Gannett Fleming

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Virginia Department of Transportation

Route 17 Bridge over I-95 to Hospital Boulevard in Spotsylvania County

State Project Number: 0017-088-R72, B616, P101
UPC 107140
From: Intersection with US Route 1 (Jefferson Davis Highway)
To: 0.90 Miles South of Intersection with US Route 1
Spotsylvania County, Virginia
Fredericksburg District

PRELIMINARY NOISE ANALYSIS

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

June 2017

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I. Executive Summary

This report addresses the noise evaluation performed for widening Route 17 from two lanes to four lanes and replacement of the structurally deficient bridge over Interstate 95 in Spotsylvania County, Virginia. The new bridge and associated approaches would accommodate four lanes on Route 17 with a shared use path on the north side of the bridge and a sidewalk on the south side. The design year for the project is 2040. The project location and the study area are depicted in Figure 1 and Figure 2.

Noise abatement was evaluated for the noise sensitive receptors based on the Virginia Department of Transportation (VDOT) and Federal Highway Administration (FHWA) criteria for Type I noise abatement. All noise modeling was performed using Version 2.5 of the FHWA Traffic Noise Model (FHWA TNM) and are in accordance with the VDOT *Highway Traffic Noise Impact Analysis Guidance Manual*, dated July 14, 2015 (Version 7).

For analysis purposes, the project study area was divided into five (5) Common Noise Environments (CNEs). CNEs include representative noise sensitive receptors within 500 feet of the project area. The analysis includes evaluating noise sensitive receptors in all five CNEs for the Existing Year (2014), the Design Year (2040) Build and the Design Year (2040) No Build scenarios. A field visit was conducted at the project site to perform noise measurements at 14 locations and document field parameters to include in the Traffic Noise Model (TNM). An additional 11 sites were included in the model to further represent the noise sensitive sites within the five (5) CNEs.

Noise modeling was completed for Existing Year (2014) and Design Year (2040) Build and No Build conditions. Design Year (2040) Build noise levels were predicted at each modeled receptor site under the proposed widening scenario. For purposes of validating the FHWA TNM, noise measurements and concurrent traffic counts were conducted in all CNEs and are reported in Table 2. Normal traffic growth can be expected to generally increase noise levels by from one to three dB(A) in the project area. Noise levels were predicted at all modeled and measured receivers representing 87 single family residences and two large multi-family developments for all modeling scenarios (Activity Category B and C – Table 1). Under Design Year (2040) Build conditions a total of two receptors representing one residence and one residential complex swimming pool are predicted to experience noise impacts. These two impacts are predominately from I-95 and not attributed to widening of the Route 17 project. Based on the evaluation of existing and future noise levels and the noise abatement criteria (NAC) described in Table 1, project-related noise impacts were considered negligible in all CNEs with the exception of one receptor in each of CNEs 1 and 3. Noise barriers were evaluated and determined not to be feasible or reasonable. A detailed discussion of the noise abatement evaluation follows in Section VIII of this report.

No considerable, long-term construction related noise impacts are anticipated. Any noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and would cease upon completion of the project construction phase.

II. Introduction and Background

Noise impacts are often a concern for roadway improvement projects when noise sensitive environments are located adjacent to the project area. Noise analysis methodology and noise level criteria established by Federal Highway administration (FHWA) and Virginia Department of Transportation (VDOT) are utilized to assess the potential noise impacts of the transportation improvement projects.

This report addresses the noise evaluation performed for widening Route 17 from two lanes to four lanes and to replace the structurally deficient bridge over Interstate 95 in Spotsylvania County, Virginia. The new bridge and approaches would accommodate four lanes on Route 17 with a shared use path on the north side of the bridge and a sidewalk on the south side. The project location and the study area are depicted in Figure 1 and Figure 2. The land use along the corridor is mainly residential. The planned project area improvements are depicted in Figure 3.

Noise monitoring, noise modeling and impact evaluation were performed for noise sensitive receptors based on the Virginia Department of Transportation (VDOT) and Federal Highway Administration (FHWA) criteria for Type I noise abatement; generally within 500 feet of the construction limits depicted in Figure 4.

III. Noise Analysis Methodology, Terminology and Criteria

The methodologies applied to the noise analysis for the widening of Route 17 is in accordance with VDOT's "*State Noise Abatement Policy"* effective July 13, 2011 and the "*Highway Traffic Noise Impact Analysis Guidance Manual*", updated July 14, 2015. VDOT guidelines are based on Title 23 of the Code of Federal Regulations, Part 772 and the Procedures for Abatement of Highway Traffic Noise and Construction Noise, (23 CFR 772).

To determine the degree of highway noise impact, Noise Abatement Criteria (NAC) have been established for a number of different land use categories that are considered to be sensitive to highway traffic noise. Table 1, located at the end of this report, documents the NAC for the associated activity land use category shown in the adjacent column. The project is considered developed with dense areas of residential development. For the purposes of this analysis, the majority of the land uses are considered Category B (residential), with one Category C (an apartment pool) land use within the project study area.

The NAC are given in terms of an hourly, A-weighted, equivalent noise level. The A-weighted noise level frequency is used for human use areas because it is comprised of the noise level frequencies that are most easily distinguished by the human ear within the noise level spectrum. Highway traffic noise is categorized as a linear noise source, where varying noise levels occur at a fixed point during a single vehicle pass by due to the Doppler effect and is affected by physical barriers between the noise source and the receptor location as well as weather conditions. It is acceptable to characterize these fluctuating noise levels with a single number known as the equivalent noise level (Leq). The Leq is the value of a steady noise level that would represent the same acoustic energy as the actual time-varying sound evaluated over the same time period. For highway noise assessments, Leq is typically evaluated over a one-hour period.

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

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

~or~

- A substantial noise increase has been defined by VDOT as a 10 dB(A) increase above existing noise levels for all noise sensitive exterior activity categories. A 10 dB(A) increase in noise reflects the generally accepted range of a perceived doubling of the loudness.

If a traffic noise impact is identified within the project corridor, then consideration of noise abatement measures is necessary. The final decision on whether or not to provide noise abatement along a project corridor will take into account the feasibility of the design and overall cost weighted against the benefit. Phase 2 and Phase 3 of the three-phased approach are discussed in the noise abatement evaluation section of this report.

IV. Noise Monitoring Methodology

The identification of noise sensitive land uses with aerial imagery and local government parcel data guided the selection of noise monitoring locations along the project corridor. In order to validate the noise models, noise monitoring was conducted at 14 representative noise sensitive receptor sites. Figure 3 shows an overview of the build alternative and Figure 4 shows the locations of the 14 noise monitoring sites.

Short-term noise monitoring is not a process to determine design year noise impacts or barrier locations. Short-term noise monitoring provides a level of consistency between what is present in real-world situations and how that is represented in the computer noise model. Common Noise Environments (CNEs) are groupings of receptor sites that, by location, form distinct communities within the project area and are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. These areas are used to evaluate traffic noise impacts and potential noise mitigation options to residential developments or communities as a whole, as well as for consideration of feasibility and reasonableness of possible noise abatement measures for specific communities.

Monitoring was performed at 14 noise sensitive receptors using Type I Rion NA-28 sound level meters on the A-weighted scale and reported in decibels (dB(A)). The sound level meters (SLM) were calibrated with a Rion NC-74 calibrator. The SLMs meet the American National Standard Specifications for Sound Level Meters, ANSI S1.4-1983 (R1991) Type 1 requirements as well as those defined by FHWA. The SLMs were used to measure typical ambient background levels at each site in accordance with the methodologies contained in FHWA-PD-96-046, Measurement of Highway-Related Noise (FHWA, May 1996). See Appendix A for the field data sheets. Calibration certificates related to noise meters and calibrators are contained in Appendix B.

Ambient noise measurements were conducted throughout the project study area. Short-term noise monitoring was performed on March 23rd of 2017 during hours of free flow conditions. Within each of the CNEs, short-term (20-minute duration) noise readings were taken along with concurrent traffic counts at 14 locations. Readings were taken on the A-weighted scale and reported in decibels (dB(A)). It should be noted that short-term measurements were taken at various times during the day on March 23rd, 2017 and did not necessarily represent the noisiest condition at any particular measurement site (receptor). However all roads had free flow traffic conditions during measurement periods. In addition, measurement sites (receptors) were positioned in order to enable validation of the noise prediction model and to assist in defining existing noise levels for second-row residences and for receivers located within approximately 500 feet of Route 17 or the connection of Glenwood Drive and Germanna Point Drive. Data collected included, L_{eq}, L_{min}, L_{max}, and SEL as well as site geometry, unusual noise events, ambient weather conditions (including temperature, humidity and wind speeds) and latitude and longitude. Traffic was counted on local roads, as well as Route 17 and I-95 during each measurement period and grouped by autos, medium trucks, heavy trucks, buses, and motorcycles. Measured existing L_{eq} noise levels at short-term measurement sites (receptors) ranged from 43 to 69 dB(A). This data was use in FHWA's Traffic Noise Model (TNM 2.5) to validate the project site model.

V. Undeveloped Lands

Highway traffic noise analyses are performed for developed lands as well as undeveloped lands if they are considered "permitted". Undeveloped lands are deemed to be permitted when there is a definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of at least one building permit. In accordance with the VDOT State Noise Policy, an undeveloped lot is considered to be planned, designed, and programmed if a building permit has been issued by the local authorities prior to the Date of Public Knowledge for the relevant project.

The Spotsylvania County Planning Department has no current record of planned or pending development upon the undeveloped land included in the Project Area (Tax Map# 36-14-1 or TM 36-14-2) as of April 2017. There are no prior approved or active re-zoning, special use permits, site plans, plats, building permits in the Spotsylvania system. Correspondence from Spotsylvania County Planning Department is included in Appendix C.

VDOT considers the Date of Public Knowledge as the date that the final National Environmental Policy Act (NEPA) approval is made. VDOT has no obligation to provide noise mitigation for any undeveloped land that is permitted or constructed after the date of Public Knowledge. As a result of the above coordination with Spotsylvania County, no ongoing permitted land uses appear to be present within the project corridor.

VI. Validation and Existing Conditions

The FHWA Traffic Noise Model (TNM 2.5) is the approved highway noise prediction model for predicting the Existing (2014) and Design Year (2040) noise levels associated with traffic-induced noise. The modeling process begins with model validation, as per VDOT requirements. The short-term noise measurements concurrently with the traffic data, site specific topography and existing

characteristics were modeled and compared to measured noise levels. A difference of 3 dB(A) or less between the monitored and modeled level is considered acceptable. This comparison ensures that reported changes in noise levels between Existing (2014) and Design Year (2040) conditions are due to changes in traffic conditions and not to discrepancies between monitoring and modeling techniques.

Existing conditions include terrain lines based on site topography, barriers from buildings, local roads, and existing traffic. Existing short-term measured noise levels and hourly traffic data based on concurrent traffic counts are summarized in Table 4, with field measurement data sheets contained in Appendix A. Validation results are shown in Table 5. The measured versus modeled noise levels were within the acceptable 3 dB(A) range for all sites evaluated, therefore the FHWA TNM is considered to be validated for this project. The results of the validation process were used to help model the FHWA TNM used for purposes of modeling existing and future year noise levels, determining future year impacts, and evaluating potential noise abatement options.

There are many factors that influence the measured noise levels that may cause differences with computed noise levels of several decibels. Such factors included atmospheric conditions (upwind, neutral or downwind), shielding by structures, and the representation of louder vehicles passing during the measurement period. The validated noise model was the base noise model for the remainder of the noise analysis. Modeling sites were added to the validated model to thoroughly predict Existing (2014) noise levels throughout the project area. Additional noise modeling was then performed for existing conditions using 2014 traffic data supplied by VDOT (see Appendix D). This modeling step was performed to predict Existing (2014) worst-case noise levels associated with existing worst-case traffic volumes and composition. Table 4 provides a summary of the modeled Existing (2014) predicted worst-case noise levels in the project area.

Analysis locations were grouped into five CNEs which are groupings of receptor sites that, by location, form distinct communities within the project area and have a common noise environment. These areas were used to evaluate traffic noise impacts and potential noise abatement options and to assess the feasibility and reasonableness of potential noise abatement measures for specific communities. Where residential communities or groupings of noise sensitive land use areas exist, both noise monitoring and noise modeling-only sites were grouped into a CNE. A description of each CNE is provided below.

For noise analysis purposes, the project study area was divided into the following CNEs as shown in Figure 2:

CNE 1
Activity Category B land uses located adjacent to the eastbound travel lanes (south side) of Route 17, including multi-family (Overlook Terrace apartments) residential dwellings on Lookout Lane (Figure 3). The modeled existing (2014) worst-case noise level within CNE 1 is predicted to range from 54-68 dB(A). Modeled existing (2014) noise levels exceed the NAC in this CNE with noise impacts at one receptor representing the pool at Overview Terrace Apartments, as shown in Figures 2 and 3 and Table 5.

CNE 2
Activity Category B land uses located adjacent to the westbound travel lanes (north side) of Route 17 and to the east of Glenwood Drive, including Glenwood Manufactured Home Community (Figure 3). The modeled existing (2014) worst-case noise level within CNE 2 is predicted to range from 52-62 dB(A), with no noise impacts modeled, as shown in Figures 2 and 3 and Table 5. Modeled existing (2014) noise levels do not approach or exceed the NAC in this CNE.

CNE 3
Activity Category B land uses located to the west of Glenwood Drive (Figure 4). The modeled existing (2014) worst-case noise level within CNE 3 is predicted to range from 64-66 dB(A). Modeled existing (2014) noise levels exceed the NAC in this CNE with noise impacts at receptor 3-1 on Gleewood Drive, as shown in Figure 2 and 3 and Table 5.

CNE 4
Activity Category B land uses located adjacent to the northbound travel lanes (west side) Germanna Point Drive, including multi-family (Matti Hill Ct) residential dwellings (See Figure 3). The modeled existing (2014) worst-case noise level within CNE 4 is predicted to range from 50-52 dB(A), with no noise impacts modeled, as shown in Figures 2 and 3 and Table 5. Modeled existing (2014) noise levels do not approach or exceed the NAC in this CNE.

CNE 5
Activity Category B land uses located on Lee Hill School Drive near the corner of Route 17 and Germanna Point Drive (Figure 3). The modeled existing (2014) worst-case noise level within CNE 4 is predicted to range from 57-60 dB(A), with no noise impacts modeled, as shown in Figures 2 and 3 and Table 5. Modeled existing (2014) noise levels do not approach or exceed the NAC in this CNE.

VII. Evaluation of Design Year Noise Levels and Noise Impact Assessment

The model used to predict worst case existing and future noise levels and to evaluate noise abatement options was the FHWA's TNM, Version 2.5. The FHWA TNM predicts noise levels at selected locations based on traffic data, roadway design, topographic features, and the relationship of the analysis site (receiver) to nearby roadways. ENTRADA is not currently available for this project, VDOT has provided preliminary traffic number that they indicated will for the preliminary study. However, ENTRADA will be developed for the Final Design Noise Analysis which will include hourly volumes, compositions, and operational speeds. Existing and future traffic data used were based on design hourly volume, D and T factors provided by VDOT. The traffic data used for modeling was approved by VDOT noise specialist. Traffic data used for prediction of existing (year 2014) and future (year 2040) noise levels for both no-barrier and barrier conditions is contained in Appendix D. The percentages of automobiles, medium trucks, and heavy trucks used in the FHWA TNM modeling process were developed from review of traffic classification data obtained from VDOT. The modeled speed of 35 mph on Route 17 was based on the information provided by VDOT (see Appendix D).

The modeled sites included in the existing model were used to predict the Design Year (2040) noise levels throughout the project area. Additional noise modeling was then performed for existing conditions using 2040 traffic data supplied by VDOT (see Appendix D). This modeling

step was performed to predict Design Year (2040) worst-case noise levels associated with existing worst-case traffic volumes and composition. This modeled analysis was performed with the planned project improvements (Design Year Build Alternative). Table 4 provides a summary of the modeled Design Year (2040) predicted worst-case noise levels in the project area for the Build Alternative.

The following describes the locations and predicted sound levels of each CNE in the Route 17 Bridge Improvement Projects study area. CNE 1 is located in the southern project area while the remaining CNEs (2 through 5) are located in the northern project area. The CNEs are shown in Figures 2 and 3. All CNEs are located east of the Route 17 Bridge and are all residential.

CNE 1

The dominant noise source within CNE 1 is I- 95. The Design Year (2040) Build sound levels are predicted to range from 59-69 dB(A), with noise impacts at one receptor representing the Overview Terrace Apartment pool attributed to noise levels from I-95 and are not related to the widening of Route 17. CNE 1 is comprised of four (4) measurement sites and five (5) modeled sites representing approximately 10 single family residences and two (2) multifamily residences. Due to Design Year (2040) Build sound levels exceeding the NAC, noise abatement is considered warranted and will be discussed in Section VIII.

CNE 2

The dominant noise source within CNE 2 is I- 95. The Design Year (2040) Build sound levels are predicted to range from 53-62 dB(A), with no noise impacts modeled. As such, consideration of noise abatement within this CNE was not warranted. CNE 2 is comprised of five (5) measurement sites and three (3) modeled sites representing approximately 70 single family residences.

CNE 3

The dominant noise sources within CNE 3 are I-95 and Route 17. The Design Year (2040) Build sound levels are predicted to range from 65-67 dB(A), with noise impacts modeled at receptor 3-1 on Glenwood Drive attributed to noise levels from I-95 and are not related to the widening of Route 17. CNE 3 is comprised of one (1) measurement site and one (1) modeled site representing two residences. Due to Design Year (2040) Build sound levels exceeding the NAC, noise abatement is considered warranted and will be discussed in Section VIII.

CNE 4

The dominant noise source within CNE 4 is Route 17 and local roads. The Design Year (2040) Build sound levels are predicted to range from 50-54 dB(A), with no noise impacts modeled. Traffic data was not available for the new road addition connecting Glenwood Drive to Germanna Point Drive although the volume is expected to be low. As such, consideration of noise abatement within this CNE was not warranted. CNE 4 is comprised of three (3) measurement sites and one (1) modeled site representing 6 multifamily residences.

CNE 5

The dominant noise source within CNE 5 is Route 17. The Design Year (2040) Build sound levels are predicted to range from 59-62 dB(A), with no noise impacts modeled. As such, consideration of noise abatement within this CNE was not warranted. CNE 5 is comprised of one (1) measurement site and one (1) modeled site representing two residences.

VIII. Noise Abatement Evaluation

The appropriate level of highway traffic noise analysis must be completed to adequately address whether noise abatement measures are warranted, feasible, and reasonable. Consideration of noise abatement is required if noise levels approach or exceed the NAC (example: 66 dB(A) or higher for Activity Category B and C land uses) or create a substantial noise increase 10 dB(A) over existing levels. Under 23 CFR 772, if the predicted noise level approaches or exceeds the Noise Abatement Criteria, there is a traffic noise impact regardless of whether or not the proposed project is the cause and noise abatement must be considered. The noise levels for the future year were compared to the NAC levels and to the increases over existing year noise levels to determine if there would be any noise impacts. The Design year (2040) Build noise levels are also predicted to exceed NAC at receivers R1-1 and R3-1. These receivers can be seen in Figure 4 and Figure 5.

Phase 2 and Phase 3 of VDOT's three-phased approach to considering noise abatement and determining the feasibility and reasonableness of noise barriers is discussed below in detail.

Phase 2: Feasibility Criteria for Noise Barriers

All receptors that meet the warranted criterion must progress to the "feasible" phase. Phase 2 of the noise abatement criteria requires that both of the following acoustical and engineering conditions be considered:

- 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

- 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, 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.

FHWA and VDOT guidelines recommend a variety of abatement measures that should be considered in response to transportation-related noise impacts. While noise barriers and/or earth berms are generally the most effective form of noise abatement, additional abatement measures exist that have the potential to provide considerable noise reductions, under certain circumstances. A brief description of VDOT-approved noise abatement measures is provided below:

Traffic Control Measures (TCM): Traffic control measures, such as speed limit restrictions, truck traffic restrictions, and other traffic control measures that may be considered for the reduction of noise emission levels are not practical for this project. Reducing speeds will not be an effective noise mitigation measure since a substantial decrease in speed is necessary to provide adequate noise reduction. Typically, a 10 mph reduction in speed will result in only a 2 dB(A) decrease in

noise level, which is not considered a sufficient level of attenuation to be considered feasible. Likewise, a 2 dB(A) change in noise is not perceptible to the human ear. Additionally, a reduction in speed is not practical for this project since the posted speed is already 55 miles per hour.

Alteration of Horizontal and Vertical Alignments: The alteration of the horizontal and vertical alignment has been considered to reduce or eliminate the impacts created by the proposed project. Because residential development is located adjacent to the project corridor over much of its length, it does not allow for meaningful alterations in the horizontal or vertical alignment without significant impacts. Shifting the horizontal alignment to the east or west of its existing location to reduce noise impacts to receptors will create undesirable impacts such as extensive right-of-way acquisition and potentially relocations. Additionally, shifting the roadway alignment away from one group of receptors to reduce noise impacts will cause noise levels to increase at the receptors the alignment is being moved closer to. By maintaining the existing alignment, the project balances impacts to receptors on both sides of the corridor. Further, altering the vertical alignment is not practical because there is a minimum required clearance for I-95 as it passes under Route 17.

Acoustical Insulation of Public-Use and Non-Profit Facilities: This noise abatement measure option applies only to public and institutional use buildings. Since no public use or institutional structures are anticipated to have interior noise levels exceeding FHWA's interior NAC, this noise abatement option will not be applied.

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

Construction of Berms / Noise Barriers: Construction of noise barriers can be an effective way to reduce noise levels at areas of outdoor activity. Noise barriers can be wall structures, earthen berms, or a combination of the two. The effectiveness of a noise barrier depends on the distance and elevation difference between roadway and receptor and the available placement location for a barrier. Gaps between overlapping noise barriers also decrease the effectiveness of the barrier, as opposed to a single 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. In these situations, 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 to implement this form of noise mitigation and make it unreasonable.

Availability of fill material to construct the berm also needs to be considered. On proposed projects where proposed grading yields excess waste material, earth berms 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 may be considered a viable mitigation option throughout the project area, and would be evaluated further where possible in the final design stage.

Additionally, the Code of Virginia (§33.1-223.2:21) 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 noise 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." Based on the noise analysis, there are two noise impacts at one residence and one swimming pool complex in CNE 1 and CNE 3, respectively. The predicted impacts are due to noise from I-95 and are not related to the widening of Route 17. The receptors are elevated and are significantly exposed to traffic for I-95. It is not likely any barrier, built on I-95 right of way, is feasible and reasonable. Noise mitigation is not recommended for this project. Therefore, there is no need for HB 2577 documentation that inquire about the possibility of noise reducing design, the usage of low noise pavement, and visual screening.

In summary, due to right-of-way constraints, noise barriers were considered the only form of abatement having the potential to reduce Design Year (2040) Build noise levels.

Phase 3: Reasonableness Criteria for Noise Barriers

A determination of noise barrier reasonableness will include the consideration of the parameters listed below. The parameters used during the NEPA process are also used during the final design phase when making a determination of noise barrier reasonableness. All of the reasonableness factors must collectively be achieved in order for a noise abatement measure to be deemed reasonable.

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

- **Cost-effectiveness**
  Typically, the limiting factor related to barrier reasonableness is the cost effectiveness value, where the total surface area of the barrier is divided by the number of benefited receptors receiving at least a 5 dB(A) reduction in noise level. VDOT's approved cost is based on a maximum square footage of abatement per benefited receptor, a value of 1,600 square feet per benefited receptor. Where multi-family housing includes balconies at elevations that exceed a 30-ft high barrier or the topography causes receptors to be above the elevation of a 30-ft barrier, these receptors are not assessed for barrier benefits and are not included in the computation of the barrier's reasonableness. For non-residential properties such as parks and public use facilities, a special calculation is performed in order to quantify the type and duration of activity and compare to the cost effectiveness criterion. The determination is based on cost, severity of impact (both in terms of noise levels and the size of the impacted area and the activity it contains), and amount of noise reduction.

- **Noise Reduction Design Goals**
  The design goal is a reasonableness factor indicating a specific reduction in noise levels that VDOT uses to identify that a noise abatement measure effectively reduces noise. The design goal establishes a criterion, selected by VDOT, which noise abatement must achieve. VDOT's noise reduction design goal is defined as a 7 dB(A) insertion loss for at least one impacted receptor, meaning that at least one impacted receptor is predicted to achieve a 7 dB(A) or greater noise reduction with the proposed barrier in place. The design goal is not the same as acoustic feasibility, which defines the minimum level of effectiveness for a noise abatement measure. Acoustic feasibility indicates that the noise abatement measure can, at a minimum, achieve a discernible reduction in noise levels.

Noise reduction is measured by comparing the future design year build condition pre-and post-barrier noise levels. This difference between unabated and abated noise levels is known as "insertion loss" (IL). It is important to optimize the noise barrier design to achieve the most effective noise barrier in terms of both noise reduction (insertion losses) and cost. Although at least a 5 dB(A) reduction is required to meet the feasibility criteria, the following tiered noise barrier abatement goals are used to govern barrier design and optimization.

- Reduction of future highway traffic noise by 7 dB(A) at one (1) or more of the impacted receptor sites (required criterion).

- Reduction of future highway traffic noise levels to the low-60-decibel range when practical (desirable).

- Reduction of future highway traffic noise levels to existing noise levels when practical (desirable).

The following is a discussion of the potential abatement measures for the impacted CNEs under the worst-case Design Year (2040) Build Alternative. These areas will be identified and described as such. Noise abatement was evaluated where noise impacts are predicted to occur. Where a noise barrier was evaluated, the effectiveness was measured in terms of achievable insertion loss. Noise

abatement measures in the project area were evaluated at heights ranging from 10 to 30 feet, at two-foot increments. Tables 5 and 6 list the Design Year (2040) Build noise levels, the abated noise levels, and the net insertion losses for the barriers and barrier systems that were determined to be feasible and reasonable. Feasible and reasonable noise abatement was evaluated based on constructability and the VDOT acoustic design goals. Noise abatement was determined to be feasible and not reasonable for CNE 1 and CNE 3. Appendix E provides completed warranted, feasible, and reasonable worksheets.

CNE 1

Design Year (2040) Build noise levels are predicted to exceed the NAC at one modeling site representing a multifamily dwelling units pool within this portion of CNE 1. A noise barrier was evaluated for this specific impact within CNE 1 along the elevated right of way travel lanes of I-95. In total, the preliminary barrier system evaluated for this project has a length of 746 feet (see Figure 5), with an average height ranging from 10 to 30 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at the one impacted receptor only with a 30 feet high barrier. The barrier does not meet the design goal of an insertion loss (IL) of 7 dB(A) at the one impacted receptor at the evaluated height. The total area for the barrier is 22,386 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 22,386, which exceeds the allowable (MaxSF/BR) value of 1,600. Therefore, CNE 1 noise barrier is considered feasible, but not reasonable at this time. A summary of the abatement for this barrier is shown in Table 5.

CNE 3

Design Year (2040) Build noise levels are predicted to exceed the NAC at one modeling site representing a residential dwelling unti within this portion of CNE 3. A noise barrier was evaluated for this specific impact within CNE 3 along the elevated right of way travel lanes of I-95. In total, the preliminary barrier system evaluated for this project has a length of 652 feet (see Figure 5), with an average height ranging from 10 to 20 feet. The noise barrier achieves feasible (>5 dB(A)) noise reductions at the one impacted receptor with a 18 feet high barrier. The barrier does meet the design goal of an insertion loss (IL) of 7 dB(A) at the one impacted receptor at the evaluated height. The total area for the barrier is 11,736 square feet. It is considered not reasonable due to its Maximum Square Footage of Abatement per Benefited Receptor (MaxSF/BR) value of 11,736, which exceeds the allowable (MaxSF/BR) value of 1,600. Therefore, CNE 3 noise barrier is considered feasible, but not reasonable at this time. A summary of the abatement for this barrier is shown in Table 6.

IX. Construction Noise Considerations

VDOT is 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 and ensure construction operations stay below that level.

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 2016 *Road and Bridge Specifications, Section 107.16(b.3), "Noise"*. The contractor will be required to conform to this specification to reduce the impact of construction noise on the surrounding community.

The specifications have been reproduced below:

- The Contractor's operations shall be performed so that exterior noise levels measured during a noise sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise sensitive activity is occurring. A noise sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.

- VDOT may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.

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

- Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.

- When feasible, the Contractor shall establish haul routes that direct construction related vehicular traffic 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.

FHWA and VDOT policies require that VDOT provides certain information to local officials within whose jurisdiction the highway project is located to minimize future traffic noise impacts of Type I projects on currently undeveloped lands (Type I projects involve highway improvements with noise analysis). This information must include details on noise-compatible land-use planning and noise impact zones for undeveloped lands within the project corridor. The aforementioned details are provided below and shown in Figure 6. Additional information about VDOT's noise

abatement program has also been included in this section.

Sections 12.1 and 12.2 of VDOT's 2011 Highway Traffic Noise Impact Analysis Guidance Manual outline VDOT's approach to communication with local officials, and provide information and resources on highway noise and noise-compatible land-use planning. VDOT's intention is to assist local officials in planning the uses of undeveloped land adjacent to highways to minimize the potential impacts of highway traffic noise.

Entering the Quiet Zone is a brochure that provides general information and examples to elected officials, planners, developers, and the general public about the problem of traffic noise and effective responses to the noise. The following is a link to this brochure on FHWA's website: http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/land_use/qz00.cfm.

A wide variety of administrative strategies may be used to minimize or eliminate potential highway noise impacts, thereby preventing the need or desire for costly noise abatement structures such as noise barriers in future years. There are five broad categories of such strategies:

- Zoning,
- Other legal restrictions (subdivision control, building codes, health codes),
- Municipal ownership or control of the land,
- Financial incentives for compatible development, and
- Educational and advisory services.

The Audible Landscape: A Manual for Highway and Land Use is a very well-written and comprehensive guide addressing these noise-compatible land use planning strategies, with detailed information. This document is available through FHWA's website, at http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/al00.cfm.

Also required under the revised FHWA and VDOT noise policies is information on the noise impact zones adjacent to project roadways in undeveloped lands. To determine these zones, noise levels are computed at various distances from the edge of the project roadways in each of the undeveloped areas of the project study area. The distances from the edge of the roadway to the NAC noise levels are then determined through interpolation. Distances vary in the project corridor due to changes in traffic volumes or terrain features. The distances for this project are summarized in Table 7. Any noise sensitive sites within these zones should be considered noise impacted if no barrier is present to reduce noise levels.

Noise level contours are lines of equal noise exposure that typically parallel roadway alignments. Highway traffic noise is considered a linear noise source and noise levels can drop considerably over distance. The degree that noise levels decrease can vary based on a number of different factors including objects that shield the roadway noise, terrain features and ground cover type (e.g., pavement, grass or snow). The use of noise level contours has become increasingly popular over the last several years, as they have been implemented in planning programs for undeveloped areas with roadway noise influence. Through conscious planning efforts and noise contour generation,

municipal officials can restrict future development inside the noise impact zone (i.e., the area within the 66 dB(A) noise contour). Figure 6 shows the approximate 66 dB(A) noise level contours when considering the improvements made to Route 17 with the Design Year (2040) Build traffic volumes, speeds and composition.

X. Conclusion

This report addresses the noise evaluation performed for the widening of Route 17, the replacement of the bridge of Route 17 over I-95 and the addition of a local road connecting Glenwood Drive and Germanna Point Drive in Spotsylvania County. The design year for the project is 2040.

Normal traffic growth can be expected to generally increase noise levels by from one to three dB(A) in the project area. Such increases are typically perceived as ranging from not noticeable to somewhat noticeable. Based on the analysis of noise reported herein, sound levels were below the noise impact criteria for all CNEs except for two noise impacts at one residence and one swimming pool complex in CNE 1 and CNE 3, respectively. Noise barriers were examined along the right of way of I-95 up to 20 feet in height and resulted in less than 3 dB(A) of attenuation (Figure 5). The steep elevation of the area east of I-95 hinders barriers from being an effective abatement solution. The predicted impacts are due to noise from I-95 and are not related to the widening of Route 17. It is unlikely any noise barriers are feasible and reasonable as the receptors are elevated and are significantly exposed to traffic from I-95. Therefore noise mitigation is not recommended for this project.

TABLES

Table 1- FHWA Noise Abatement Criteria Hourly Equivalent A-Weighted Sound Levels (Decibels dB(A))		
Activity Category	Activity Criteria[1] Leq(h) [2]	Activity Description
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67 (exterior)	Residential
C [3]	67 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E [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.

Table 2: Current Conditions for Validation

CNE	Site	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurrent Traffic Counts							Measured Noise Level dB(A)
					Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
CNE 1	R1-1	Overview Terrace Apartments	3/23/2017	7:43-8:03am	NB I-95	624	26	113	1	0	764	68.2
					SB I-95	640	20	122	8	0	790	
	R1-2	4705 Overview Drive	3/23/2017	9:23-9:43am	NB I-95	643	23	175	2	0	843	62.7
					SB I-95	567	17	133	14	0	731	
	R1-3	Overview Terrace Apartments	3/23/2017	8:15-8:35am	NB I-95	698	24	136	5	2	865	52.2
					SB I-95	588	19	115	7	0	729	
	R1-4	4609 Overview Drive	3/23/2017	8:56-9:16am	NB I-95	622	19	157	3	0	801	56.4
					SB I-95	552	15	109	6	0	682	
CNE 2	R2-1	Glenwood Circle	3/23/2017	1:31-1:51pm	NB I-95	761	31	169	3	1	965	59.9
					SB I-95	860	25	188	3	0	1076	
	R2-2	4736 Glenwood Circle	3/23/2017	3:40-4:00pm	NB I-95	771	19	147	9	0	946	57.2
					SB I-95	879	18	128	1	0	1026	
	R2-3	4634/4633 Glenwood Circle	3/23/2017	2:02-2:22pm	NB I-95	688	37	144	8	0	877	59.9
					SB I-95	898	28	193	3	0	1122	
	R2-4	4639 Glenwood Circle	3/23/2017	2:26-2:46pm	NB I-95	741	26	126	5	0	898	50.4
					SB I-95	878	21	172	1	0	1072	
	R2-5	4701 Glenwood Circle	3/23/2017	2:51-3:11pm	NB I-95	726	26	157	5	1	915	47.9
					SB I-95	934	24	159	6	0	1123	
CNE 3	R3-1	9733 Gleenwood Drive	3/23/2017	4:05-4:25pm	NB I-95	782	23	117	7	0	929	61.6
					SB I-95	944	21	106	2	1	1074	
CNE 4	R4-1	Matti Hill Court	3/23/2017	11:02-11:22am	NB I-95	614	12	165	3	3	797	43.0
					SB I-95	721	18	181	2	2	924	
	R4-2	9921/9929 Matti Hill Court	3/23/2017	11:59am-12:19pm	NB I-95	636	15	174	4	0	829	48.5
					SB I-95	741	18	203	1	0	963	
	R4-3	Matti Hill Court	3/23/2017	11:33-11:52am	NB I-95	704	10	172	2	1	889	49.8
					SB I-95	721	17	188	0	0	926	
CNE 5	R5-1	Lee Hill School Drive	3/23/2017	10:21-10:41am	NB I-95	707	11	167	5	0	890	52.4
					SB I-95	742	19	174	0	0	935	

Table 3: TNM Validation								
CNE	**Site ID**	**Address of Measurement Site**	**Date**	**Time Period**	**TNM Model Calibration Noise Levels in dB(A)**			
					Modeled Leq(h)	**Measured Leq**	**Difference**	**Validated**
CNE 1	R1-1	Overview Terrace Apartments	3/23/2017	10:21-10:41am	67.0	68.6	-1.6	Yes
	R1-2	4705 Overview Drive	3/23/2017	10:21-10:41am	62.3	62.7	-0.4	Yes
	R1-3	Overview Terrace Apartments	3/23/2017	9:48-10:08am	54.2	52.2	2.0	Yes
	R1-4	4609 Overview Drive	3/23/2017	9:14-9:34am	57.8	56.4	1.4	Yes
CNE 2	R2-1	Glenwood Circle	3/23/2017	9:14-9:34am	58.2	59.9	-1.7	Yes
	R2-2	4736 Glenwood Circle	3/23/2017	10:57-11:17am	59.1	57.2	1.9	Yes
	R2-3	4634/4633 Glenwood Circle	3/23/2017	10:57-11:17am	58.4	59.9	-1.5	Yes
	R2-4	4639 Glenwood Circle	3/23/2017	3:43-4:03pm	52.8	50.4	2.4	Yes
	R2-5	4701 Glenwood Circle	3/23/2017	3:43-4:03pm	50.9	47.9	3.0	Yes
CNE 3	R3-1	9733 Gleenwood Drive	3/23/2017	5:15-5:35pm	64.3	61.6	2.7	Yes
CNE 4	R4-1	Matti Hill Court	3/23/2017	5:15-5:35pm	42.4	43	-0.6	Yes
	R4-2	9921/9929 Matti Hill Court	3/23/2017	3:11-3:31pm	51.1	48.5	2.6	Yes
	R4-3	Matti Hill Court	3/23/2017	3:09-3:29pm	50.3	49.8	0.5	Yes
CNE 5	R5-1	Lee Hill School Drive	3/23/2017	4:41-5:01pm	54.7	52.4	2.3	Yes

Table 4: TNM Sound Level Results						
	ID	D.U.	Address	Existing (2014)	Future Build (2040)	Increase over Existing
CNE 1	R1-1	1	Overview Terrace Apartments	68	69	1
	R1-2	1	4705 Overview Drive	64	65	1
	R1-3	1	Overview Terrace Apartments	57	59	2
	R1-4	1	4609 Overview Drive	62	65	3
	M1	1	Overview Terrace Apartments	54	56	2
	M2	1	4621 Overlook Drive	59	61	2
	M3	1	4619 Overlook Drive	58	60	2
	M4	1	4614 Overlook Drive	57	58	1
	M5	1	4610 Overlook Drive	56	58	2
CNE 2	R2-1	1	Glenwood Circle	59	61	2
	R2-2	1	4736 Glenwood Circle	61	62	1
	R2-3	1	4634/4633 Glenwood Circle	60	62	2
	R2-4	1	4639 Glenwood Circle	55	57	2
	R2-5	1	4701 Glenwood Circle	55	58	3
	M6	1	Glenwood Circle	58	60	2
	M7	1	Glenwood Circle	52	53	1
	M8	1	Glenwood Circle	55	57	2
CNE 3	R3-1	1	9733 Glenwood Drive	68	70	1
	M9	1	9735 Glenwood Drive	61	62	1
CNE 4	R4-1	1	Matti Hill Court	51	54	3
	R4-2	1	9921/9929 Matti Hill Court	52	54	2
	R4-3	1	Matti Hill Court	51	51	0
	M10	1	9951 Matti Hill Ct	50	53	3
CNE 5	R5-1	1	4601 Lee Hill School Drive	57	59	2
	M11	1	4601 Lee Hill School Drive	60	62	2

Table 7: Distance from Centerline of Proposed Design (2040) to 66 dB(A) Contour		
CNE	**Distance (feet) from Route 17**	**Distance (feet) from I-95**
1	**60**	**150**
2	**115**	**240**
3	**N/A**	**280**
4	**N/A**	**N/A**
5	**70**	**N/A**

Note:

N/A – Not Applicable. Contour from roadway is not near CNE.

FIGURES

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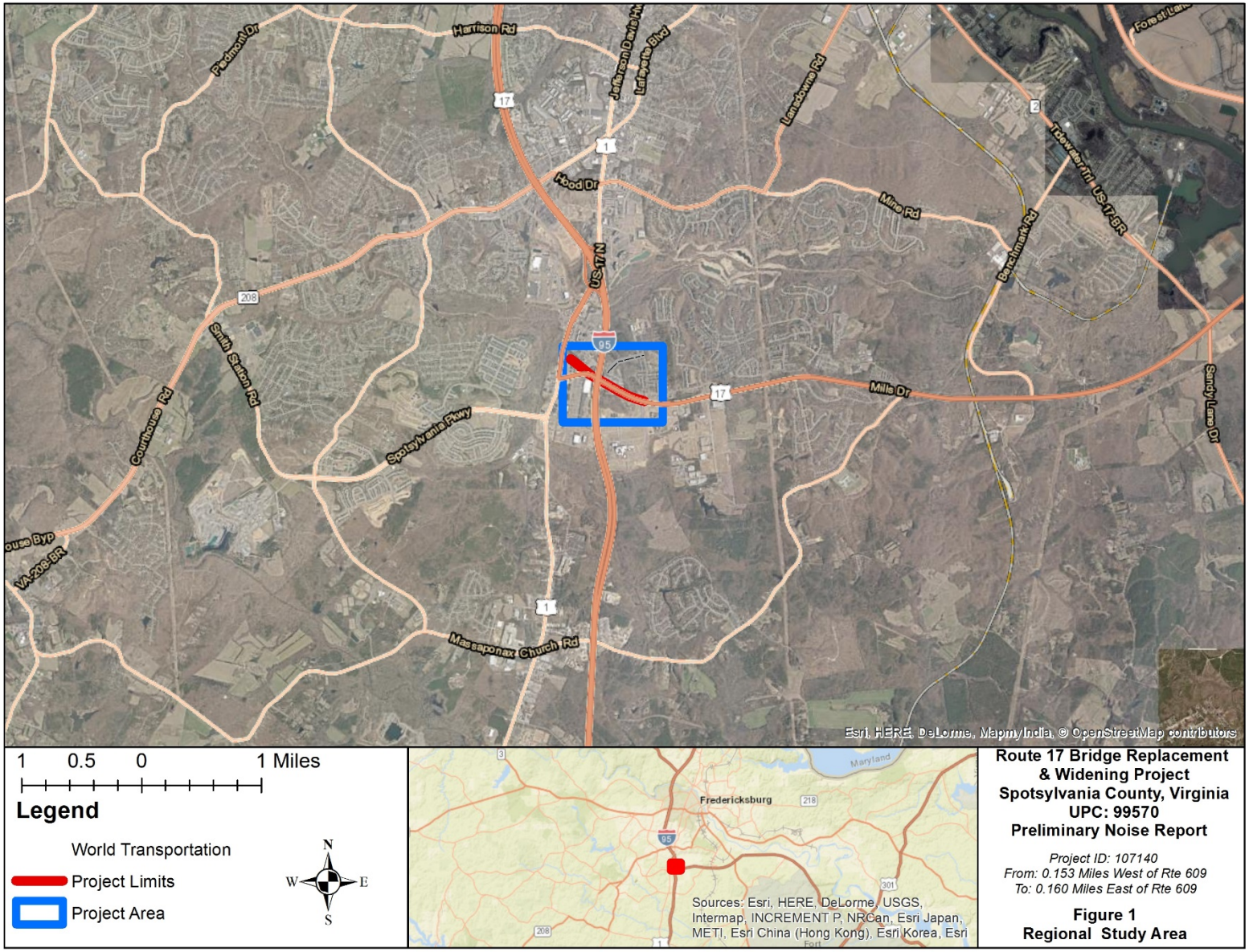
Excellence Delivered ***As Promised***



Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 99570
Preliminary Noise Report

Project ID: 107140
From: 0.153 Miles West of Rte 609
To: 0.160 Miles East of Rte 609

Figure 1
Regional Study Area

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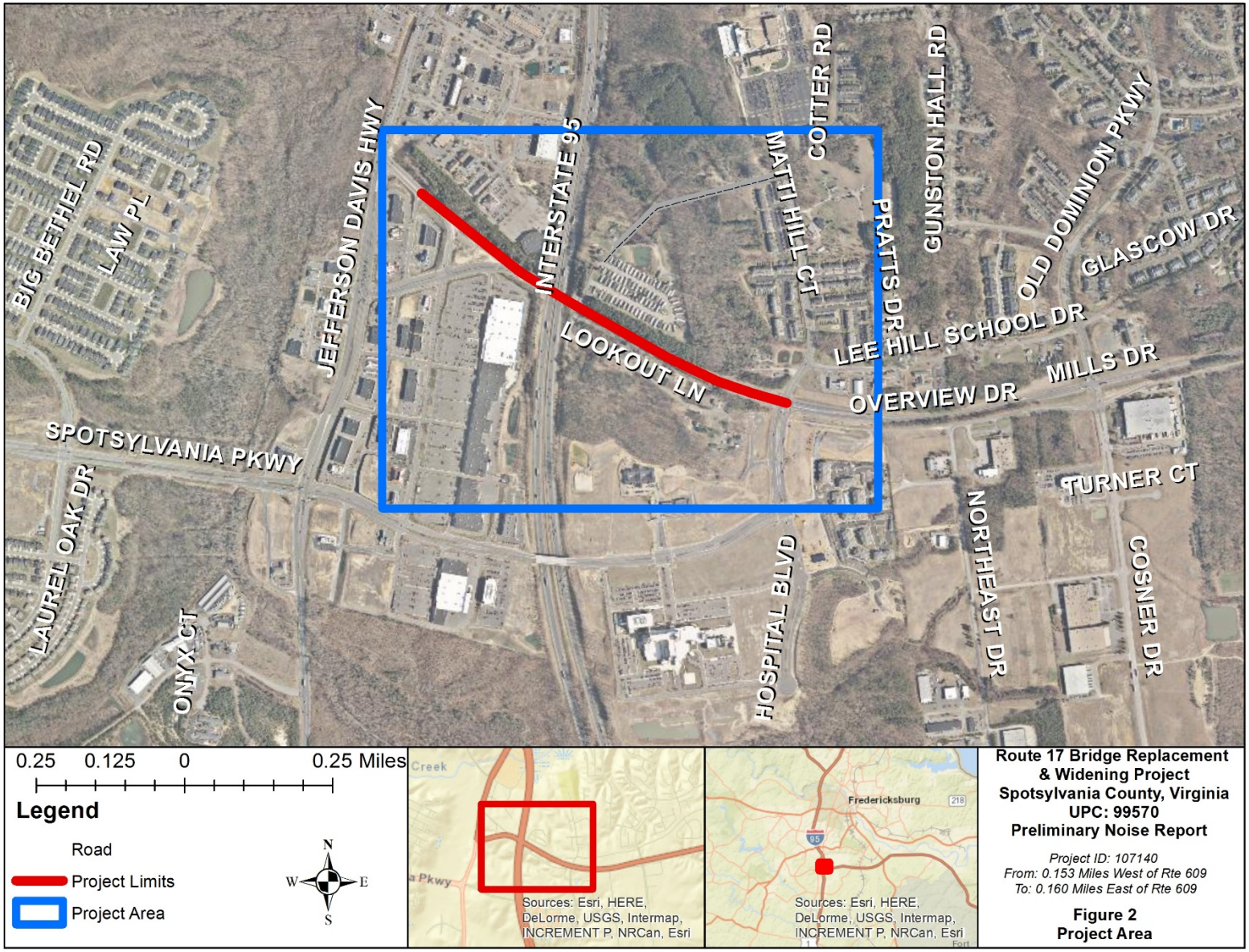

Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 99570
Preliminary Noise Report

Project ID: 107140
From: 0.153 Miles West of Rte 609
To: 0.160 Miles East of Rte 609

Figure 2
Project Area


(1) TARGET CORPORATION T-2038 AC.15.52 $2,800,000
(2) MARY WILLIAMS AC.0.79 $107,500
(3) CHRISTOPHER W. EASTRIDGE AC.0.54 $23,200
(4) TRACEY D. ROYER & CHARLES A. ROYER AC.0.66 $26,400
(5) APARTMENTS AT OVERLOOK TERRACE LLC AC.8.25 $1,351,800
(6) EDWARD BROWNFIELD, JR. AC.0.41 $10,800
(7) BRIAN K. DOBSON AC.1.76 $43,300
(8) LEE HILL LLC AC.1.91 $1,560,000
(9) APARTMENTS AT OVERLOOK TERRACE LLC AC.8.25 $1,351,800
(10) SOUTHPORT MOVIES II LLC AC.4.72 $1,869,700
(11) AV5.92AC PARCEL LLC LOT 17 AC.1.57 $85500
(12) FLORENCE W. TAYLOR LIFE ESTATE AC.1.92 $106,900
(13) RONALD BANKS OR ORLAND BANKS SR AC.8.79 $286,000
(14) ISAAC TAYLOR ESTATE AC.37.32 $945,000
(15) LEE'S HILL COMMUNITY ASSN INC AC.9.13
(16) LEE'S HILL COMMUNITY ASSN INC AC.9.33
(17) GLENWOOD MHC LLC AC.14.6 $373,300
(18) GERMANNA POINT COMMON AREA SECTION I AC.5.22
(19) GLEWOOD INVESTMENT PROPERTIES LLC AC.5.93 $163,100
(20) AV 5.92 ACRE PARCEL LLC AC.5.93 $326,200
(21) ELAINE V. WALLER AC.1.39 $45,000
(22) LUISE P. PURKS AC.0.64 $38,300
(23) SAGA LLC AND BACKLICK ROAD LLC AC.1.74 $947,400
GERMANNA POINT DRIVE
GLENWOOD DRIVE
LEE HILL SCHOOL DRIVE
OVERVIEW DRIVE
HOSPITAL BLVD
95
17
BRIDGE SITE
FREDERICKSBURG
3
2
208
1

Figure 3

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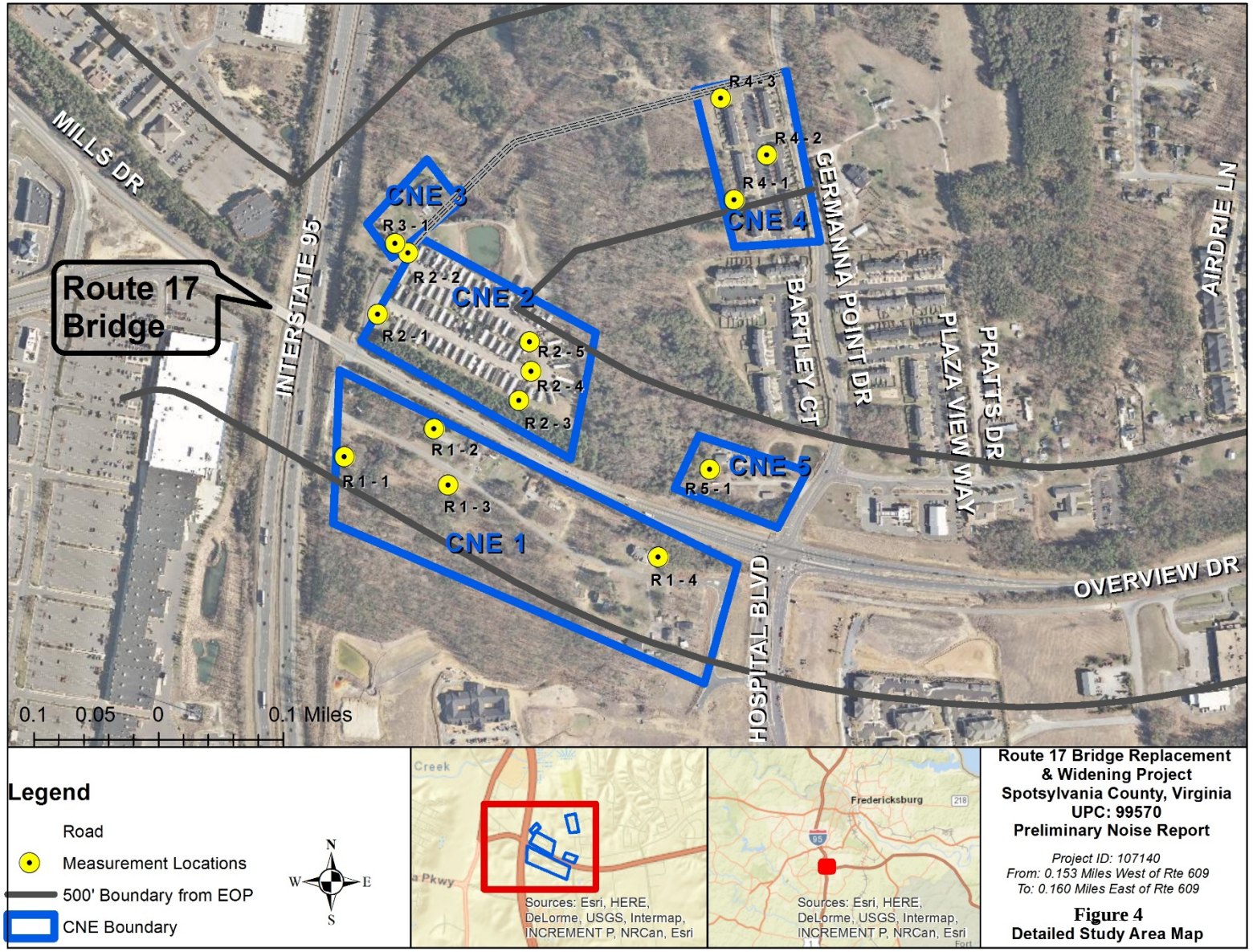

Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 99570
Preliminary Noise Report

Project ID: 107140
From: 0.153 Miles West of Rte 609
To: 0.160 Miles East of Rte 609

Figure 4
Detailed Study Area Map

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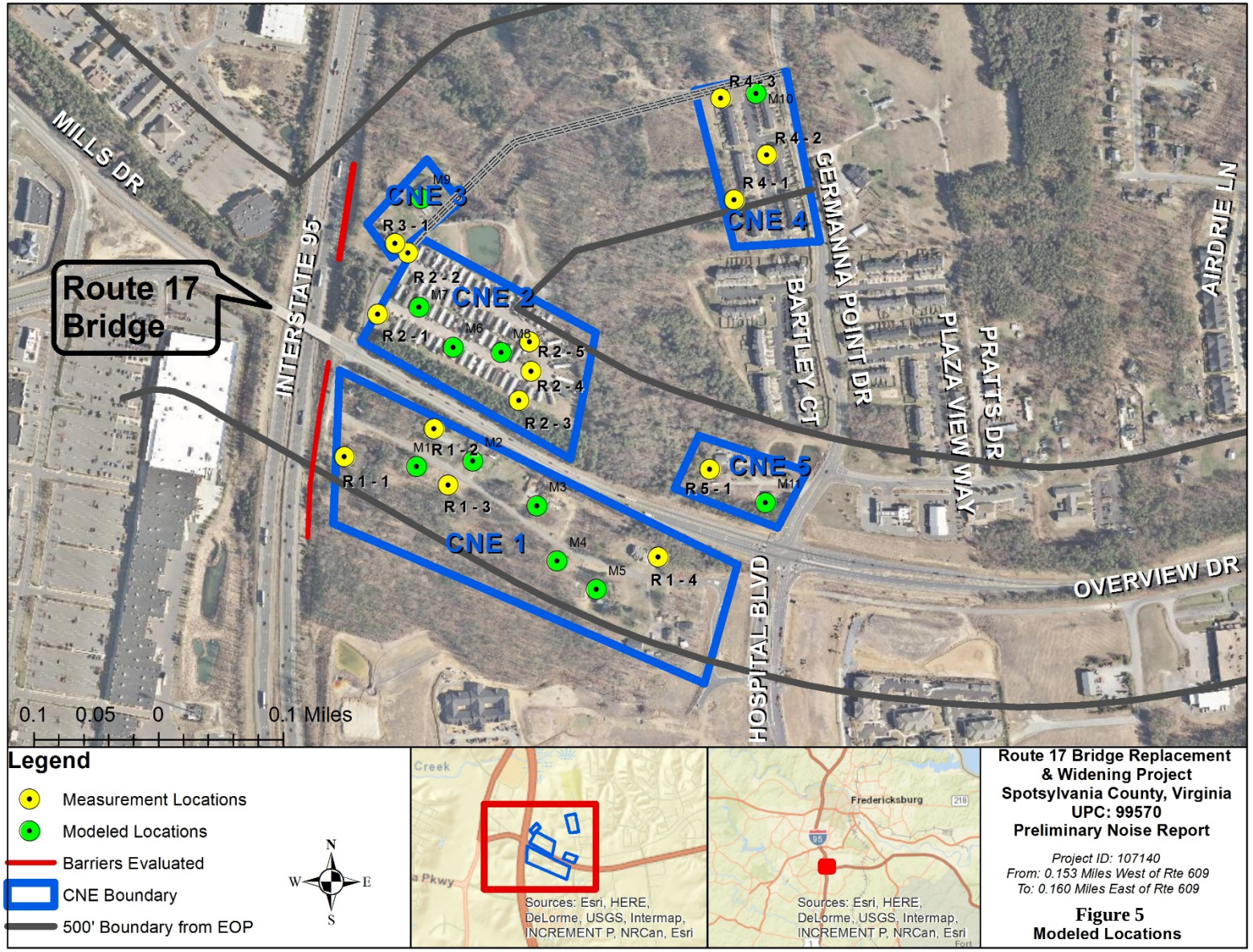

Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 99570
Preliminary Noise Report

Project ID: 107140
From: 0.153 Miles West of Rte 609
To: 0.160 Miles East of Rte 609

Figure 5
Modeled Locations

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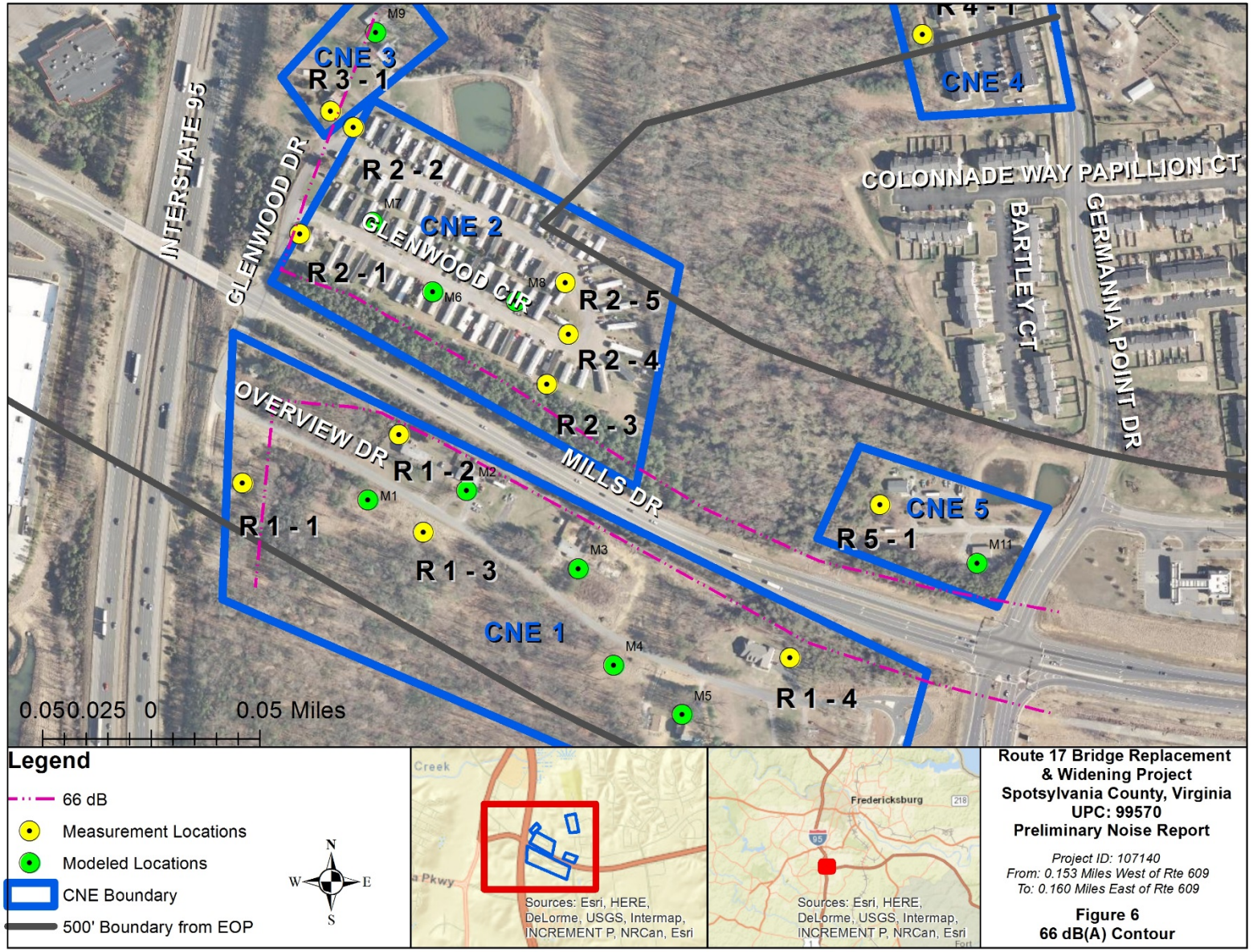
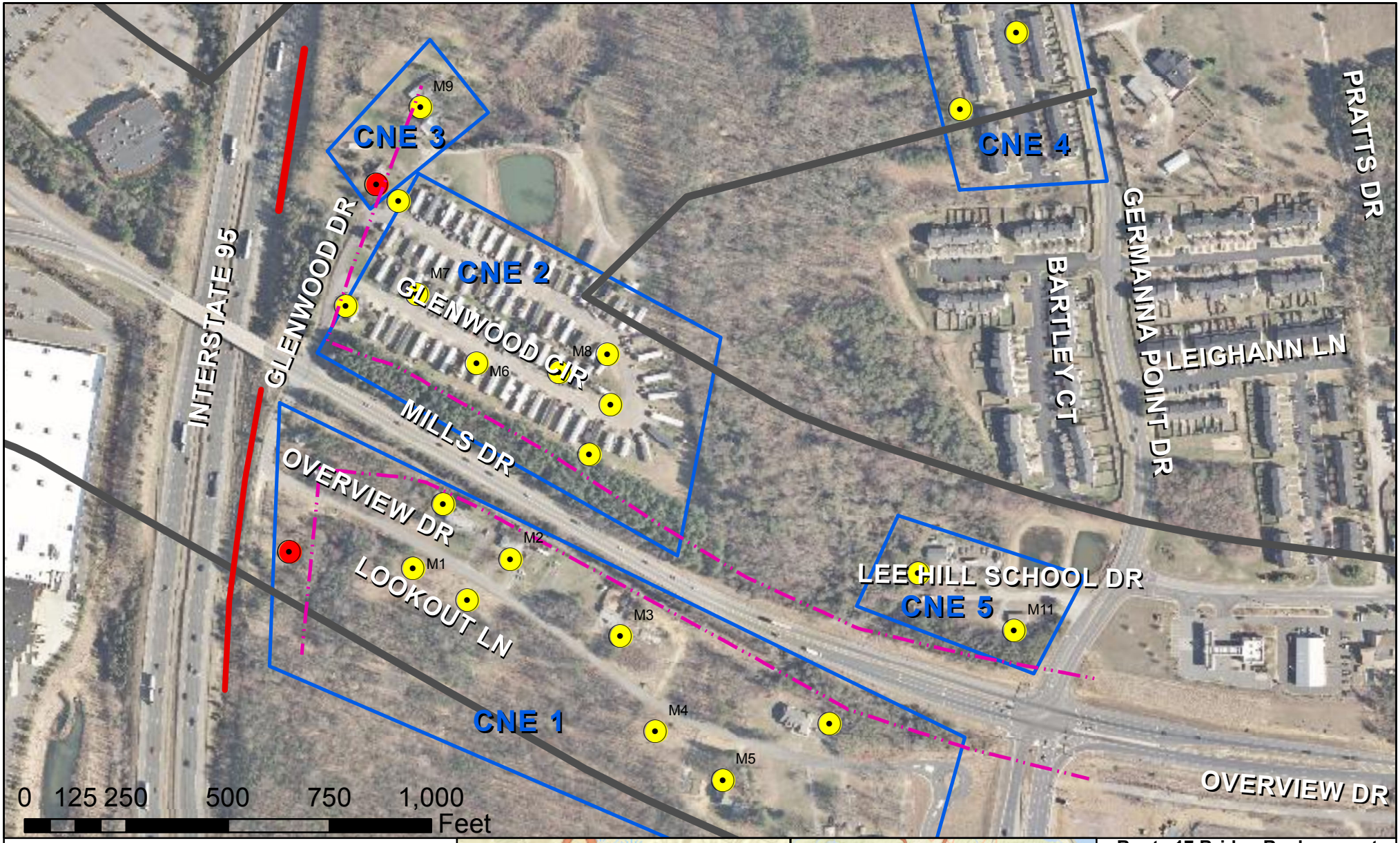


Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 99570
Preliminary Noise Report

Project ID: 107140
From: 0.153 Miles West of Rte 609
To: 0.160 Miles East of Rte 609

Figure 6
66 dB(A) Contour

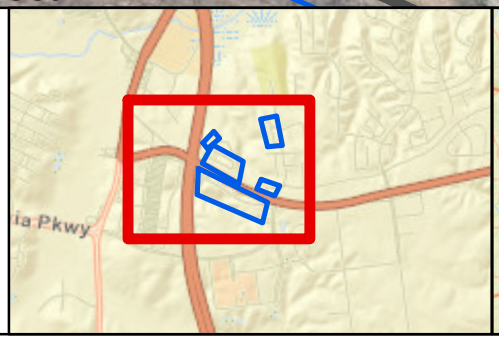
APPENDICES

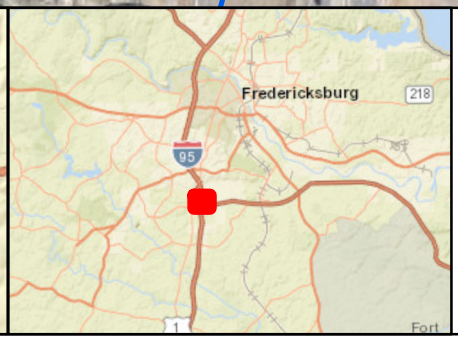


Legend

- Impacted & Not Benefited
- Not impacted & Not Benefited
- 66 dB
- 500' Boundary from EOP
- CNE Boundary

N W E S





Route 17 Bridge Replacement & Widening Project
Spotsylvania County, Virginia
UPC: 107140
Preliminary Noise Report

Project ID: 0017-088-R72
From: Intersection with US Rte 1
To: 0.9 Miles S. of Intersection with US Rte 1

Figure 6
66 dB(A) Contour

Source: Aerial Image ESRI

APPENDICES

APPENDIX A

Short-term Measurements Field Data Sheets

Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17-95 WIDENING

JOB # 59935 003

SITE ID R1-1

Gannett Fleming, Inc.

ADDRESS: ADT OFFICE POOL

OVERVIEW TERRACE APTS

Meter Storage # 364

TYPE ☐ Residential ☑ Commercial ☐ Religion ☐ Educational ☐ Other LEASING OFFICE

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after 93.8

GPS PT 195-196 N 33° 8.470 W 111° 59.941

Weather: temperature _____ wind speed _____ cloud cover _____

Time:	1st	start	7:43	stop	8:03	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	68.6	Lmax	78.1	Lmin	56.8	SEL	99.4
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

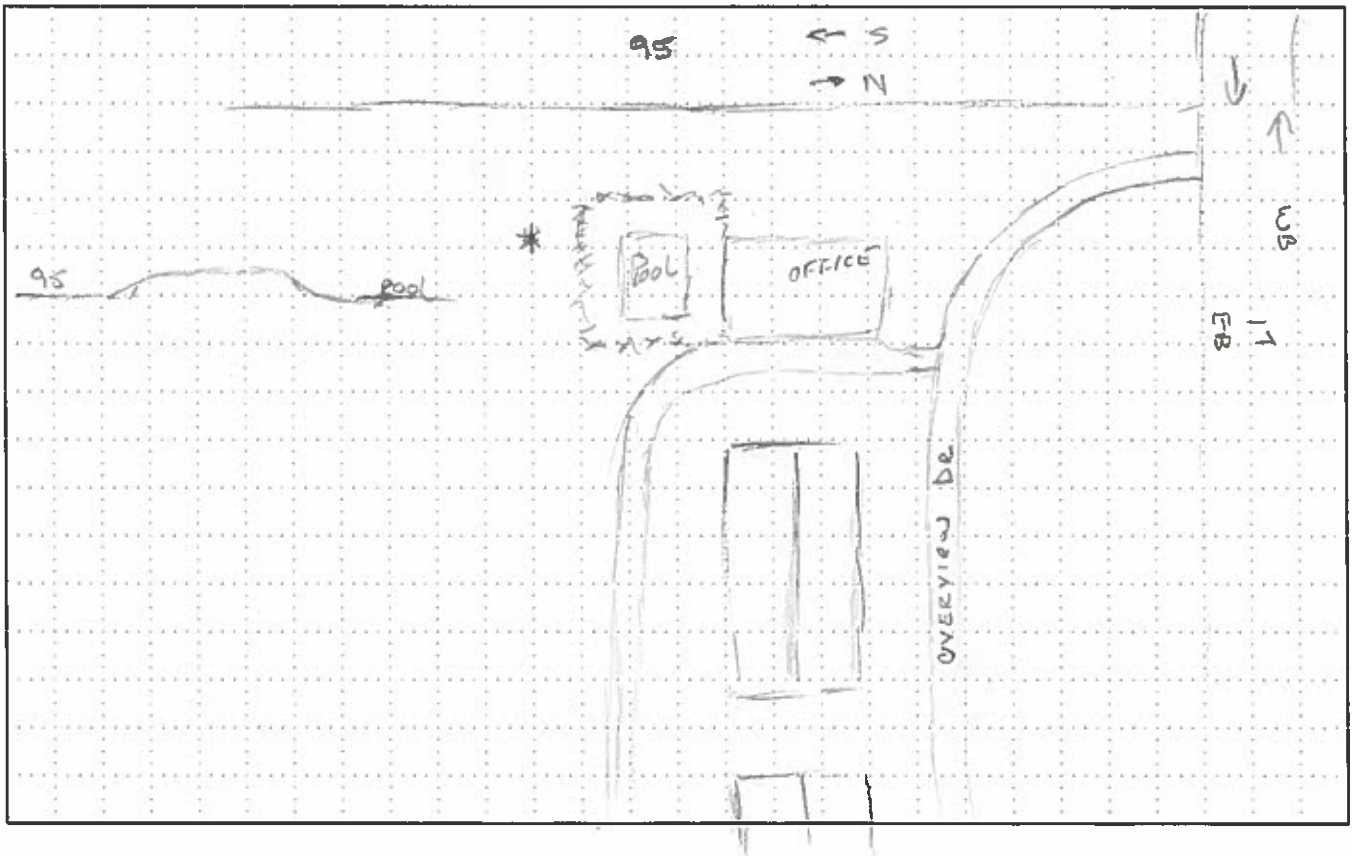
20 min

Roadway#1	I-17 EB	Roadway#2	I-17 WB	Roadway#3	I-95	Roadway#4	I-95
Direction	EB	Direction	WB	Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	183		340					
med. trk.	5		8					
hvy trk.	4		10					
bus	3		4					
motorcycle	0		0					

NOTES: I-95 MAIN NOISE SOURCE (COUNT ON VIDEO)

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3.23.17

PROJECT: I-17 | I-95

JOB # 59935-003

SITE ID R1-2

Gannett Fleming, Inc.

ADDRESS: 4705 Overlook Dr

Meter Storage # 367

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT 199
N 38° 13.485
W077 · 29.860

Weather: temperature 31 wind speed _____ cloud cover _____

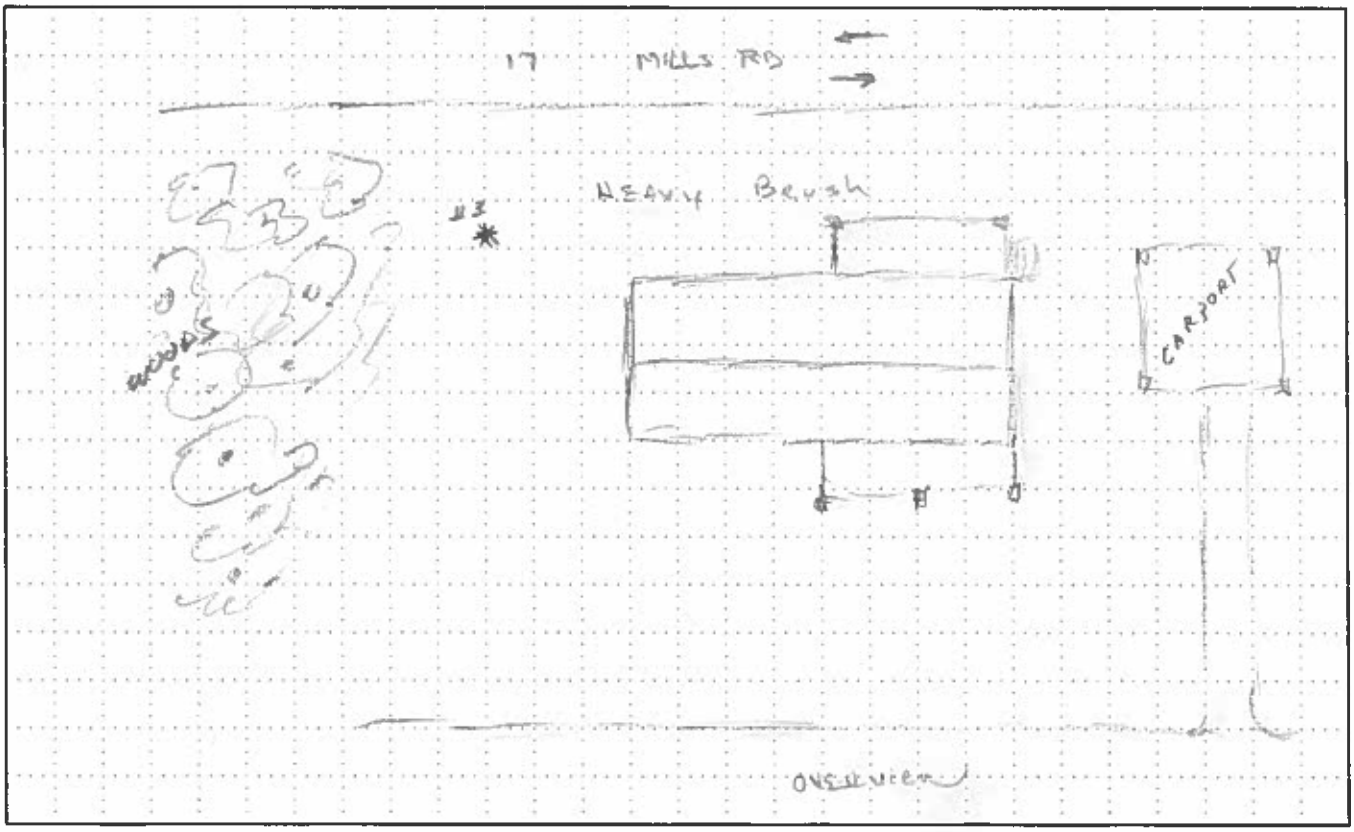
Time:	1st	start	9:23	stop	9:43	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	62.7	Lmax	74.5	Lmin	48.5	SEL	93.5
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17		Roadway#2	I-17		Roadway#3			Roadway#4		
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	209		auto	235		auto			auto		
med. trk.	6		med. trk.	6		med. trk.			med. trk.		
hvy trk.	12		hvy trk.	10		hvy trk.			hvy trk.		
bus	0		bus	1		bus			bus		
motorcycle	0		motorcycle	0		motorcycle			motorcycle		

NOTES: Note House at Grade with Roadway

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / L95

JOB # 59935-003

SITE ID R1-3

Gannett Fleming, Inc.

ADDRESS: Overview Terrace Apt

24 units per bldg?

Meter Storage # 365

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT N 33 13.47 W 097.29.945 196

Weather: temperature 28° wind speed 0-5 cloud cover 0

Time:	1st	start	8:15	stop	8:35	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	52.2	Lmax	64.5	Lmin	48.2	SEL	83.0
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17	
Direction	EB	
	1st	2nd
auto	190	
med. trk.	1	
hvy trk.	4	
bus	6	
motorcycle	0	

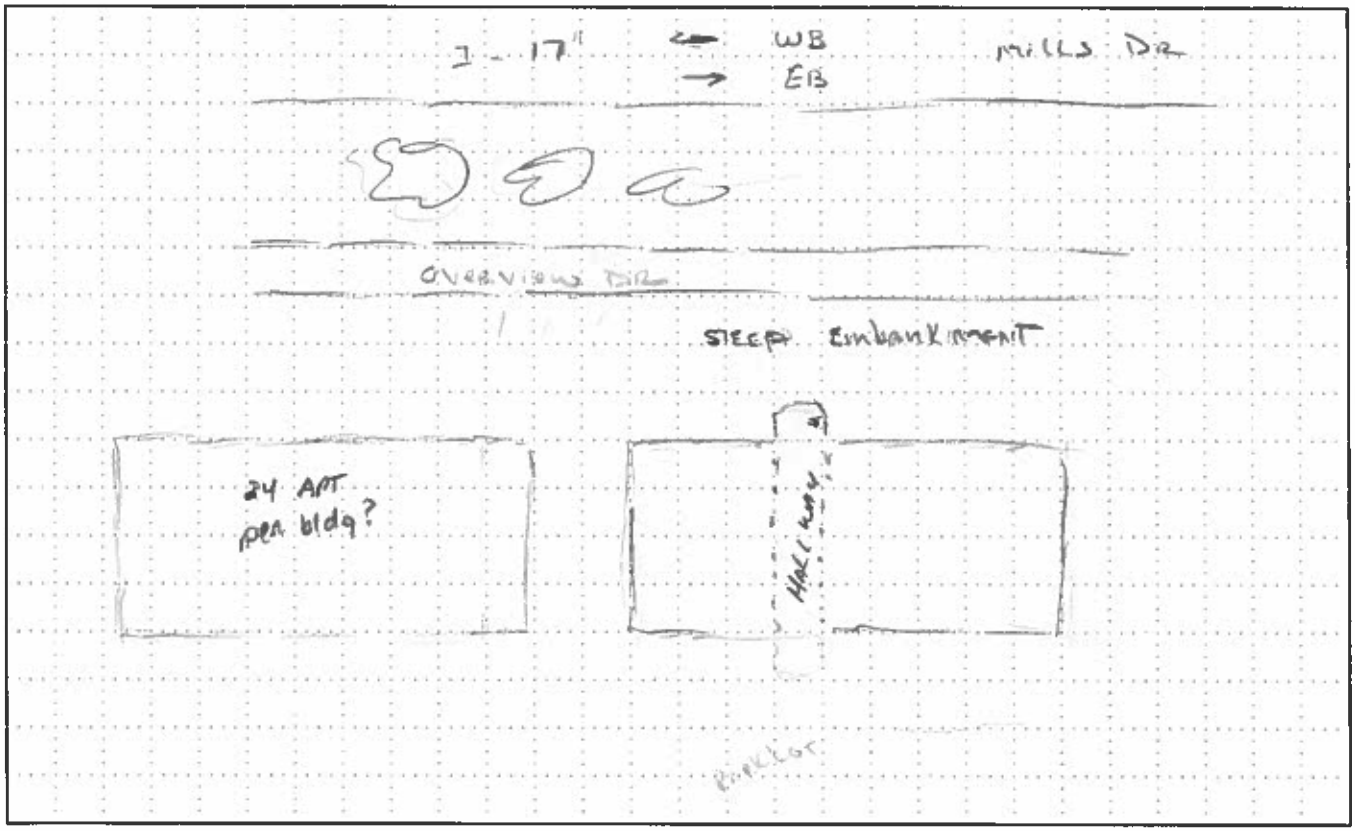
Roadway#2	I-17	
Direction	WB	
	1st	2nd
auto	323	
med. trk.	14	
hvy trk.	4	
bus	3	
motorcycle	1	

Roadway#3		
Direction		
	1st	2nd
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

Roadway#4		
Direction		
	1st	2nd
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

NOTES: heat pumps running

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3.23-17

PROJECT: I-17 / I-99 WIDENING

JOB # 59935-003

SITE ID R1-4

Gannett Fleming, Inc.

ADDRESS: 4609 Overview Dr

Meter Storage # 766

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 43 SLM Calibration before 93.8 after

GPS PT 148 N. 33° 13. 397 W 079° 29. 656

Weather: temperature 81 wind speed cloud cover 0

Time:	1st	start	9:56	stop	10:16	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	56.4	Lmax	67.5	Lmin	44.4	SEL	87.2	
	2nd	Leq		Lmax		Lmin		SEL		

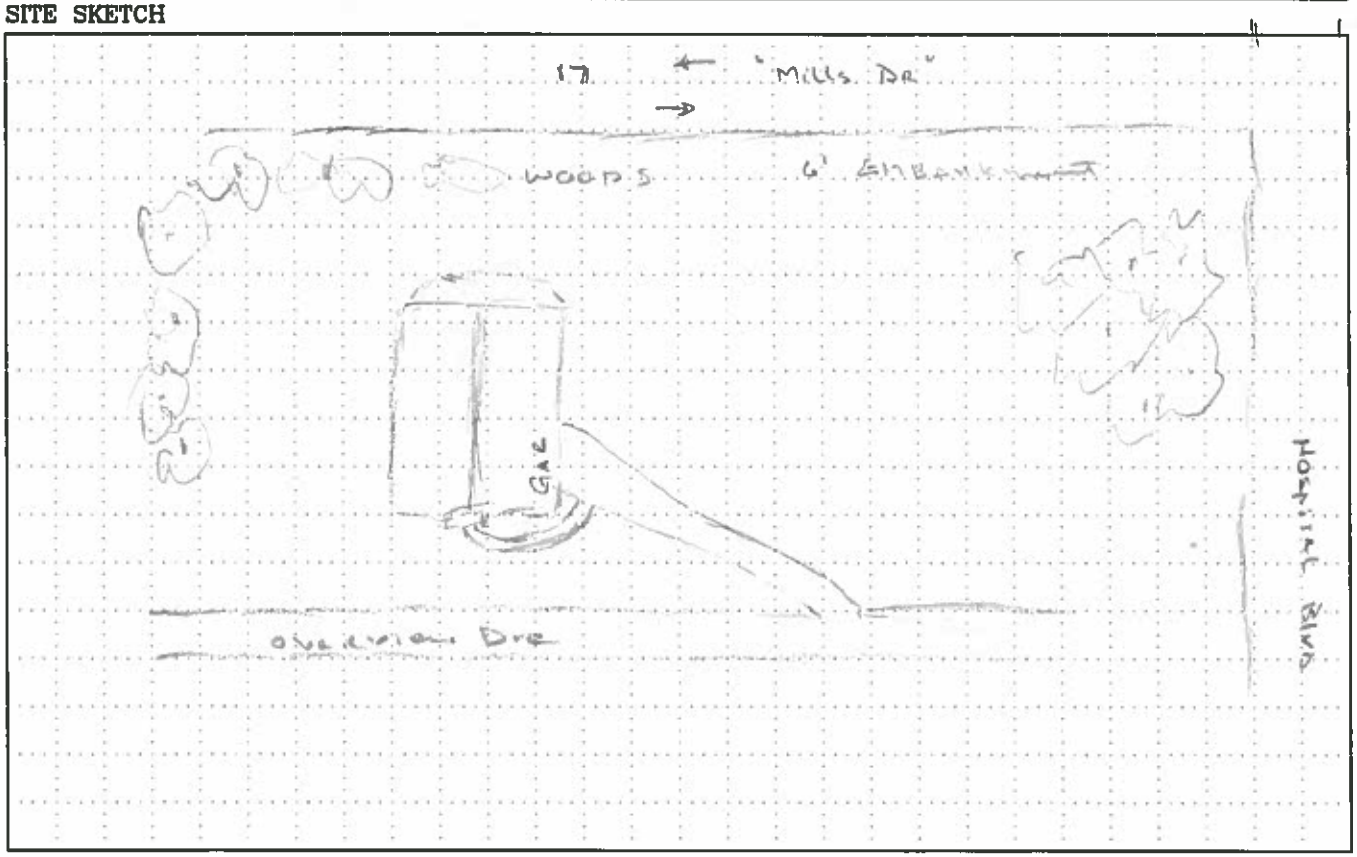
Traffic Data

	Roadway#1 I-17 Direction EB		Roadway#2 I-17 Direction WB		Roadway#3 Direction		Roadway#4 Direction	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	230		244					
med. trk.	3		5					
hvy trk.	6		12					
bus	0		1					
motorcycle	0		0					

NOTES: WOOD PANELING FENCE ON BACK

TRUCKS SHIFTING GEARS AS PULLING FROM INTERSECTION

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3.23.17

PROJECT: I-17 | I95 widening

JOB # 59935-003

SITE ID R2-1

Gannett Fleming, Inc.

ADDRESS: Glenwood Cir

Meter Storage # 372

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT 209
N- 38° 13.521'
W 077° 29.905'

Weather: temperature 43° wind speed 0-5 cloud cover 0

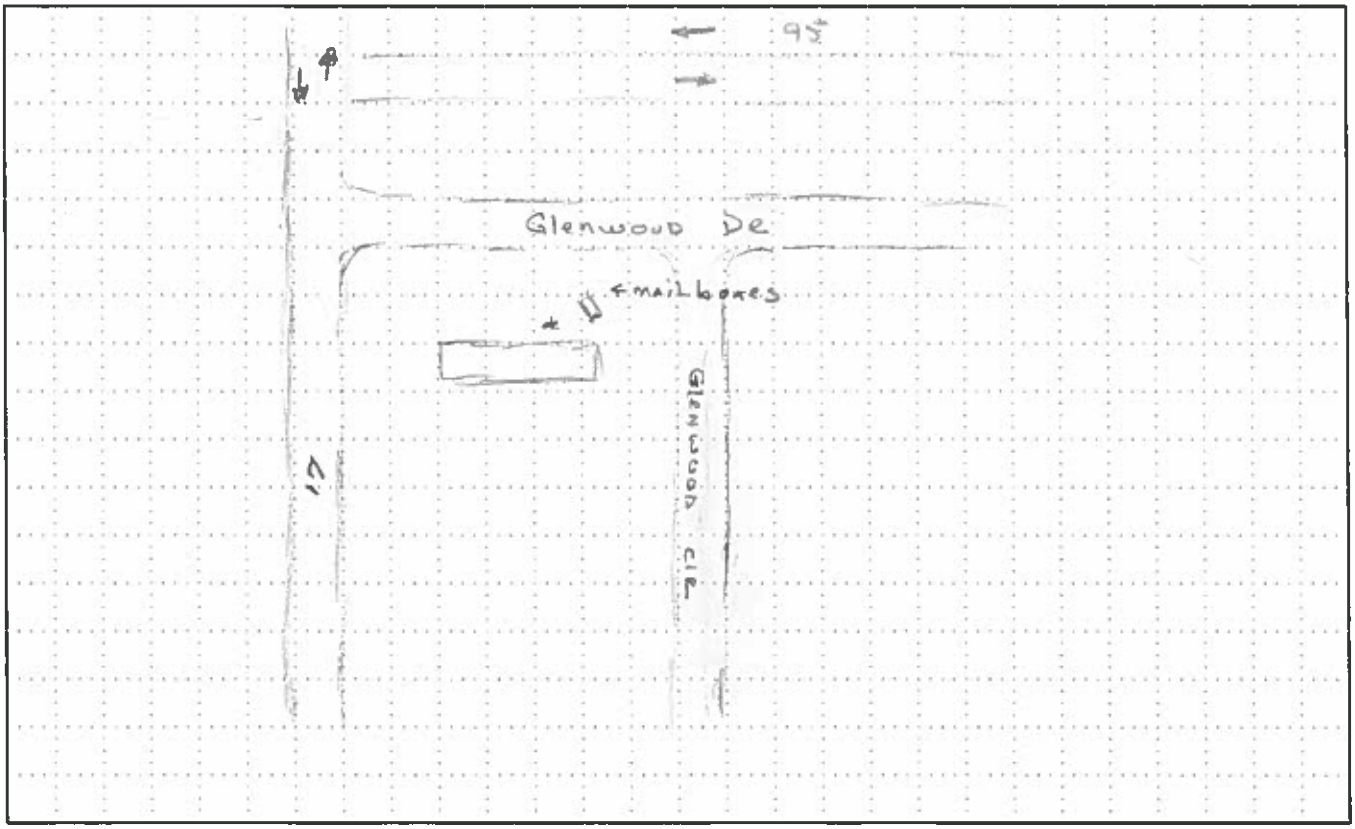
Time:	1st	start	1:31	stop	1:51	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	59.9	Lmax	68.3	Lmin	54.7	SEL	90.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

	Roadway#1 I-17 EB		Roadway#2 I-17 WB		Roadway#3 Glen Cir		Roadway#4 Glenwood Dr	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	237		285		11		11	
med. trk.	6		8					
hvy trk.	7		10					
bus	0		0					
motorcycle	3		1					

NOTES: Def. NEAR 195 - maintain closing Lanes 1:43

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17
PROJECT: I-17
JOB #: 59935-003
SITE ID: R2-2

Gannett Fleming, Inc.

ADDRESS: 4736 Glenwood Circle
Meter Storage # 0375

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT 217 N 34° 13.616' W 077° 29.877'

Weather: temperature 48° wind speed 0-5 mph cloud cover 0

Time:	1st	start 3:40 pm	stop 4:00 pm	total					
	2nd	start	stop	total					
Data:	1st	Leq 57.2	Lmax 68.9	Lmin 51.8	SEL 88.0				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

Roadway#1 I-17 E	1st	2nd
Direction EB		
auto	264	
med. trk.	6	
hvy trk.	3	
bus	3	
motorcycle	1	

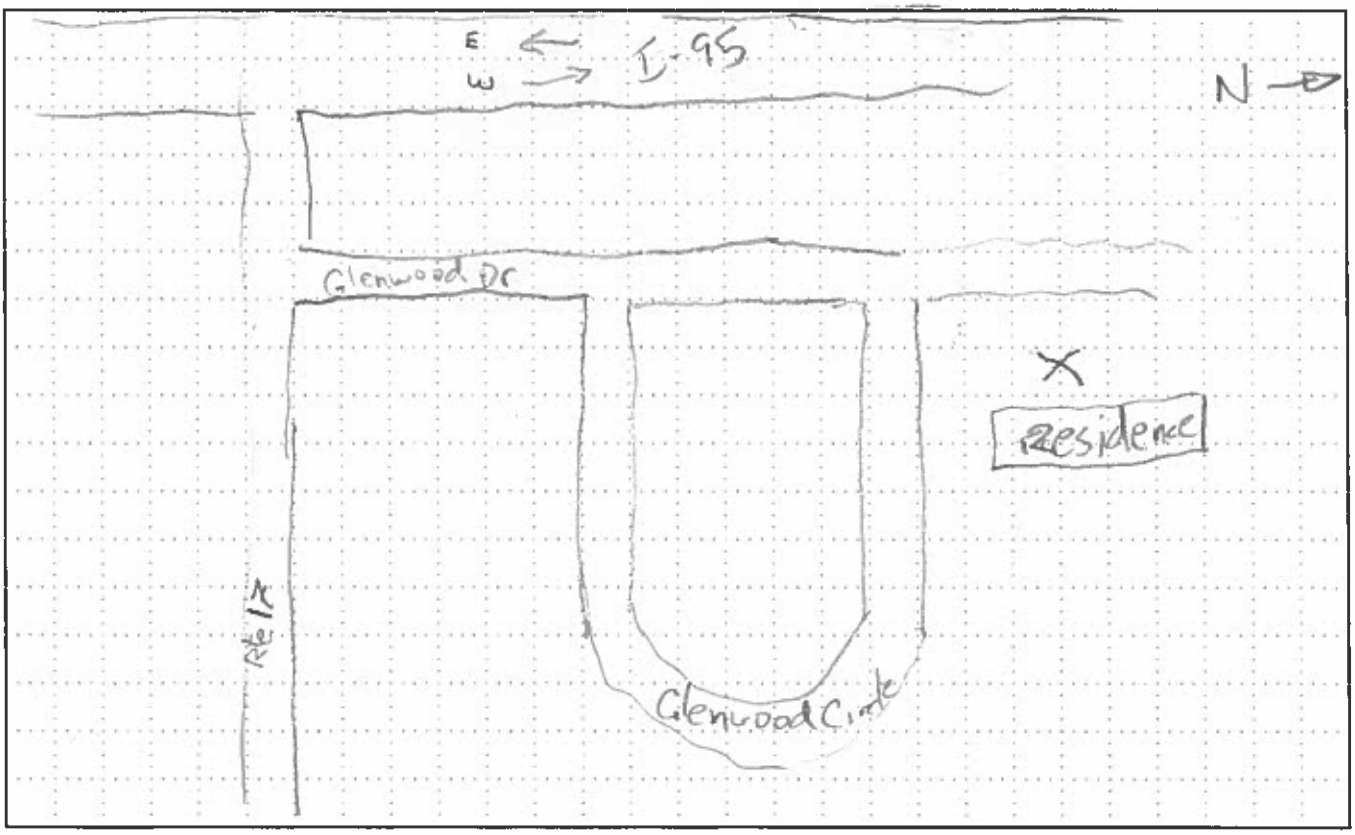
Roadway#2 I-17 WB	1st	2nd
Direction		
auto	222	
med. trk.	12	
hvy trk.	4	
bus	6	
motorcycle	0	

Roadway#3 Glenwood Dr	1st	2nd
Direction		
auto	//// ////	
med. trk.		
hvy trk.		
bus		
motorcycle		

Roadway#4 Glenwood Cir	1st	2nd
Direction		
auto	//// ////	
med. trk.		
hvy trk.		
bus		
motorcycle		

NOTES: Hear I-95 heavy trucks 3:52 loud car muffler noise meter 53.30

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3.23.17

PROJECT: I-17 / I-95

JOB # 59935.003

SITE ID R2-3

Gannett Fleming, Inc.

ADDRESS: 4634 / 4632 Glenwood Cir

Meter Storage # _____

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after _____ GPS PT 212

Weather: temperature 45 wind speed 0-5 cloud cover 0

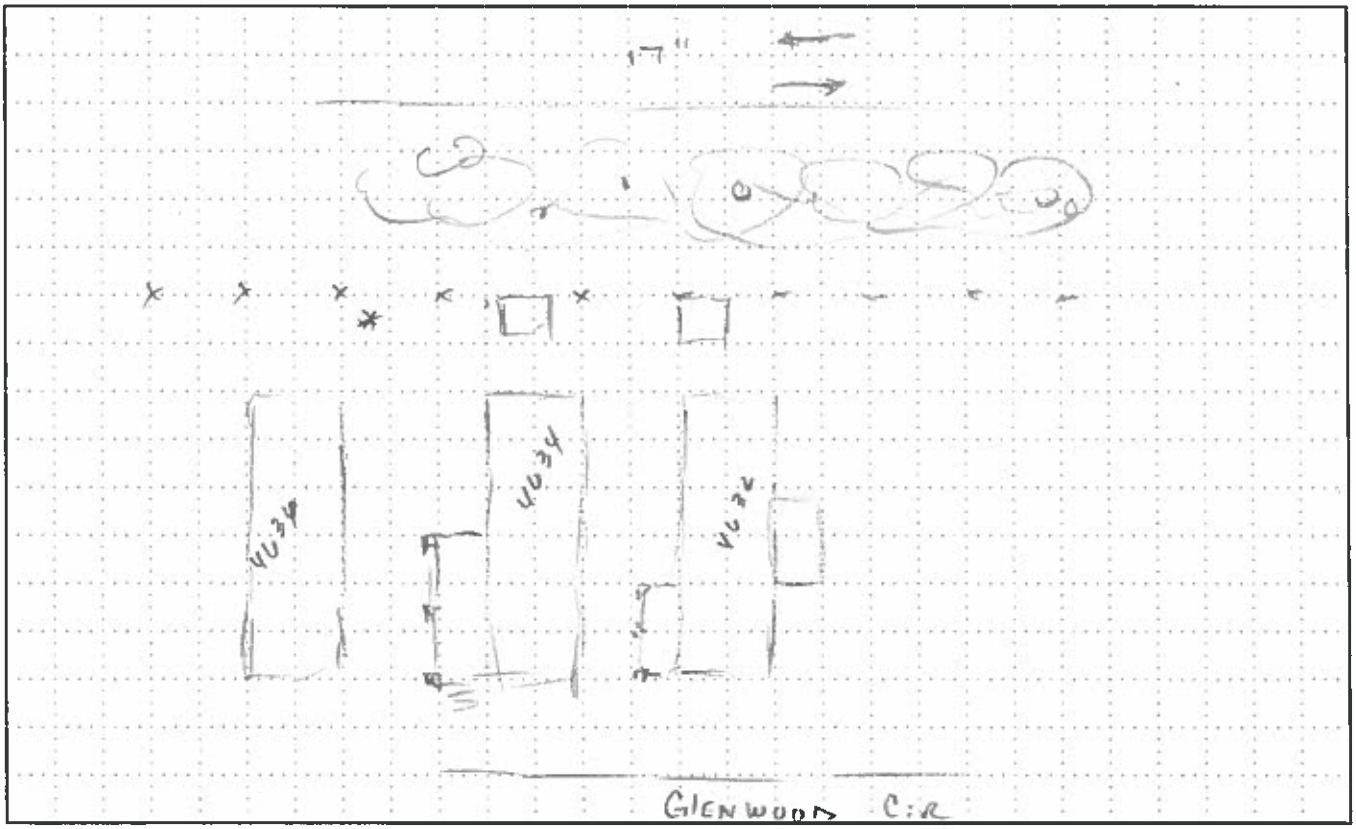
Time:	1st	start	2:02	stop	2:32	total	30			
	2nd	start		stop		total				
Data:	1st	Leq	59.9	Lmax	68.3	Lmin	54.7	SEL	90.7	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I 17		Roadway#2	I-17		Roadway#3			Roadway#4		
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	253		auto	239		auto			auto		
med. trk.	5		med. trk.	4		med. trk.			med. trk.		
hvy trk.	9		hvy trk.	7		hvy trk.			hvy trk.		
bus	1		bus	2		bus			bus		
motorcycle	0		motorcycle	1		motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / I-95

JOB # 59935-003

SITE ID R2-4

Gannett Fleming, Inc.

ADDRESS: 4639 Glenwood Cir

Meter Storage # _____

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT 215 N 38° 13.529 W 077° 29.770

Weather: temperature 45 wind speed 0-5 cloud cover 0

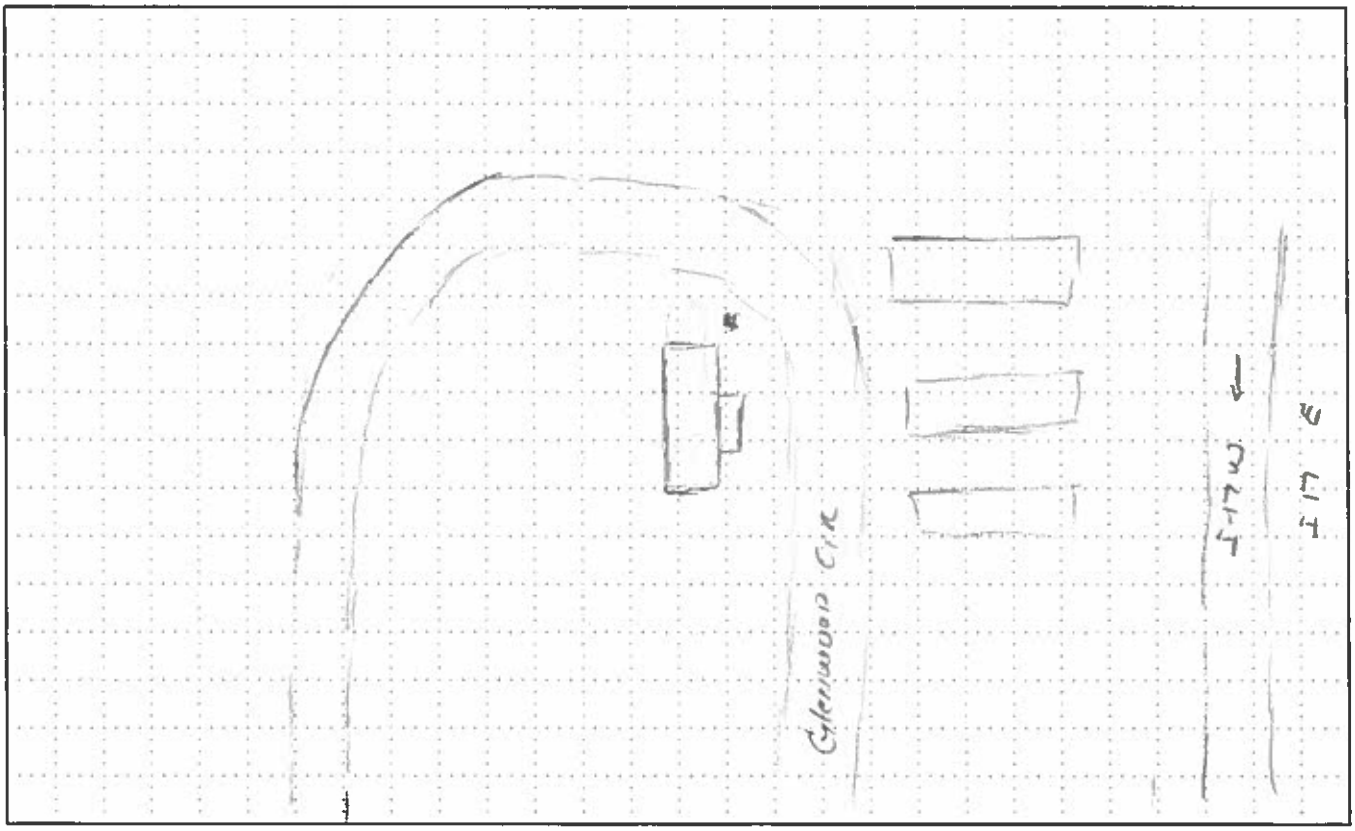
Time:	1st	start	2:26	stop	2:46	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	50.4	Lmax	67.7	Lmin	41.7	SEL	81.2
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17		Roadway#2	I-17		Roadway#3	Glenwood		Roadway#4		
Direction	EB		Direction	WB		Direction	Cir		Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	244		auto	286		auto	1		auto		
med. trk.	3		med. trk.	4		med. trk.			med. trk.		
hvy trk.	8		hvy trk.	8		hvy trk.			hvy trk.		
bus	6		bus	4		bus	1		bus		
motorcycle	0		motorcycle	1		motorcycle			motorcycle		

NOTES: Loud car 1 school bus

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / I-95

JOB #

SITE ID R2-S

Gannett Fleming, Inc.

ADDRESS: 4701 Glenwood Cir

Meter Storage # 374

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before 93.8 after

GPS PT 215 N 38° 13.548' W 077° 29.769'

Weather: temperature 45 wind speed 0-5 cloud cover 0

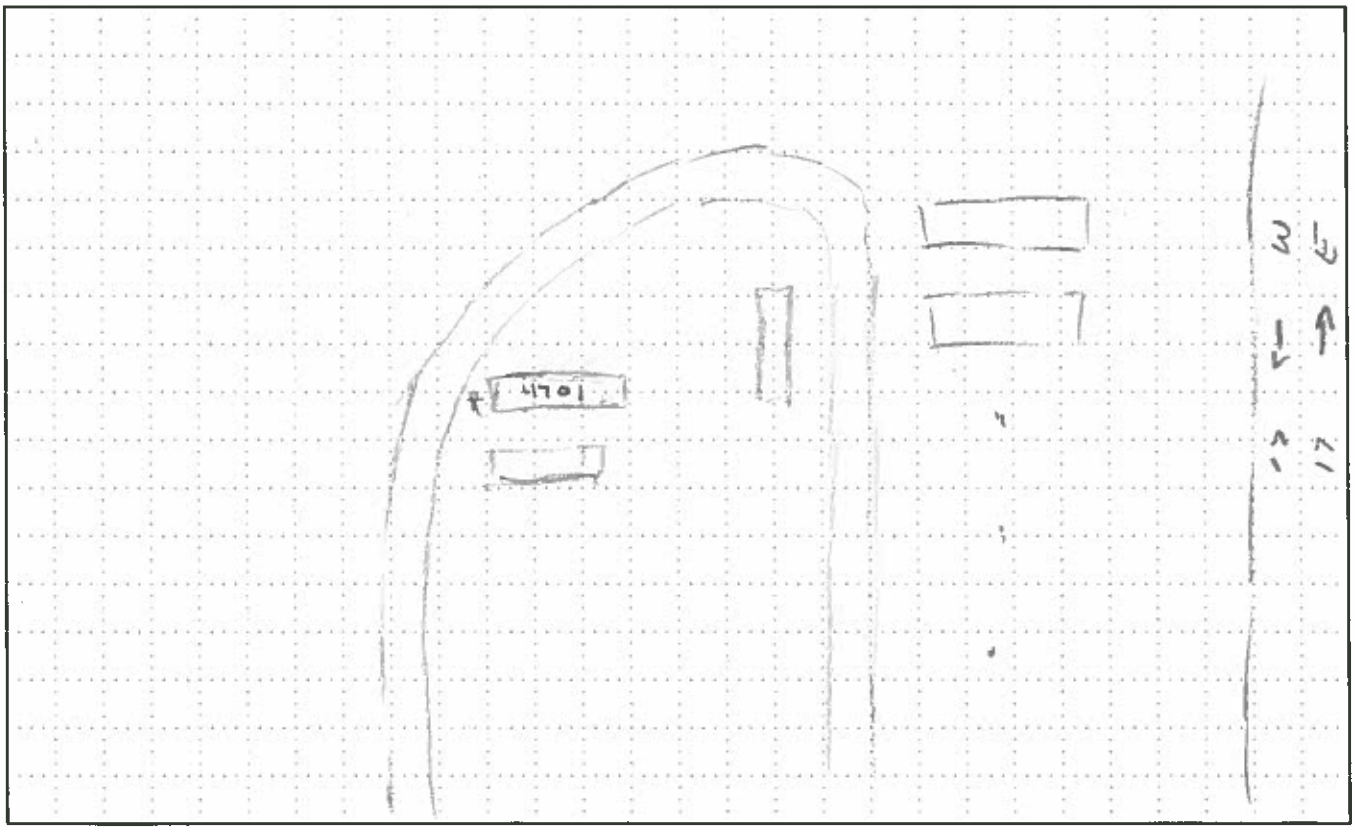
Time:	1st	start	2:51	stop	3:11	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	47.9	Lmax	65.4	Lmin	39.8	SEL	78.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 I-17			Roadway#2 I-17			Roadway#3			Roadway#4		
Direction EB			Direction WB			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	311		auto	292		auto			auto		
med. trk.	9		med. trk.	1		med. trk.			med. trk.		
hvy trk.	5		hvy trk.	8		hvy trk.			hvy trk.		
bus	6		bus	5		bus			bus		
motorcycle	1		motorcycle	0		motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17
PROJECT: I-17
JOB #
SITE ID R3-1

Gannett Fleming, Inc.

ADDRESS: Glenwood Dr
Meter Storage # Ø376

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before 93.8 after 93.7 GPS PT 218
N 36°13.618'
W 077° 29.895'

Weather: temperature 48° wind speed 0-5 cloud cover Ø

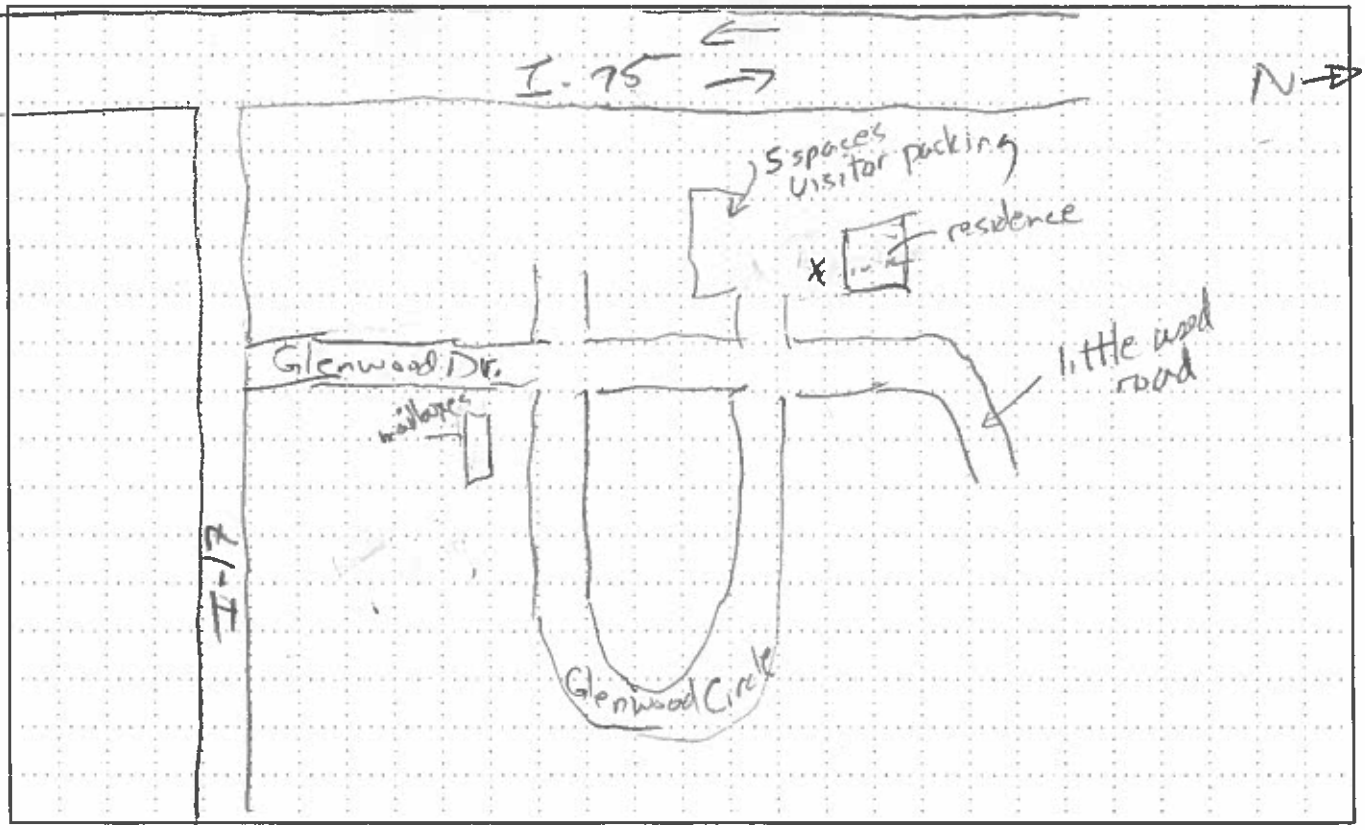
Time:	1st	start	4:05pm	stop	4:25p	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	61.6	Lmax	67.6	Lmin	54.5	SEL	92.4
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17		Roadway#2	I-17		Roadway#3	Glenwood Dr		Roadway#4	Glenwood Cir	
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	271		auto	281		auto	IIII		auto	IIII	
med. trk.	5		med. trk.	0		med. trk.			med. trk.		
hvy trk.	11		hvy trk.	2		hvy trk.			hvy trk.		
bus	1		bus	4		bus			bus		
motorcycle	0		motorcycle	0		motorcycle			motorcycle		

NOTES: Hear I-95 trucks → Kids playing 4:05p-4:07 then they left
4:12.00p - vehicle parked in visitor spot (quiet, no door slam)
4:19:15 - ice cream truck - minimal music

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17/I-95

JOB # 59935-003

SITE ID R4-1

Gannett Fleming, Inc.

ADDRESS: Matti Hill Court

Meter Storage # 369

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after 93.7

GPS PT 203 N38° 13.648' W077° 29.587'

Weather: temperature 37° wind speed 0-5 cloud cover 0

Time: 1st start 11:02 stop 11:22 total 20 (10:54-11:14) COUNT

2nd start _____ stop _____ total _____

Data: 1st Leq 43.0 Lmax 65.4 Lmin 34.6 SEL 73.8

2nd Leq _____ Lmax _____ Lmin _____ SEL _____

Traffic Data

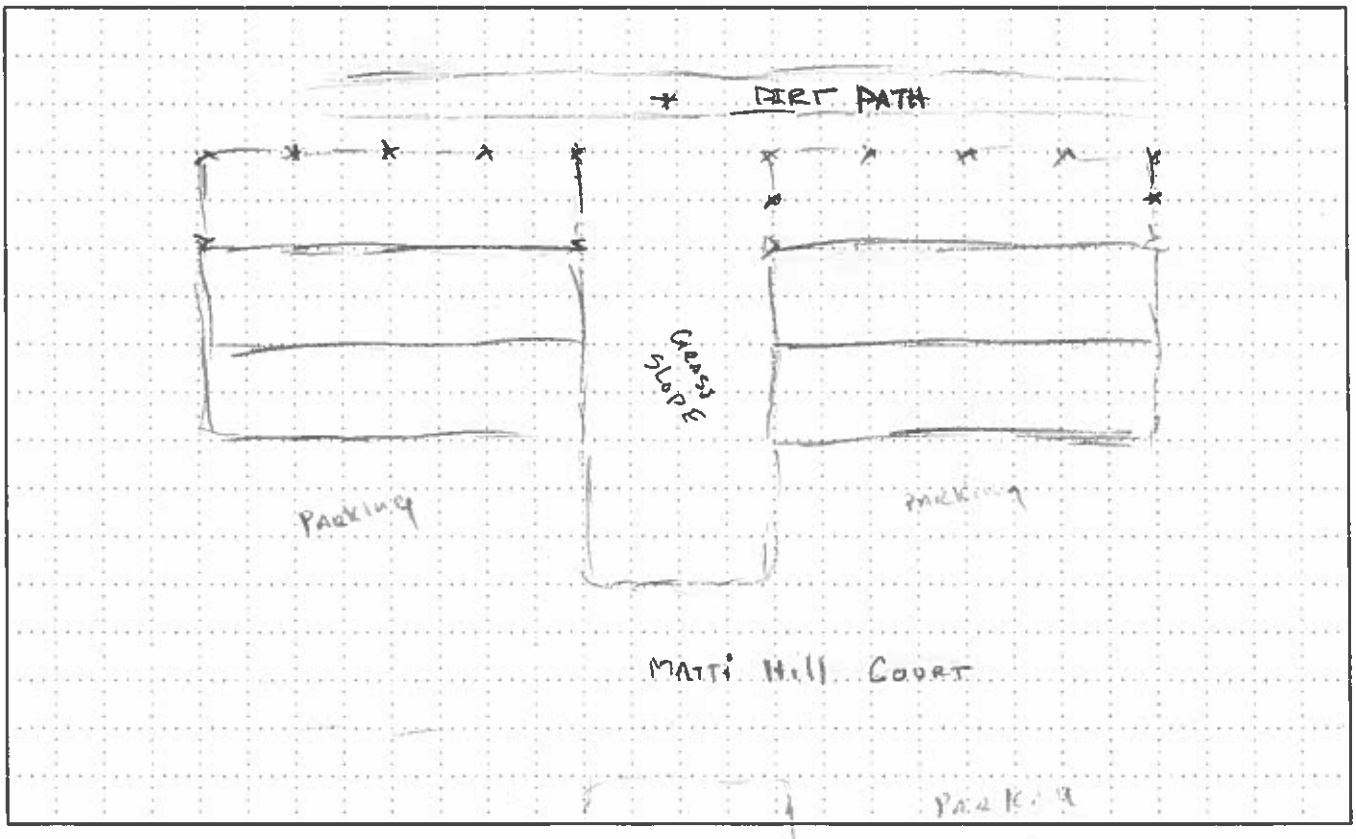
	Roadway#1 I-17		Roadway#2 I-17		Roadway#3		Roadway#4	
Direction	EB		WB					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	203		232					
med. trk.	5		6					
hvy trk.	9		7					
bus	1		1					
motorcycle	1		0					

NOTES: Crows - helicopter flyover - 10:57 - people talking in background

Bird chirping - new leaves rustling

Note all have privacy fences around backyards

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / I-95 WIDENING

JOB # 59935.003

SITE ID R4-2

Gannett Fleming, Inc.

ADDRESS: 9931 / 9929 MATTI COURT

Meter Storage # 371

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after 93.7

GPS PT 205 N 35° 13. 676 W077 29.561'

Weather: temperature 41 wind speed 0-5 cloud cover 0

Time:	1st	start	11:59	stop	12:19	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	48.5	Lmax	66.1	Lmin	36.8	SEL	79.3
	2nd	Leq		Lmax		Lmin		SEL	

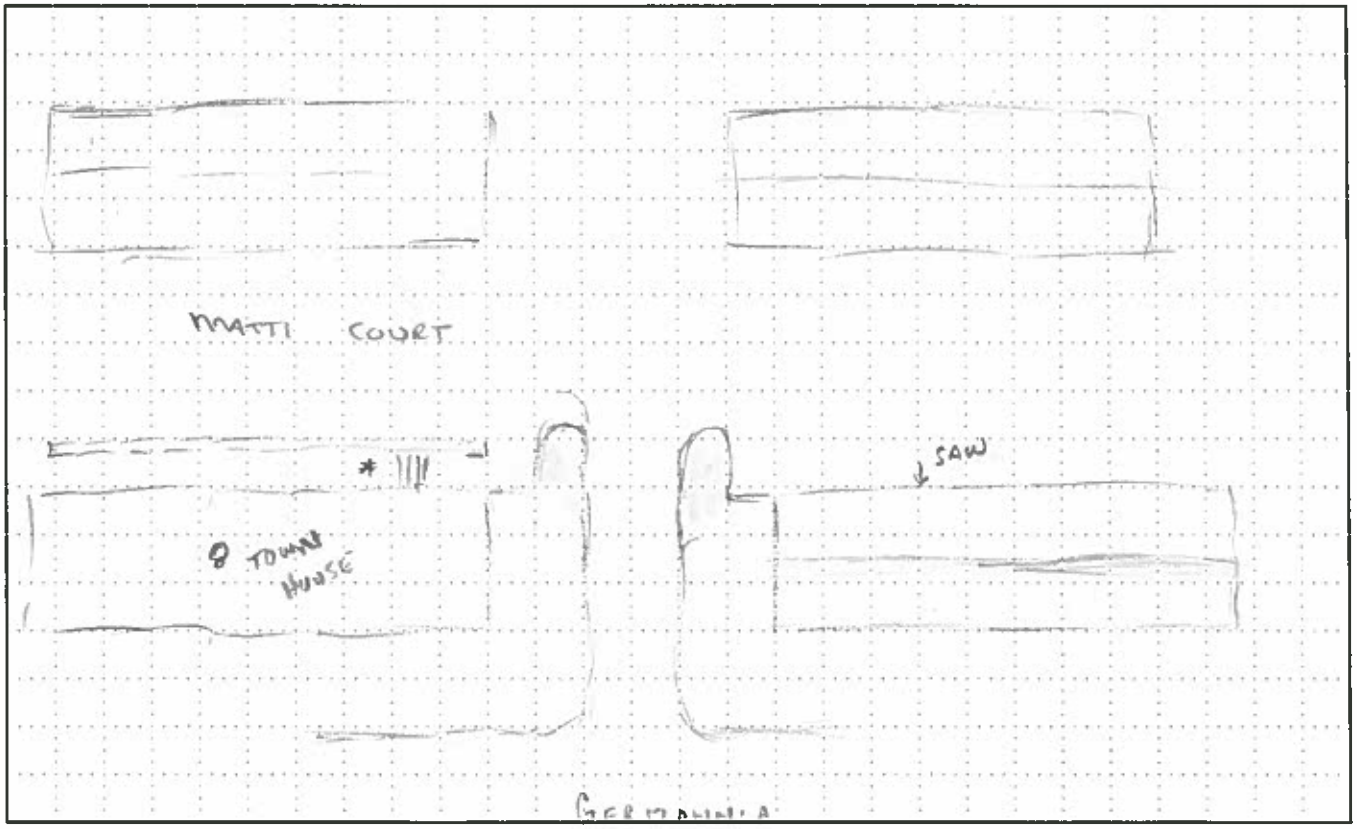
Traffic Data

10 min

Roadway#1	I-17		Roadway#2	I-17		Roadway#3	GERMANNA		Roadway#4		
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	219		auto	282		auto	112		auto		
med. trk.	2		med. trk.	3		med. trk.			med. trk.		
hvy trk.	14		hvy trk.	9		hvy trk.			hvy trk.		
bus	0		bus	0		bus			bus		
motorcycle	0		motorcycle	0		motorcycle			motorcycle		

NOTES: AIRPLANE FLYOVER 12:07 - NEAR CIRCULAR SAW AT NEIGHBORS NEAR TRAFFIC ON GERMANNA.

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / I-95

JOB # 59935.003

SITE ID R4-3

Gannett Fleming, Inc.

ADDRESS: MATTI COURT

Meter Storage # 370

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. _____ SLM Calibration before 93.8 after _____

GPS PT 205 N-38.13719' W 077.29.601'

Weather: temperature 37' wind speed 0-5 cloud cover 0

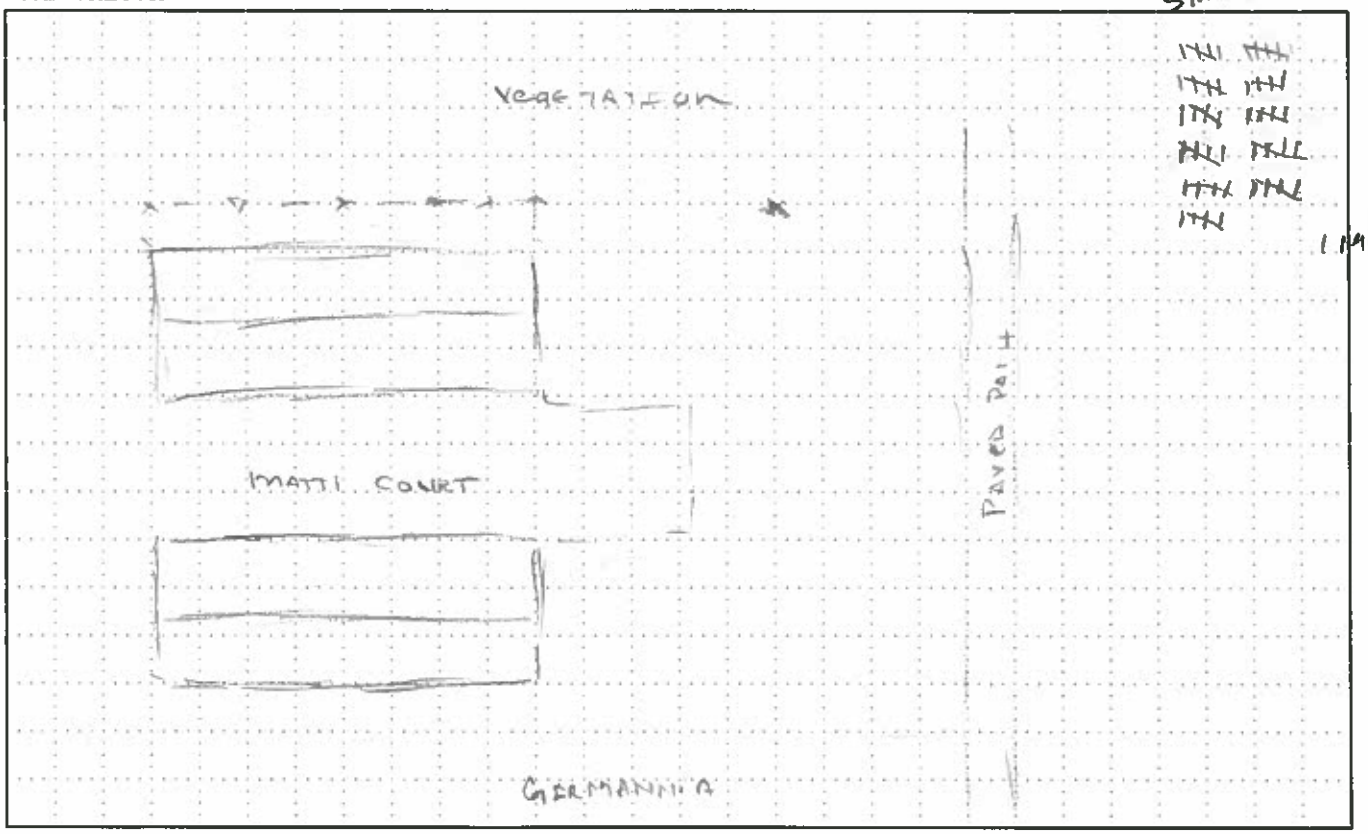
Time:	1st	start	11:33	stop	11:53	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	49.8	Lmax	69.9	Lmin	34.7	SEL	80.6
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17		Roadway#2	I-17		Roadway#3	Germania		Roadway#4		
Direction	EB		Direction	WB		Direction	Both ways 5 min		Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	218		auto	249		auto	55		auto		
med. trk.	8		med. trk.	3		med. trk.			med. trk.		
hvy trk.	11		hvy trk.	11		hvy trk.			hvy trk.		
bus	1		bus	1		bus			bus		
motorcycle	0		motorcycle	1		motorcycle	1		motorcycle		

NOTES: Kid talking - Talk to neighbor - Dogs barking - Hear saw occasionally behind us - Hear traffic on Germania - Door slamming van & Townhouses so.

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3-23-17

PROJECT: I-17 / I-95

JOB # 59935-003

SITE ID R5-1

Gannett Fleming, Inc.

ADDRESS: Lee Hill School Dr

Meter Storage # 208

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other _____

Measurement Data

Photograph #'s _____

SLM NO. #3 SLM Calibration before 93.8 after 93.8

GPS PT 202
N-38° 13.454'
W 77° 29.614'

Weather: temperature 37° wind speed 0-5 cloud cover 0

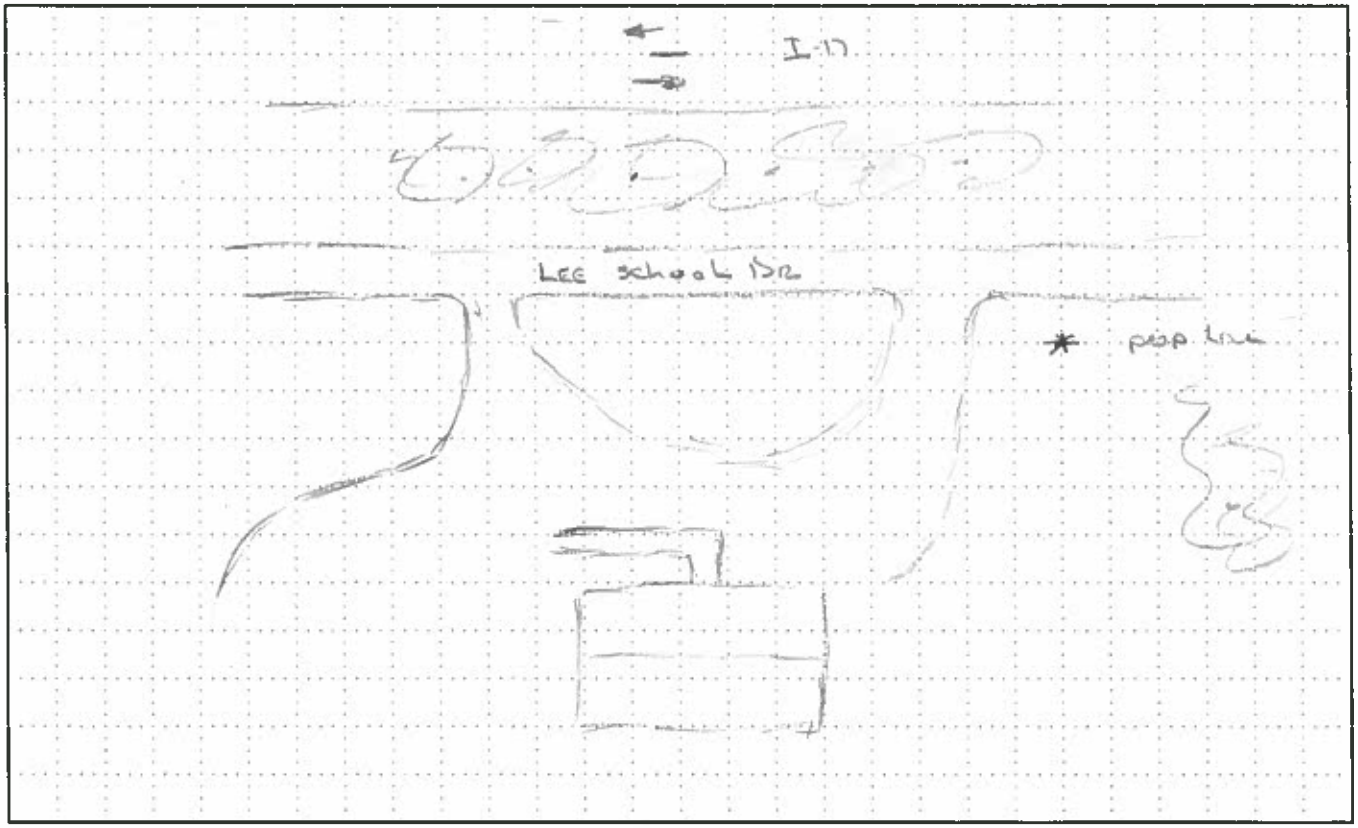
Time:	1st	start	10:21	stop	10:41	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	52.4	Lmax	63.3	Lmin	44.0	SEL	83.2
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-17		Roadway#2	I-17		Roadway#3			Roadway#4		
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	166		auto	191		auto			auto		
med. trk.	6		med. trk.	7		med. trk.			med. trk.		
hvy trk.	4		hvy trk.	9		hvy trk.			hvy trk.		
bus	0		bus	2		bus			bus		
motorcycle	0		motorcycle	0		motorcycle			motorcycle		

NOTES: pausing in background - Roadway slightly elevated

SITE SKETCH



Site 1-6

CC Sheet 1

TRAFFIC COUNT DATA SHEET

DATE: 3-23-17

PROJECT: I-17

JOB #

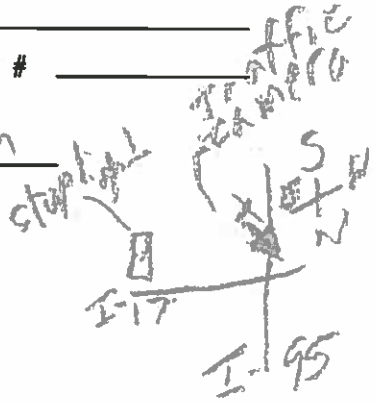
SITE ID I-17 & I-95

Gannett Fleming, Inc.

ADDRESS:

Meter Storage #

Weather: temperature 30° wind speed cloud cover clear



Traffic Data

Time: 1st start 7:47 stop 8:07 total 20 min
2nd start 8:19 stop 8:39 total 20 min

(my watch synchronized sonnies 7:43)

	Roadway#1 I-17 EB		Roadway#2 I-17 WB	
	1st	2nd	1st	2nd
auto	143	140	340	373
med. trk.	5	1	8	14
hvy trk.	4	4	6	4
bus	3	16	4	3
motorcycle	0	0	0	1

NOTES: EB bus stopped to pick up kids 8:06:00 (1st count)
traffic I-95 loud

Traffic Data

Time: 1st start 8:56 stop 9:16 total 20 m
2nd start 9:23 stop 9:43 total 20 m

	Roadway#1 I-17 EB		Roadway#2 I-17 WB	
	1st	2nd	1st	2nd
auto	230	209	244	235
med. trk.	3	6	5	6
hvy trk.	6	12	12	10
bus	2	0	1	1
motorcycle	0	0	0	0

NOTES:
after 3
Sonnic reset [illegible] watch, mine was 30 secs ahead

Traffic Data

Time: 1st start 10:21 stop 10:41 total 20m
2nd start 10:53 stop 11:13 total 20min

	Roadway#1 I-17 EB		Roadway#2 I-17 WB	
	1st	2nd	1st	2nd
auto	166	203	191	232
med. trk.	6	5	7	6
hvy trk.	4	9	9	7
bus	0	1	2	1
motorcycle	0	1	0	0

NOTES: 4 buses w/ Bus (5)
6) 1 Art Corridex
Sliding NT parked WB 17 7 mins
& nail gun
tilend

Northside of 17

Sites 7-

CC Sheet 2

TRAFFIC COUNT DATA SHEET

DATE: 3/23/17

PROJECT: I-17

JOB #

SITE ID I-17 & I-95

Gannett Fleming, Inc.

ADDRESS:

Meter Storage #

Weather: temperature 38° wind speed ____ cloud cover clear

Traffic Data

Time: 1st start (2) 11:33 stop 11:53 total 20 min

2nd start (3) 11:59 stop 12:19 total 20 mins

changed batteries

	Roadway#1 I-17 Direction EB		Roadway#2 I-17 Direction WB	
	1st	2nd	1st	2nd
auto	216	219	241	237
med. trk.	8	9	3	3
hvy trk.	11	14	11	4
bus	1	0	1	0
motorcycle	0	0	1	0

NOTES: 7) #2

HT still idling, nail gun banging

Lunch

Traffic Data

Time: 1st start (9) 1:31 stop 1:51 total 20 mins

2nd start (10) 2:02 stop 2:22 total 20 mins

	Roadway#1 I-17 Direction EB		Roadway#2 I-17 Direction WB	
	1st	2nd	1st	2nd
auto	237	253	285	239
med. trk.	6	5	8	4
hvy trk.	7	9	10	7
bus	0	1	0	2
motorcycle	3	0	1	1

NOTES: 9) random home / visitor parking

10) trailer park start

Traffic Data

Time: 1st (11) start 2:27 stop 2:47 total 20 mins

2nd (12) start 2:51 stop 3:13 total 22 mins

	Roadway#1 I-17 Direction EB		Roadway#2 I-17 Direction WB	
	1st	2nd	1st	2nd
auto	244	311	286	292
med. trk.	3	9	4	1
hvy trk.	8	5	8	8
bus	6	6	4	5
motorcycle	0	1	1	0

NOTES: 11) trailer park

2 buses stopped (≈ 1 min each)

bus stopped 2nd min

2nd bus 3 min

3rd bus 20 min (1 min)

bus has mud on rear tires

TRAFFIC COUNT DATA SHEET

DATE: _____

PROJECT: _____

JOB # _____

SITE ID _____

Gannett Fleming, Inc.

ADDRESS: _____

_____

_____

Meter Storage # _____

Weather: temperature _____ wind speed _____ cloud cover _____

I-95 NB traffic cam

Traffic Data

Time: 1st start 8:41:05 stop 8:51:05 total 10min

2nd start _____ stop _____ total _____

	Roadway#1		Roadway#2	
Direction				
	1st	2nd	1st	2nd
auto	365			
med. trk.	29			
hvy trk.	55			
bus	6			
motorcycle	Ø			

NOTES: _____

I-95 traffic cam verification

by CC's watch

Traffic Data

Time: 1st start 4:42pm stop 5:02 total _____

2nd start _____ stop _____ total _____

stopped rec recording w/ camera @ 5:04p

	Roadway#1 I-95		Roadway#2 I-95	
Direction	NB		SB	
	1st	2nd	1st	2nd
auto	679		939	
med. trk.	21		14	
hvy trk.	87		90	
bus	7		5	
motorcycle	1		Ø	

NOTES: _____

Traffic Data

Time: 1st start 3:40 stop 4:00 total 20

2nd start 4:05 stop 4:25 total 20

	Roadway#1 West		Roadway#2 East	
Direction	→		←	
	1st	2nd	1st	2nd
auto	222	271	264	281
med. trk.	12	5	10	0
hvy trk.	4	11	3	2
bus	6	1	3	4
motorcycle	0	0	1	0

NOTES: _____

APPENDIX B

Noise Meters
Certification of Calibration

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP Lab Code: 200625-0

Calibration Certificate No.36373

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **5/31/2016**	*Cal Due:* **5/31/2017**
Model:	**NC-74**	*Status:*	**Received** / **Sent**
Manufacturer:	**Rion**	*In tolerance:*	**X** / **X**
Serial number:	**01200033_80289.000**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	**__Yes _X_ No**
Barometer s/n:			
Customer:	**Environmental Acoustics, Inc.**	*Address:*	**1400 Hummel Avenue**
Tel/Fax:	**717-737-4680 / 717-737-4685**		**Lemoyne, PA 17043**

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 1/16/2015

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 23, 2015	Scantek, Inc./ NVLAP	Oct 23, 2016
DS-360-SRS	Function Generator	33584	Oct 20, 2015	ACR Env./ A2LA	Oct 20, 2017
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 6, 2015	ACR Env. / A2LA	Oct 6, 2016
HM30-Thommen	Meteo Station	1040170/39633	Oct 23, 2015	ACR Env./ A2LA	Oct 23, 2016
140-Norsonic	Real Time Analyzer	1406424	Oct 26, 2015	Scantek / NVLAP	Oct 26, 2016
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 10, 2015	Scantek, Inc. / NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	14052	Aug 24, 2015	Scantek, Inc./ NVLAP	Aug 24, 2016

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Valentin Buzduga
Signature	Lydon Dawkins	Signature	
Date	5/31/2016	Date	6/01/2016

Scantek, Inc.

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37417

Instrument: **Noise Dosimeter / SLM**
Model: **Spark 706**
Manufacturer: **Larson Davis**
Serial number: **01595**
Tested with: **Microphone MPR002 s/n B0565**
ID number: **80389.000**
Type (class): **2**
Customer: **Environmental Acoustics**
Tel/Fax: **717-730-4680 / -730-4685**

Date Calibrated: **11/30/2016** *Cal Due:* **11/30/2017**

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: ___Yes _X_ No
Calibration service: ___ Basic _X_ Standard
Address: **1400 Hummel Avenue**
Lemoyne, PA 17403-1749

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 25, 2016	Scantek, Inc./ NVLAP	Jul 25, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.9	99.08	45.9

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	11/30/16	Date	12/02/2016

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.37416

Instrument:	**Noise Dosimeter / SLM**
Model:	**Spark 706**
Manufacturer:	**Larson Davis**
Serial number:	**01596**
Tested with:	**Microphone MPR002 s/n B0404**
ID number:	**80390.000**
Type (class):	**2**
Customer:	**Environmental Acoustics**
Tel/Fax:	**717-730-4680 / -4685**

Date Calibrated: **12/1/2016** *Cal Due:* **12/1/2017**

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **1400 Hummel Avenue**
Lemoyne, PA 17403-1749

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 27, 2016	Scantek, Inc./ NVLAP	Jul 27, 2017
DS-360-SRS	Function Generator	88077	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2018
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 15, 2016	ACR Env./ A2LA	Sep 15, 2017
HM30-Thommen	Meteo Station	1040170/39633	Nov 1, 2016	ACR Env./ A2LA	Nov 1, 2017
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2016	Scantek, Inc./ NVLAP	Nov 10, 2017
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 25, 2016	Scantek, Inc./ NVLAP	Jul 25, 2017

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.4	99.26	37.5

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Steven E. Marshall
Signature		Signature	
Date	12/1/16	Date	12/02/2016

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.36194

Instrument: **Sound Level Meter**
Model: **NA28**
Manufacturer: **Rion**
Serial number: **00870496** *ID Number:* **80430.000**
Tested with: **Microphone UC-59 s/n 04607**
Preamplifier NH23 s/n 70511
Type (class): **1**
Customer: **Environmental Acoustics**
Tel/Fax: **717-730-4680 / -4685**

Date Calibrated: **5/10/2016** *Cal Due:* **5/10/2017**

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **1400 Hummel Avenue**
Lemoyne, PA. 17043

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 20, 2015	Scantek, Inc./ NVLAP	Jul 20, 2016
DS-360-SRS	Function Generator	88077	Sep 9, 2014	ACR Env./ A2LA	Sep 9, 2016
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 24, 2015	ACR Env./ A2LA	Sep 24, 2016
HM30-Thommen	Meteo Station	1040170/39633	Oct 23, 2015	ACR Env./ A2LA	Oct 23, 2016
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.7	100.89	42.6

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Burduga
Signature		Signature	
Date	5/10/16	Date	5/10/2016

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.36371

Instrument: **Sound Level Meter**
Model: **NA28**
Manufacturer: **Rion**
Serial number: **01170630**
ID number: **80427.000**
Tested with: **Microphone UC-59 s/n 04608**
Preamplifier NH23 s/n 70648
Type (class): **1**
Customer: **Environmental Acoustics, Inc.**
Tel/Fax: **717-737-4680 / 717-737-4685**

Date Calibrated: **6/1/2016** *Cal Due:* **6/1/2017**

Status:	**Received**	**Sent**
In tolerance:	**X**	**X**
Out of tolerance:		
See comments:		

Contains non-accredited tests: **__Yes X No**
Calibration service: **__ Basic X Standard**
Address: **1400 Hummel Avenue**
Lemoyne, PA 17043

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 23, 2015	Scantek, Inc./ NVLAP	Oct 23, 2016
DS-360-SRS	Function Generator	33584	Oct 20, 2015	ACR Env./ A2LA	Oct 20, 2017
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 6, 2015	ACR Env. / A2LA	Oct 6, 2016
HM30-Thommen	Meteo Station	1040170/39633	Oct 23, 2015	ACR Env./ A2LA	Oct 23, 2016
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.0	100.25	49.4

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Valentin Buzduga
Signature	Lydon Dawkins	Signature	
Date	6/01/2016	Date	6/01/2016

APPENDIX C

Spotsylvania County Planning Department Correspondence

April 20, 2017

Spotsylvania, Virginia

Parcel ID Number (PIN):	Property Address:	Owner:	Billing Address:
36-14-1	0 Mills DR Fredericksburg, VA	AV 5.92 Acre Parcel LLC c/o The Carlyle Group Inc - Bruce	9073 Nemo ST WEST HOLLYWOOD, CA 90069

General Information

Subdivision:	Anderson Property
Legal Description 1:	James Anderson Est 635
Legal Description 2:	No Data
Legal Land Area:	5.93

Voting District Information

Voting:	Lee Hill
Precinct:	LEE HILL
State House:	54
State Senate:	4
Congressional:	01
Polling Place:	LEE HILL ELEMENTARY SCHOOL
Polling Address:	3600 LEE HILL SCHOOL DRIVE

This information listed above is based upon the location of the selected parcel in relation to the voting districts and is provided for general information purposes only. Since voting districts generally do not follow neatly along property lines, you can verify your voting location by using the map. Any specific questions about where you vote should be directed to the Spotsylvania County Voter Registrar's Office at (540) 507-7380.

Census

Magisterial:	LEE HILL DISTRICT
Census Block:	2032
Census Tract:	202.04
TAZ:	1241
First Due :	11

School Information

Elementary School:	Lee Hill Elementary
Middle School:	Thornburg Middle
High School:	Massaponax High

School information is based upon the location of the selected parcel in relation to the school districts and is provided for general information purposes only. Please verify with the Spotsylvania County School Administration Office's Bus Stop Information Website.

Land Development

Zoning:	R-2
AgForestal District:	N
Airport Protection Overlay District:	Y
Historic Overlay District:	N
Highway Corridor Overlay District:	N
Reservoir Protection Overlay District:	N
River Protection Overlay District:	N

Environmental Constraints

Resource Protection Area (RPA):	N
FEMA 100 Year Flood Plain:	N
Watershed:	E20
SubWatershed:	RA47

Assessment(2015)

Building Assessment:	$
Land Assessment:	$326,200
Year Built:	0
Sq Footage:	No Data
Transfer Date:	03/30/2006
Instrument Number:	200600010902
Book Number:	No Data
Page:	No Data

Feet
0 100 200 300 400
1:4,514 / 1"=293 Feet

Title: Parcel View **Date: 4/20/2017**

DISCLAIMER: The geographic data you are about to access are electronic public records as defined by the Code of Virginia,1950, Section 2.2-3704. This information is made available as a public service. Spotsylvania County assumes no responsibilityfor any action or actions taken by users of this information. Spotsylvania County shall not be liable to the user or to any other person for the use or misuse of this data. This information is for general information only and shall not be used for thedesign, modification, or construction of improvements to real property or for flood plain determination. If you believe anydata provided is inaccurate, please inform the GIS Division by e-mail at gis@spotsylvania.va.us

April 20, 2017

Spotsylvania, Virginia

Parcel ID Number (PIN):	Property Address:	Owner:	Billing Address:
36-14-2	0 Assigned on Request	Glenwood Investment Properties LLC	9073 Nemo ST
	No Data	No Data	WEST HOLLYWOOD, CA 90069

General Information

Subdivision:	Anderson Property
Legal Description 1:	James Anderson Estate 635
Legal Description 2:	No Data
Legal Land Area:	5.93

Voting District Information

Voting:	Lee Hill
Precinct:	LEE HILL
State House:	54
State Senate:	4
Congressional:	01
Polling Place:	LEE HILL ELEMENTARY SCHOOL
Polling Address:	3600 LEE HILL SCHOOL DRIVE

This information listed above is based upon the location of the selected parcel in relation to the voting districts and is provided for general information purposes only. Since voting districts generally do not follow neatly along property lines, you can verify your voting location by using the map. Any specific questions about where you vote should be directed to the Spotsylvania County Voter Registrar's Office at (540) 507-7380.

Census

Magisterial:	LEE HILL DISTRICT
Census Block:	2032
Census Tract:	202.04
TAZ:	1241
First Due :	11

School Information

Elementary School:	Lee Hill Elementary
Middle School:	Thornburg Middle
High School:	Massaponax High

School information is based upon the location of the selected parcel in relation to the school districts and is provided for general information purposes only. Please verify with the Spotsylvania County School Administration Office's Bus Stop Information Website.

Land Development

Zoning:	R-2
AgForestal District:	N
Airport Protection Overlay District:	Y
Historic Overlay District:	N
Highway Corridor Overlay District:	N
Reservoir Protection Overlay District:	N
River Protection Overlay District:	N

Environmental Constraints

Resource Protection Area (RPA):	N
FEMA 100 Year Flood Plain:	N
Watershed:	E20
SubWatershed:	RA47

Assessment(2015)

Building Assessment:	$
Land Assessment:	$163,100
Year Built:	0
Sq Footage:	No Data
Transfer Date:	08/01/2005
Instrument Number:	200500031386
Book Number:	No Data
Page:	No Data

Feet

0 100 200 300 400

1:4,514 / 1"=293 Feet

Title: Parcel View **Date: 4/20/2017**

DISCLAIMER: The geographic data you are about to access are electronic public records as defined by the Code of Virginia,1950, Section 2.2-3704. This information is made available as a public service. Spotsylvania County assumes no responsibilityfor any action or actions taken by users of this information. Spotsylvania County shall not be liable to the user or to any other person for the use or misuse of this data. This information is for general information only and shall not be used for thedesign, modification, or construction of improvements to real property or for flood plain determination. If you believe anydata provided is inaccurate, please inform the GIS Division by e-mail at gis@spotsylvania.va.us

APPENDIX D

Traffic Data

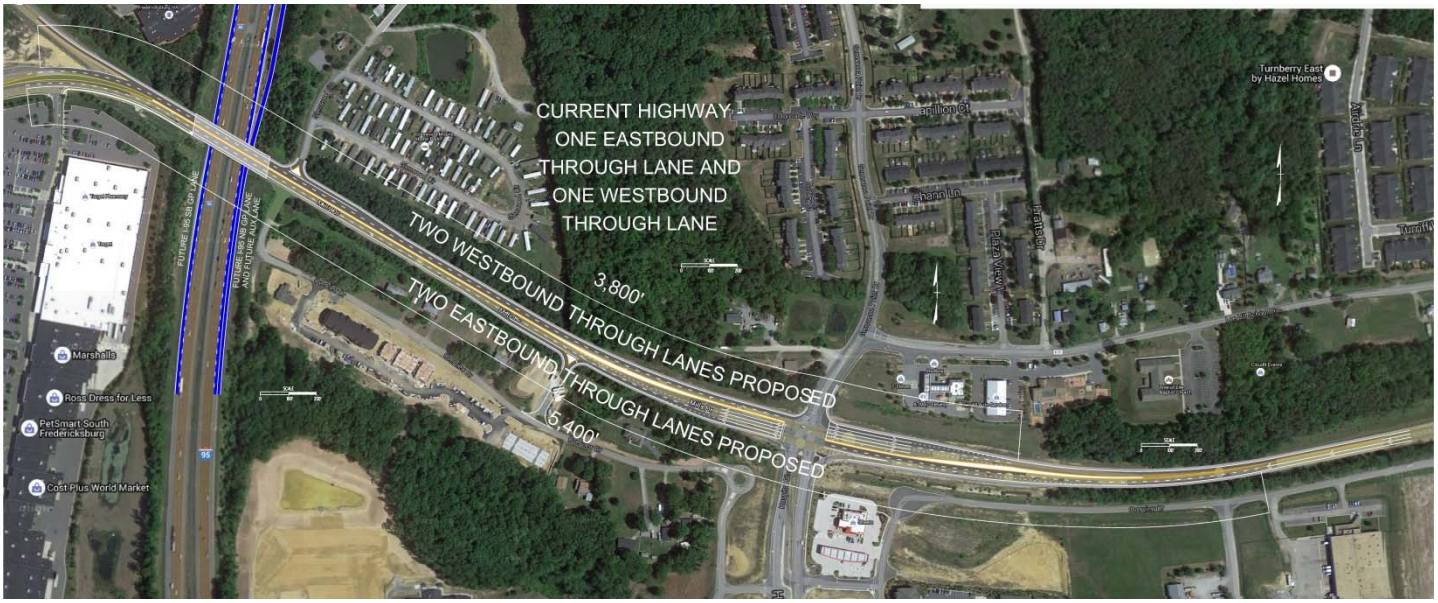
Rte 17						
	ADT	DHV	Peak	Auto	MT	HT
2014	23000	1977	1980	1841	40	99
2040	38400	3300	3280	3050	66	164

I-95						
	ADT	DHV	Peak	Auto	MT	HT
2014	97800	8383	8690	7387	174	1130
2040	140000	12000	11958	10164	239	1555

From the Traffic data

107140 – Request for Traffic Data for Noise Analysis

Lane Configuration – Route 17 – Mills Drive
Current - Two Through-Lanes
Proposed - Four Through-Lanes



Route 17
ADT 23,000 (2014)
ADT 38,400 (2040)
DHV 3,300
D(am) =55WB/45EB
D(pm) =45WB/55EB
T = 7% (2% Class 4-5, 5% Class 6-13)
Posted Speed 35 MPH
Operating Speed 35 MPH
Heavy trucks do not have another reasonable alternative to Rte 17 unless they are long-distance hauls, in which case they may be able to use I-95 and I-64. Route 17 is a Principal Arterial Highway/National Highway System Route and a Corridor of Statewide Significance. Trucks will not be diverted elsewhere.

Interstate 95
ADT 97,800 (2015)
ADT 140,000 (2040)
DHV 12,000
D (am) =55NB/45SB
D (pm) =45NB/55SB

T = 15% (2% Class 4-5, 13% Class 6-13)
Posted Speed 65 MPH
Operating Speed – Unknown – Future configuration of I-95 is undetermined.
2040 Projected volume exceeds current capacity in the peak hour.
Heavy trucks do not have another reasonable alternative to I-95.
I-95 is a Principal Arterial Highway/National Highway System Route and a Corridor of Statewide Significance. Trucks will not be diverted elsewhere.

Route 17	
Hour	Vol
24-1	544
1-2	472
2-3	472
3-4	544
4-5	832
5-6	976
6-7	2128
7-8	3280
8-9	2416
9-10	1984
10-11	1840
11-12	1984
12-13	2272
13-14	1984
14-15	1840
15-16	1984
16-17	2272
17-18	3280
18-19	1984
19-20	1552
20-21	1264
21-22	1048
22-23	832
23-24	616

I-95	
Hour	Vol
24-1	1983
1-2	1721
2-3	1721
3-4	1983
4-5	3033
5-6	3558
6-7	7758
7-8	11958
8-9	8808
9-10	7233
10-11	6708
11-12	7233
12-13	8283
13-14	7233
14-15	6708
15-16	7233
16-17	8283
17-18	11958
18-19	7233
19-20	5658
20-21	4608
21-22	3821
22-23	3033
23-24	2246

Germanna Point Drive - Southern End (near Rte 17)

The Northern and Southern segments of Germanna Point Drive break at Colonnade Way

ADT 5,100 (2014)
ADT 7,400 (2040)
DHV 700
Posted Speed 25 MPH
Operating Speed 25 MPH
Approximate Truck % is 3% (1% + 2%)
D (am) = 60SB/40NB
D (pm) = 40SB/60NB

Germanna Point Drive – Northern End (near Community College)
ADT 3,000 (2014)
ADT 5,000 (2040)
DHV 450
Posted Speed 25 MPH
Operating Speed 25 MPH
Approximate Truck % is 3% (1% + 2%)
D = 60/40

No other data is available.

No data is available for Hospital Blvd.

Germanna Pt Dr S	
Hour	Vol
24-1	82
1-2	67
2-3	67
3-4	82
4-5	144
5-6	175
6-7	421
7-8	668
8-9	483
9-10	391
10-11	360
11-12	391
12-13	452
13-14	391
14-15	360
15-16	391
16-17	452
17-18	668
18-19	391
19-20	298
20-21	236
21-22	190
22-23	144
23-24	98

Germanna Pt Dr N	
Hour	Vol
24-1	56
1-2	45
2-3	45
3-4	56
4-5	97
5-6	118
6-7	285
7-8	451
8-9	326
9-10	264
10-11	243
11-12	264
12-13	306
13-14	264
14-15	243
15-16	264
16-17	306
17-18	451
18-19	264
19-20	201
20-21	160
21-22	128
22-23	97
23-24	66

APPENDIX E

Warranted, Feasible and Reasonable Worksheets

Appendix E Warranted, Feasible, and Reasonable Worksheet

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

Date:	5/31/2017
Project No. and UPC:	0017-088-R72, B616, P101 UPC 107140
County:	Spotsylvania
Facility:	
Barrier System ID:	
Noise Abatement Category(s)	B
Community Name and/or CNE#	CNE 1

Design phase: ☒ Preliminary Design ☐ Final Design

Warranted

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

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

Feasibility

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

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

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

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

Reasonableness

1. Cost-Benefit Factors
   a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2) 22,386
   b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 1
   c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 0
   d. Total number of benefited receptors. 1
   e. Surface Area per benefited receptor unit. (ft^2/BR) 22,386
   f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? No
   g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? No

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

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

Decision

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

Additional Reasons for Decision:

Appendix E Warranted, Feasible, and Reasonable Worksheet

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

Date:	5/31/2017
Project No. and UPC:	0017-088-R72, B616, P101 UPC 107140
County:	Spotsylvania
Facility:	
Barrier System ID:	
Noise Abatement Category(s)	B
Community Name and/or CNE#	CNE 2

Design phase: ☒ Preliminary Design ☐ Final Design

Warranted

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

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

Feasibility

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

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

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

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

Reasonableness

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

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

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

Decision

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

Additional Reasons for Decision: _____

Appendix E Warranted, Feasible, and Reasonable Worksheet

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

Date:	5/31/2017
Project No. and UPC:	0017-088-R72, B616, P101 UPC 107140
County:	Spotsylvania
Facility:	
Barrier System ID:	
Noise Abatement Category(s)	B
Community Name and/or CNE#	CNE 3

Design phase: ☒ Preliminary Design ☐ Final Design

Warranted

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

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

Feasibility

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

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

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

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

Reasonableness

1. Cost-Benefit Factors
   a. Surface Area (Total square foot) of the proposed noise barrier. (ft^2) 11,736
   b. Impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 1
   c. Non-impacted noise sensitive receptor(s) receiving 5 dB(A) IL or more. 0
   d. Total number of benefited receptors. 1
   e. Surface Area per benefited receptor unit. (ft^2/BR) 11,736
   f. Is (1e) less than or equal to the maximum square feet per benefited receptor (MaxSF/BR) value of 1600? No
   g. Does the barrier provide an IL of at least 7 dB(A) for at least one impacted receptor in the design year? Yes

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

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

Decision

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

Additional Reasons for Decision:

Appendix E Warranted, Feasible, and Reasonable Worksheet

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

Date:	5/31/2017
Project No. and UPC:	0017-088-R72, B616, P101 UPC 107140
County:	Spotsylvania
Facility:	
Barrier System ID:	
Noise Abatement Category(s)	B
Community Name and/or CNE#	CNE 4

Design phase: ☒ Preliminary Design ☐ Final Design

Warranted

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

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

Feasibility

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

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

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

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

Reasonableness

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

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

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

Decision

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

Additional Reasons for Decision: _____

Appendix E Warranted, Feasible, and Reasonable Worksheet

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

Date:	5/31/2017
Project No. and UPC:	0017-088-R72, B616, P101 UPC 107140
County:	Spotsylvania
Facility:	
Barrier System ID:	
Noise Abatement Category(s)	B
Community Name and/or CNE#	CNE 5

Design phase: ☒ Preliminary Design ☐ Final Design

Warranted

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

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

Feasibility

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

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

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

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

Reasonableness

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

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

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

Decision

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

Additional Reasons for Decision: _____

APPENDIX F

References

References

- Procedures for Abatement of Highway Traffic Noise and Construction Noise 23 CFR 772. 2011.

- U.S. Department of Transportation, Federal Highway Administration, *Highway Traffic Noise: Analysis and Abatement Guidance*, FHWA Report No. FHWA-HEP-10-025, December 2011.

- U.S. Department of Transportation, Federal Highway Administration, *Measurement of Highway-Related Noise* FHWA Report No. FHWA-PD-96-046, May 1996.

- Virginia State Noise Abatement Policy

- Code of Virginia Noise Abatement Practices and technologies, Section 33.1-223.2:21. 2013, (HB 2577).

- Virginia Department of Transportation, *Highway Traffic Noise Impact Analysis Guidance Manual*, approved March 15, 2011, effective July 13, 2011, updated July 14th, 2015.

- Virginia Department of Transportation, 2016 *Road and Bridge Specifications*, Section 107.16(b.3) "Noise."

APPENDIX G

List of Preparers/Reviewers

List of Preparers / Reviewers

Gannett Fleming Inc.

Ahmed El-Aassar, Ph.D., P.E., ENV SP
Noise, Vibration and Air Quality Manager
Education: B.S., Civil Engineering
M.S., Environmental Engineering
Ph.D.,Environmental Engineering
Professional Experience: 17 Years
Role: Project Coordination, Report Preparation & QA/QC

Anjoli Martin, P.E.
Noise Engineer
Education: B.S., Civil Engineering
M.S., Environmental Engineering
Professional Experience: 10 Years
Role: Noise Modeling, Report Preparation

Sondra Peterson
Noise and Air Quality Technician
Education: A.S., CAD Drafting and Design
Professional Experience: 19 Years
Role: Noise Field Work

Chris Corbisier, E.I.T
Noise Analyst
Education: B.S., Civil Engineering
Professional Experience: 6 Years
Role: Noise Field Work

Virginia Department of Transportation (VDOT)

Ross Hundall
Senior Highway Noise Specialist
Years of Professional Experience: 11
Role in the project: Reviewer/Noise Study Project Manager