E	Witter Field Soccer	59	59	0
E020	Athletic Field	C	1	E	Witter Field Soccer	59	59	0
E021	Athletic Field	C	1	E	Witter Field Soccer	63	63	0
E022	Cemetery	C	1	E	Witter Drive	62	63	1
E023	Athletic Field	C	1	E	Witter Field Soccer	62	62	0
E024	Athletic Field	C	1	E	Witter Field Soccer	62	62	0
E025	Athletic Field	C	1	E	Witter Field Soccer	61	61	0
E026	Athletic Field	C	1	E	Witter Field Soccer	63	63	0
E027	Athletic Field	C	1	E	Witter Field Soccer	61	61	0
E028	Athletic Field	C	1	E	Witter Field Soccer	61	61	0
E029	Athletic Field	C	1	E	Witter Field Soccer	66	66	0
E030	Athletic Field	C	1	E	Witter Field Soccer	66	66	0
E031	Athletic Field	C	1	E	Witter Field Soccer	65	65	0
E032	Athletic Field	C	1	E	Witter Field Soccer	65	65	0
E033	Athletic Field	C	1	E	Witter Field Soccer	65	65	0

**Table A-1: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project
Noise-Sensitive Receptors and Hourly Equivalent Noise Levels**

Receptors						Predicted Noise Levels, Leq(h) (dB(A))		
Rec. No.	Land Use	NAC	ERs ¹	CNEs	Address	2018 Existing	2036 Build	2036 Build - Existing Δ
E034	Athletic Field	C	1	E	WITTER FIELD SOCCER	65	65	0
E035	Residential	B	1	E	WITTER PLACE	59	59	0
E036	Residential	B	1	E	WITTER PLACE	58	58	0
F001	Daycare	C	1	F	20 DOVE ST	65	66	1
Predicted Traffic Noise Impacts							13²	0³
Impact = 								
<ol style="list-style-type: none"> 1. The number of equivalent receptors (ERs) 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). 2. Predicted traffic noise impact due to approaching or exceeding NAC. 3. Predicted traffic noise impact due to a “substantial increase” above existing noise levels of 10 dB(A) or more. 								

Table A-2: Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project Comparison of Railway and Traffic Noise Levels for CNE-E							
Receptors			Predicted Noise Levels, Leq(h) (dB(A))				
Rec. No.	Land Use	CNE	Railway¹	2018 Existing		2036 Build	
				Roadway	Combined²	Roadway	Combined²
E001	Athletic Field	E	59	61	63	62	64
E002	Athletic Field	E	59	61	63	62	64
E003	Athletic Field	E	59	61	63	61	63
E004	Athletic Field	E	59	60	62	60	63
E005	Athletic Field	E	62	60	64	61	64
E006	Athletic Field	E	62	59	64	60	64
E007	Athletic Field	E	62	58	64	59	64
E008	Athletic Field	E	64	57	65	58	65
E009	Athletic Field	E	66	61	67	61	67
E010	Athletic Field	E	66	59	67	60	67
E011	Athletic Field	E	66	58	66	58	66
E012	Athletic Field	E	65	56	65	57	65
E013	Athletic Field	E	59	56	61	57	61
E014	Athletic Field	E	59	57	61	58	62
E015	Athletic Field	E	59	57	61	58	61
E016	Athletic Field	E	58	50	59	51	59
E017	Athletic Field	E	58	48	58	48	58
E018	Athletic Field	E	58	49	59	49	59
E019	Athletic Field	E	58	52	59	53	59

Receptors			Predicted Noise Levels, Leq(h) (dB(A))				
Rec. No.	Land Use	CNE	Railway ¹	2018 Existing		2036 Build	
				Roadway	Combined ²	Roadway	Combined ²
E020	Athletic Field	E	58	53	59	53	59
E021	Athletic Field	E	62	56	63	56	63
E022	Cemetery	E	61	56	62	57	63
E023	Athletic Field	E	61	56	62	56	62
E024	Athletic Field	E	61	55	62	56	62
E025	Athletic Field	E	61	53	61	54	61
E026	Athletic Field	E	62	50	63	51	63
E027	Athletic Field	E	61	50	61	51	61
E028	Athletic Field	E	61	51	61	52	61
E029	Athletic Field	E	65	55	66	56	66
E030	Athletic Field	E	65	55	66	55	66
E031	Athletic Field	E	65	54	65	55	65
E032	Athletic Field	E	64	53	65	54	65
E033	Athletic Field	E	64	51	65	52	65
E034	Athletic Field	E	65	50	65	51	65
E035	Residential	E	59	45	59	45	59
E036	Residential	E	58	45	58	46	58

1. The railway noise level is the same for 2018 Existing and 2036 Build conditions.
2. The combined noise level is the sum of noise generated by the railway and roadway at each receiver. Noise levels are added logarithmically (e.g., for E001, the existing noise level = $10\log((10^{(59/10)})+(10^{(61/10)}))$)

Appendix B

AMBIENT NOISE LEVEL MONITORING AND VALIDATION

Measurement Site ID	Land Use	Roadway Noise Source	Date	Start/Stop Time	Leq(h) dB(A)
ST1	Residential	Duke St WB /Telegraph Rd Ramps	3/25/2025	11:17-11:37	62.4
ST2	Residential	Duke St	3/25/2025	12:00-12:20	66.8
ST3	Athletic Field	Telegraph Rd	3/28/2025	9:44-10:04	57.5

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

Site	Date	Time	Temp (F)	Wind Speed (mph) and Direction	Relative Humidity (%)	Station ID ¹
ST1	3/25/2025	11:17	62	2 mph/East	33%	KVAALEXA408
ST2	3/25/2025	12:00	63	3 mph/East	33%	KVAALEXA408
ST3	3/28/2025	9:44	51	0 mph/East	53%	KVAALEXA408

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

Site	Date	Start/Stop Time	Roadway	Cars	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Speed (mph)
ST1 ¹	3/25/2025	11:17-11:37	Telegraph Rd Ramp	509	16	0	1	0	25
ST2	3/25/2025	12:00-12:20	Duke St WB	510	17	1	4	1	25-35
			Duke St EB	150	4	0	1	1	25-35
			Duke St EB Ramp to Telegraph Rd SB	351	9	1	3	2	25
			Duke St Service Rd	11	1	0	0	0	20
ST3 ²	3/28/2025	9:44-10:04	Telegraph Rd	1170	40	2	2	0	35-40

¹Traffic at ST1 was combined for both ramp directions while counting. For validation the traffic was divided evenly across all lanes.
²Traffic at ST3 was combined for both directions while counting. For validation the traffic was divided evenly across all lanes.

Table B-4: TNM Validation Results			
Measurement Site	Measured Leq(h) (dB(A))	Predicted Leq(h) (dB(A))	Difference (dB(A))¹
ST1	62.4	59.9	-2.5
ST2	66.8	65.4	-1.4
ST3	57.5	56.8	-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.			

Noise Monitoring Site ST1 – Field Data Sheet

PROJECT: Duke St WB to Telegraph Rd SB SITE SKETCH / NOTES:

MEAS SITE: ST1 - Roberts Lane

DATE: 3/25/25 STAFF: KS

MEAS NO	1		
START TIME	11:17 AM		
END TIME	11:37 AM		
INSTRUMENT	3202633		
BATTERY	12296		
LEQ	62.14		
FILE NAME	Project 001		
CALIBRATION	9/2/13	1	1

TRAFFIC

ROADWAY	Duke St/Telegraph Ramp		
VEH SPEED	25 mph		
AUTO	509		
MT	16		
HT	0		
BUS	1		
MOTO	0		
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

WEATHER

GENERAL	Clear/Sunny
TEMP	60°F
% RH	33
WIND SPD/DIR	2 mph/East
ROAD COND.	Dry

SITE

LATITUDE	38.8269002		
LONGITUDE	-77.0703469		
PICTURES	✓		

The site sketch shows a road layout. At the top right is a trapezoidal shape labeled 'Building'. Below it, a road curves from the top left towards the bottom right. A dashed line indicates a road direction labeled 'To Telegraph SB'. Another dashed line indicates a road direction labeled 'To Duke St WB'. A noise monitoring site 'ST1' is marked with a circle and a crosshair. Several small circles represent trees or bushes. A north arrow 'N ↑' is at the bottom left of the sketch.

NOISE SOURCES:
 Mostly Roadway
 Distant train horns, low-frequency engine noise

Noise Monitoring Site ST1
Roberts Lane – Multi-Family Residential
Short-Term Measurement



ST1 looking Northwest

Noise Monitoring Site ST2 – Field Data Sheet

PROJECT: Duke St / W Taylor Run

MEAS SITE: ST2

DATE: 3/25/25 STAFF: KS

MEAS NO	1		
START TIME	12:00 PM		
END TIME	12:20 PM		
INSTRUMENT	3202633		
BATTERY	100%		
LEQ	66.8 dBA		
FILE NAME	Project 002		
CALIBRATION	94 dBA	1	1

TRAFFIC

ROADWAY	Duke St WB		
VEH SPEED	25-35 mph		
AUTO	510		
MT	17		
HT	1		
BUS	4		
MOTO	1		
ROADWAY	Duke St EB (2070an camp)		
VEH SPEED	25-35 mph		
AUTO	501		
MT	13		
HT	1		
BUS	4		
MOTO	111 (3)		
ROADWAY	Duke St Service Rd		
VEH SPEED	20 mph		
AUTO	11		
MT	1		
HT	0		
BUS	0		
MOTO	0		

WEATHER

GENERAL	Clear/Sunny		
TEMP	63°F		
% RH	33%		
WIND SPD/DIR	3 mph E		
ROAD COND	Dry		

SITE

LATITUDE	38.8067309		
LONGITUDE	-77.07740723		
PICTURES	✓		

SITE SKETCH / NOTES:

The sketch shows three vertical lanes representing Duke St EB, Duke St WB, and Duke St Service Rd. To the right of these lanes is a building labeled 'Handyman' and a street labeled 'Monard Dr.'. A monitoring site 'ST2' is marked with a circle and a crosshair on the right side of the sketch. A north arrow 'N' with a right-pointing arrow is located below the sketch.

NOISE SOURCES:
All roadway (Duke St.)
No Trains

Noise Monitoring Site ST2
Duke St Service Rd – Single Family Residential
Short-Term Measurement



ST2 Looking West

Noise Monitoring Site ST3 – Field Data Sheet

PROJECT: Duke St / W Taylor Run

MEAS SITE: ST3

DATE: 3/28/25 STAFF: KS

MEAS NO	1		
START TIME	9:44 AM		
END TIME	10:04 AM		
INSTRUMENT	3022633		
BATTERY	10090		
LEQ	57.5 dBA		
FILE NAME	Project005		
CALIBRATION	94dB	1	1

TRAFFIC

ROADWAY	Telegraph Rd.		
VEH SPEED	35-40 mph		
AUTO	1172		
MT	40		
HT	2		
BUS	2		
MOTO	0		
ROADWAY	Trains on Railway		
VEH SPEED	EB	WB	
AUTO	3	2	
MT			
HT			
BUS			
MOTO			
ROADWAY			
VEH SPEED			
AUTO			
MT			
HT			
BUS			
MOTO			

WEATHER

GENERAL	Clear/Sunny
TEMP	51°F
% RH	53%
WIND SPD/DIR	0mph/E
ROAD COND.	Dry

SITE

LATITUDE	38.8252137		
LONGITUDE	-77.0749481		
PICTURES	✓		

SITE SKETCH / NOTES:

NOISE SOURCES:
 Telegraph Rd (faint)
 Rail Noise (Metro, Amtrak, VRE)

Noise Monitoring Site ST3
Telegraph Rd – Witter Baseball Field
Short-Term Measurement



ST3 Looking East

Appendix C

TRAFFIC DATA

Traffic Data

Traffic data used for this assessment is based on information provided in the *Duke Street (Route 236) at W. Taylor Run Parkway Intersection Improvement Project Final Report* prepared by WSP for the City of Alexandria, dated March 18, 2024. The final traffic report provides traffic counts and turning movements for the sections of roadway evaluated in this Preliminary Noise Report. All data used for this noise assessment was provided by the WSP traffic engineering team. Note that the final traffic report does not provide a breakdown of vehicle percentages (i.e., autos, medium trucks, heavy trucks, buses, and motorcycles). The engineering team directed us to assume that the truck percentage was 2% for the study area. Therefore, to be conservative, the noise assessment used a heavy truck percentage of 2%, which can be seen in the following tables: Table C-1 and Table C-2. Due to the types of roadways evaluated in this traffic noise assessment, the posted speed was used.

Table C-1: Base Year 2018 Traffic Volumes – Existing Condition (PM Peak Hour)

Roadway	Direction	Segment	Vehicle Volumes				Posted Speed (mph)
			Auto	Medium Trucks	Heavy Trucks	Bus	
Duke St	EB	W Taylor Run Parkway to Telegraph Rd On-Ramp EB	688	0	14	0	35
Duke St	EB	Telegraph Rd Off-Ramp EB to Roberts Ln	1398	0	29	0	35
Duke St	EB	Roth St to Witter Dr	1880	0	38	0	35
Duke St	EB	East of Roberts Ln	1433	0	29	0	35
Duke St	EB	to S Dove St	214	0	4	0	25
Duke St	EB	Witter Dr to W Taylor Run Parkway	1941	0	40	0	35
Duke St	WB	Roberts Ln and Telegraph Rd On-Ramp WB	2511	0	51	0	35
Duke St	WB	Telegraph Rd On-Ramp WB and Off-Ramp	732	0	15	0	35
Duke St	WB	Telegraph Rd Off-Ramp WB and W Taylor Run Parkway	2168	0	44	0	35
Duke St	WB	to Roberts Ln	2278	0	46	0	35
Duke St	WB	W Taylor Run Parkway to Witter Dr	1957	0	40	0	35
Duke St	WB	Witter Dr to Roth St	1952	0	40	0	35
Duke St Service Rd	EB	East of W Taylor Run Pkwy	21	0	0	0	25
Duke St Service Rd	EB	West of W Taylor Run Pkwy	77	0	2	0	25
Duke St Service Rd	WB	East of W Taylor Run Pkwy	96	0	2	0	25
Duke St Service Rd	WB	West of W Taylor Run Pkwy	46	0	1	0	25
Roberts Ln	NB	North of Duke St	31	0	1	0	25
Roberts Ln	SB	North of Duke St	57	0	1	0	25
Roth St	NB	Roth St South of Duke St	351	0	7	0	15
Roth St	SB	Roth St South of Duke St	70	0	1	0	15
S Dove St	NB	South of Duke St	251	0	5	0	25
S Dove St	NB	South of S Dove St Intersection	70	0	1	0	25
S Dove St	SB	South of Duke St	20	0	0	0	25
S Dove St	SB	South of S Dove St Intersection	52	0	1	0	25
Telegraph Rd Off-Ramp EB	EB	-	711	0	15	0	25
Telegraph Rd Off-Ramp WB	WB	-	1436	0	29	0	25

Table C-1: Base Year 2018 Traffic Volumes – Existing Condition (PM Peak Hour)

Roadway	Direction	Segment	Vehicle Volumes				Posted Speed (mph)
			Auto	Medium Trucks	Heavy Trucks	Bus	
Telegraph Rd On-Ramp EB	EB	-	1228	0	25	0	25
Telegraph Rd On-Ramp WB	WB	-	1779	0	36	0	25
W Taylor Run Pkwy	NB	Duke St and Duke St Service Rd	255	0	5	0	25
W Taylor Run Pkwy	NB	North of Duke St Service Rd	215	0	4	0	25
W Taylor Run Pkwy	SB	Duke St and Duke St Service Rd	413	0	8	0	25
W Taylor Run Pkwy	SB	North of Duke St Service Rd	266	0	5	0	25
Witter Dr	NB	Witter Dr South of Duke St	93	0	2	0	15
Witter Dr	SB	Witter Dr South of Duke St	36	0	1	0	15

Table C-2: Design Year 2036 Traffic Volumes – Build Condition (PM Peak Hour)

Roadway	Direction	Segment	Vehicle Volumes				Posted Speed (mph)
			Auto	Medium Trucks	Heavy Trucks	Bus	
Duke St	EB	W Taylor Run Parkway to Telegraph Rd On-Ramp EB	904	0	18	0	35
Duke St	EB	Telegraph Rd Off-Ramp EB to Roberts Ln	1463	0	30	0	35
Duke St	EB	Roth St to Witter Dr	2262	0	46	0	35
Duke St	EB	East of Roberts Ln	1499	0	31	0	35
Duke St	EB	Telegraph Road On-Ramp WB Trn Lane	203	0	4	0	35
Duke St	EB	Telegraph Rd On-Ramp WB and Roberts Ln	701	0	14	0	35
Duke St	EB	to S Dove St	148	0	3	0	25
Duke St	EB	Witter Dr to W Taylor Run Parkway	2327	0	47	0	35
Duke St	WB	Roberts Ln and Telegraph Rd On-Ramp WB	2550	0	52	0	35
Duke St	WB	Telegraph Rd On-Ramp WB and Off-Ramp	765	0	16	0	35
Duke St	WB	Telegraph Rd Off-Ramp WB and W Taylor Run Parkway	2267	0	46	0	35
Duke St	WB	to Roberts Ln	2382	0	49	0	35

Table C-2: Design Year 2036 Traffic Volumes – Build Condition (PM Peak Hour)

Roadway	Direction	Segment	Vehicle Volumes				Posted Speed (mph)
			Auto	Medium Trucks	Heavy Trucks	Bus	
Duke St	WB	W Taylor Run Parkway to Witter Dr	2046	0	42	0	35
Duke St	WB	Witter Dr to Roth St	2042	0	42	0	35
Duke St Service Rd	EB	East of W Taylor Run Pkwy	22	0	0	0	25
Duke St Service Rd	EB	West of W Taylor Run Pkwy	80	0	2	0	25
Duke St Service Rd	WB	East of W Taylor Run Pkwy	24	0	0	0	25
Duke St Service Rd	WB	West of W Taylor Run Pkwy	49	0	1	0	25
Roberts Ln	NB	North of Duke St	32	0	1	0	25
Roberts Ln	SB	North of Duke St	71	0	1	0	25
Roth St	NB	Roth St South of Duke St	368	0	8	0	15
Roth St	SB	Roth St South of Duke St	73	0	1	0	15
S Dove St	NB	South of Duke St	186	0	4	0	25
S Dove St	NB	South of S Dove St Intersection	73	0	1	0	25
S Dove St	SB	South of Duke St	21	0	0	0	25
S Dove St	SB	South of S Dove St Intersection	55	0	1	0	25
Telegraph Rd Off-Ramp EB	EB	-	909	0	19	0	25
Telegraph Rd Off-Ramp WB	WB	-	1501	0	31	0	25
Telegraph Rd On-Ramp EB	EB	-	1581	0	32	0	25
Telegraph Rd On-Ramp WB	EB	Duke St EB	203	0	4	0	35
Telegraph Rd On-Ramp WB	WB	-	1785	0	36	0	25
W Taylor Run Pkwy	NB	Duke St and Duke St Service Rd	268	0	5	0	25
W Taylor Run Pkwy	NB	North of Duke St Service Rd	224	0	5	0	25
W Taylor Run Pkwy	SB	Duke St and Duke St Service Rd	205	0	4	0	25
W Taylor Run Pkwy	SB	North of Duke St Service Rd	127	0	3	0	25
Witter Dr	NB	Witter Dr South of Duke St	97	0	2	0	15
Witter Dr	SB	Witter Dr South of Duke St	37	0	1	0	15

Appendix D

LIST OF PREPARERS

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

- Kody Snow – Project Manager and Noise Analyst
- Jacob (Byron) Pirkle – QA Review
- Emily Robinson – QA Review

Appendix E

TNM CERTIFICATION CERTIFICATES

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.

Certificate of Continuing Education

This is to certify that

Jacob Byron Pirkle

has satisfactorily completed 32 hours of training on

FHWA Traffic Noise Model 2.5

conducted by

Bowlby & Associates, Inc.

**Franklin, Tennessee
February 26-29, 2008**

William Bowlby

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

Darlene Reiter

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

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.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

Stephen C. Brich, P.E.
Commissioner

1401 East Broad Street
Richmond, Virginia 23219

(804) 786-2701
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August 27, 2025

MEMORANDUM

TO: VDOT/County, Project Manager
CC: LJ Muchenje PE, VDOT Noise Engineer

FROM: Kody Snow, P.E., WSP Traffic Noise Analyst

SUBJECT: UPC 115531

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 (804) 371-6768. Thank you for your time and consideration regarding this request.

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

Response: Noise reducing design is unfeasible as the project as existing Duke Street horizontal and vertical alignment governs location of scoped project improvement. Realignment of Duke Street would be a significant engineering improvement relative to the proposed modifications for the project. Additionally, horizontal alignment changes could potentially put the roadway closer to noise sensitive receptors which are located on either side of the transportation corridor.

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: Landscaping could be used in some areas to provide visual screening, where allowed, but could also create potential safety issues due to restricted vehicle visibility. Some areas of the project already have mature tree growth that provide visual screening. 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.

Note: Please provide the name of each responder.