DRAFT FINAL DESIGN ENGINEERING NOISE ANALYSIS REPORT

Central Valley Transportation Project
SR 0015, Section 088

Snyder County, Pennsylvania

Prepared for:
Pennsylvania Department of Transportation

Prepared by:
Gannett Fleming, Inc.
207 Senate Avenue
Camp Hill, PA 17011

Gannett Fleming

April 2022

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pennsylvania
DEPARTMENT OF TRANSPORTATION

April 29, 2022

Ms. Alicia Nolan
Division Administrator
Federal Highway Administration
228 Walnut Street, Room 508
Harrisburg, PA 17101-1720
Attention: Ms. Deborah Suciu Smith

Dear Ms. Nolan:

Attached for your review is the Draft Final Design Noise Report for the S.R. 0015 Section 088 Central Valley Transportation Project (Southern Section), Monroe Township and Shamokin Dam Borough, Snyder County, Pennsylvania.

The Bureau of Project Delivery and Design concurs with the findings of the report in accordance with *Publication 24, Project Level Highway Traffic Noise Handbook*. Please sign below to concur with the report. You may provide comments to James Spatz at jspatz@pa.gov. He can be reached at 717-787-5306 with any questions regarding this request.

Sincerely,

/s/ Nick A. Vivian

Nick A. Vivian, Acting Chief
Environmental Policy and Development Division
Bureau of Project Delivery and Design

JONATHAN P CRUM Digitally signed by JONATHAN P CRUM
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FHWA Division Office

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DRAFT FINAL DESIGN ENGINEERING NOISE ANALYSIS

Executive Summary

The Central Susquehanna Valley Transportation (CSVT) Project (SR 15 Section 088) is the construction of a new limited access highway from the existing SR 11/ SR 15/ SR 522 Interchange located just north of Selinsgrove, PA in Monroe Township and Shamokin Dam Borough, Snyder County to SR 147 in West Chillisquaque Township, SR Route 45 (see Figure 1). The CSVT project is broken into two separate design contracts: a northern and southern design contract. Gannett Fleming and its consultant partners are preparing the final design for the CSVT Southern Section. The CSVT Southern Section Project is the design of a new 5.7-mile limited access highway beginning at the existing SR 11/15/522 Interchange and ending at the southern limit of the CSVT Northern Section Project, located near the Union County line.

The CSVT Southern Section Project also includes design of the SR 61 Connector, connecting the existing SR 61 Interchange with SR 11/15 in Shamokin Dam to the proposed SR 15 CSVT alignment. In addition to these new roadways, several state-owned and local roadways which cross the proposed SR 15 corridor will need to be re-aligned or accommodated with proposed structures to cross the new roadway. This report focused on the noise analysis and mitigation related to the PennDOT recommended alternative (eastern alignment).

For analysis purposes, the project study area was divided into sixteen (16) Noise Study Areas (NSAs) as shown in Figures 2 through 17. Noise measurements and concurrent traffic counts were conducted in all NSAs and are reported in Table 2. 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 identified in all NSAs except NSAs 2, 12, and 16.

Based on the evaluation of the noise levels associated with the engineering plans for the eastern alignment developed to date, noise abatement features were determined to be feasible and reasonable within NSAs 1, 7, 13, 14A and 15. Various noise barrier options were considered and evaluated in terms of abatement feature lengths, heights and costs. This process resulted in the development of the following feasible and reasonable noise barriers along the project alignment:

- NSA 1 Barrier – A noise barrier averaging 12 feet in height along CSVT Bypass

Southbound, with a length of approximately 595 feet.

- NSA 7 Barrier – A noise barrier averaging 12 feet in height along CSVT Bypass Northbound, with a length of approximately 2,599 feet.

- NSA 13 Barrier – A noise barrier averaging 18 feet in height along CSVT Bypass Southbound, with a length of approximately 2,659 feet.

- NSA 14A Barrier – A noise barrier averaging 22 feet in height along CSVT Northbound and Route 61 Connector Eastbound, with a length of approximately 4,100 feet.

- NSA 15 Barrier – A noise barrier averaging 20 feet in height along Route 61 Connector Westbound, with a length of approximately 3,634 feet.

PennDOT is committed to construction of the feasible and reasonable noise abatement measures discussed above contingent upon the community input regarding desires, types, height, and location, as well as aesthetic considerations.

Introduction

The Central Susquehanna Valley Transportation (CSVT) Project (SR 15 Section 088) is the construction of a new limited access highway from the existing SR 11/ SR 15/ SR 522 Interchange located just north of Selinsgrove, PA in Monroe Township and Shamokin Dam Borough, Snyder County to SR 147 in West Chillisquaque Township, SR Route 45 (see Figure 1). The CSVT project is broken into two separate design contracts: a northern and southern design contract. Gannett Fleming and its consultant partners are preparing the final design for the CSVT Southern Section. The CSVT Southern Section Project is the design of a new 5.7-mile limited access highway beginning at the existing SR 11/15/522 Interchange and ending at the southern limit of the CSVT Northern Section Project, located near the Union County line. Noise abatement has been evaluated for the noise study areas which meet the Pennsylvania Department of Transportation (PennDOT) and Federal Highway Administration (FHWA) criteria for a Type I project. This report focused on the noise analysis and mitigation related to the Southern Section alignments including the shift to the Eastern Alternative in 2017.

PennDOT Noise Abatement Criteria (NAC), described in Table 1, for specific land use activities were used in the evaluation of traffic noise impacts. These criteria are based on criteria established in Title 23 Code of Federal Regulations, Part 772, U.S. Department of Transportation, Federal Highway Administration (FHWA), *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, and guidelines for "increase over existing" noise levels as set forth in PennDOT Publication *Project Level Highway Traffic Noise Handbook Publication No.24*, dated May, 2019. Predicted noise levels were determined using Version 2.5 of the FHWA Traffic Noise Model (FHWA TNM).

The noise level descriptor used for this project was the hourly equivalent noise level ($L_{eq}(h)$). $L_{eq}(h)$ is the steady state, A-weighted sound level, which contains the same amount of acoustic energy as the actual time-varying A-weighted noise level over a one-hour period. The FHWA and PennDOT define noise impact based upon seven activity categories, as identified in Table 1. Individual sites located within a given activity category are designated as noise sensitive receptors.

Noise impacts were also evaluated by comparing the predicted noise levels with existing noise levels. A noise impact was identified if the future (year 2047) noise level was predicted to approach or exceed 67 dB(A), where approach is defined by PennDOT as 1 dB(A) below NAC or if future noise levels within the project were predicted to cause a substantial noise increase ($\geq$10 dB(A)) as compared to existing noise levels.

Noise Study Areas

For noise analysis purposes, the project study area was divided into the following noise study areas (NSAs) as shown in Figures 2 through 17:

NSA 1: Activity Category B land uses are located in the southeast quadrant of the SR11/SR15/SR522 Interchange and includes a mix of residential and commercial properties. See Figure 2.

NSA 2: Activity Category E land uses are located adjacent to the northwest quadrant of SR11/SR15/SR522 Interchange and consists of two hotels. Activity Category B land uses are located adjacent to the southwest quadrant of SR11/SR15/SR522 and includes six residences. See Figure 3.

NSA 3: Activity Category B land uses are located adjacent to Airport Rd. and west of the proposed SR 15 alignment. This NSA includes four residences. See Figure 4.

NSA 4: Activity Category B and F land uses are located adjacent to Mill Rd. and east of the proposed SR15 alignment. This NSA consists of a large agricultural operation and many single-family residences. See Figure 5.

NSA 5: Activity Category B land uses are located adjacent to Penns Dr. and Attig Rd. west of the proposed SR 15 alignment. See Figure 6.

NSA 6: Activity Category B land uses are located east of proposed SR 15 and adjacent to Attig Rd, Kingswood Dr. and Limerick Ln. Noise sensitive land use in NSA 6 is comprised of single- and multi-family residences. See Figure 7.

NSA 7: Activity Categories B and C land uses are located south of the proposed SR 15 alignment and is comprised of a mix of residential, agricultural and recreational uses. Noise sensitive land use in NSA 7 is comprised of single-family residences and a park. See Figure 8.

NSA 8: Activity Category B land uses are located north of the proposed SR 15 alignment and adjacent to Colonial Dr. and Fisher Rd. Noise sensitive land use in NSA 8 is comprised of single-family residences. See Figure 9.

NSA 9: Activity Category B land uses are located north of proposed SR 15 adjacent to Stetler Ave., West 11th Ave., and Millers Dr. Noise sensitive land use in NSA 9 is comprised of multiple single-family residences. See Figure 10.

NSA 10: NSA is not affected by the PennDOT recommended alternative (east alignment).

NSA 11: An Activity Category B land uses are located adjacent to Sunbury Rd and proposed SR 15. This NSA lies east of the proposed SR 15 alignment. Noise sensitive land use in NSA 11 is comprised of single-family residences. See Figures 11 and 12.

NSA 12 Activity Category B land uses are located east of the proposed SR 15 alignment and is comprised of single-family residences adjacent to existing SR 15. See Figure 13.

NSA 13: Activity Category B and G land uses are located west of the proposed SR 15 alignment and in general is bounded by Park Rd. to the west, Grangers Rd. to the south and undeveloped farmland to the north. Noise sensitive land use in NSA 13 is comprised of several single-family residences on large lots. See Figure 13.

NSA 14A: Activity Category B land use is located near the eastern terminus of the proposed project and south of the proposed SR 15 alignment adjacent to Weatherfield Drive. Noise sensitive land use in NSA 14 is comprised of a relatively dense residential community in Shamokin Dam Borough, PA. See Figure 14.

NSA 14B: Activity Categories B, C and E land uses are located near the eastern terminus of the proposed project and south of the proposed SR 15 alignment adjacent to 8th Ave. and East of Chestnut St. Noise sensitive land use in NSA 14 is comprised of a relatively dense residential community, the Calvary Fellowship church and a hotel in Shamokin Dam Borough, PA. See Figure 14.

NSA 15: Activity Category B land uses are located near the eastern terminus of the proposed project in the northeast quadrant of the proposed SR 61/ SR11/ SR15 interchange, adjacent to 5th Ave., Courtland Dr., Jonathan Rd, Rome Ct. and Courtland Dr. Noise sensitive land use in NSA 15 is comprised of a relatively dense residential community in Shamokin Dam Borough, PA. See Figure 16.

NSA 16: Activity Categories B and C land uses are located near the east of the eastern terminus of the proposed project in the southwest quadrant of the existing SR 11/ SR 15/ SR 61 interchange. Noise sensitive land use in NSA 16 is comprised of a relatively dense residential community in Shamokin Dam Borough, PA. See Figure 17.

Noise Measurements and Model Validation

Ambient noise measurements were conducted throughout the project study area. Within each of the above NSAs, short-term (20-minute duration) noise measurements were taken along with concurrent traffic counts at 66 locations using American National Standards Association (ANSI) Type I noise meters. See Appendix A for field data sheets. Calibration certificates related to noise meters and calibrators are in Appendix B.

It should be noted that short-term measurements were taken at various times of the day

between September 12 and 15, 2016, and on March 27, 2019, and do not necessarily represent the noisiest condition at any particular measurement site. In addition, measurement sites were positioned to enable validation of the noise prediction model and to assist in defining existing noise levels for second-row residences and for receivers located approximately 500 feet from the proposed new alignment. As such, in certain locations, noise measurement sites do not exactly correspond with noise analysis sites. Measurements were used primarily for purposes of noise model validation, with year 2015 peak hour traffic volumes assumed in the prediction of worst-case existing noise levels. Measured existing L_{eq} noise levels at short-term measurement sites (receptors) ranged from 40 to 68 dB(A). In order to establish the background sound level, the NSA 6 noise measurements were averaged and the ambient sound level used is 45 dB(A).

Using the traffic data obtained concurrently with the short-term noise measurements, noise levels were modeled and compared to measured noise levels. Existing short-term measured noise levels and hourly traffic data based on concurrent traffic counts are summarized in Table 2, with field measurement data sheets contained in Appendix A. Validation results are shown in Table 3. Measured versus modeled noise levels were within the acceptable 3 dB(A) range for all sites evaluated, except sixteen sites where the measured sound levels were higher than modeled due to other non-highway sources (dog barking, lawn mower, agriculture operations). The results of the validation process were used to "build" the FHWA TNM used for purposes of modeling existing and future year noise levels, determining future year impacts, and evaluating potential noise abatement options.

Noise Modeling

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. Traffic data used for prediction of existing (year 2015) and future (year 2047) noise levels for both no-barrier and barrier conditions are contained in Appendix C. In addition, it was assumed that the Future No-Build and Future Build traffic are similar. 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 during the noise measurement periods corresponding to the periods of highest noise levels.

Evaluation of Noise Impacts

Consideration of noise abatement is required in Pennsylvania if noise levels approach the NAC, approach is defined as 1 dB(A) below the noise abatement criteria or create a substantial noise increase (10 dB(A)). The future year noise levels were compared to the NAC approach levels (66 dB(A)) for land use Categories B&C and (71 dB(A)) for land use Category E and to the increases over existing year noise levels using PennDOT's NAC

to determine if there would be any noise impacts. These comparisons are contained in the noise summary tables for each NSA, with the noise measurement sites and analysis sites (receivers) indicated within each NSA. Noise impacts were identified in each NSA based on predicted exterior noise levels exceeding the 66 dB(A) approach criteria level for Activity Category land uses B and C and the 71 dB(A) approach criteria level for Activity Category land use E. "Increase over existing" noise levels were generally the result of normal traffic growth predicted to occur between 2015 and 2047.

In addition to their use in evaluating noise impacts, noise analysis sites were used in the consideration of noise abatement for noise sensitive receptors within each NSA. Abatement measures such as traffic management devices and roadway realignment were determined not to be feasible since the purpose of the project is to construct a new roadway alignment. In addition, the topography and development in the area does not lend itself to the use of noise berms as an effective noise abatement technique. Therefore, noise abatement evaluations focused on the design of noise barrier walls.

Consideration of noise abatement was required in all NSAs (except NSAs 2, 12 and 16) due to noise levels approaching or exceeding the NAC. Under PennDOT noise criteria, feasible noise barriers are those that provide at least 5 dB(A) of noise reduction for at least 50% of impacted receptors, while posing no safety, engineering, maintenance, constructability, drainage, or utility impacts, or access restrictions. If determined to be feasible, a barrier was then evaluated for reasonableness. For a barrier to be reasonable based on PennDOT noise criteria, it must be cost-effective (square footage per benefited residential receptor (SF/BR) must be less than or equal to 2000), and the desires of the affected property owners and residents must be considered. Receptors are considered to be benefited if they receive 5 dB(A) or more noise reduction (insertion loss) from a barrier. To meet PennDOT's reasonableness criteria, a barrier must also achieve at least a 7 dB(A) noise reduction at one receptor.

A summary of abatement considerations within each NSA follows. Final cases of each NSA are represented in Figures two through seventeen when warranted. See referenced tables for additional details related to all barrier options considered.

NSA 1 (See Figure 2 and Table 4): Two of the fifteen receptors evaluated within this NSA were predicted to have levels at or above 66 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following five abatement options were considered for NSA 1:

- Case 1 consisted of a 10 feet high wall, 777 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved).

- Case 2 consisted of a 12 feet high wall, 777 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,418 > 2,000, which exceeds PennDOT requirements).

- Case 3 consisted of a 14 feet high wall, 777 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,936 > 2,000, which exceeds PennDOT requirements).

- Case 4 consisted of a 16 feet high wall, 777 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,454 > 2,000, which exceeds PennDOT requirements).

- Case 5 is the abatement proposed of NSA 1 and consisted of a modification to Case 1 and having a range of 10 to 14 feet high wall, 595 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and the square footage per benefited receptor SF/BR 1,852 < 2,000, which meets with PennDOT requirements).

NSA 2 (See Figure 3 and Table 5): This NSA consists of two hotels that do not have areas of outdoor frequent human use, and six residences. None of the eight receptors evaluated within this NSA approached or exceeded the NAC sound levels for impacts with the Build Alternative. As such, consideration of noise abatement within this NSA was not warranted.

NSA 3 (See Figure 3 and Table 6): Two of the four receptors evaluated within this NSA were predicted to have levels at or above 66 dB(A) and increase over existing or noise levels that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following four abatement options were considered for NSA 3:

- Case 1 consisted of a 10 feet high wall, 3,668 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 14 feet high wall, 3,668 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not

achieved).

- Case 3 consisted of an 18 feet high wall, 3,668 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 33,016 > 2,000, which exceeds PennDOT requirements).

- Case 4 consisted of a shortened 10 to 18 feet high wall, 2,614 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 21,638 > 2,000, which exceeds PennDOT requirements).

NSA 4 (See Figure 5 and Table 7): Twelve of the ninety-two receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following four abatement options were considered for NSA 4:

- Case 1 consisted of a 10 feet high wall, 3,243 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 14 feet high wall, 3,243 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 3 consisted of an 18 feet high wall, 3,243 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 4 consisted of a 20 feet high wall, 3,243 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

NSA 5 (See Figure 6 and Table 8): Twelve of the twenty-three receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following five abatement options were considered for NSA 5:

- Case 1 consisted of a 10 feet high wall, 4,672 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 67% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not

achieved).

- Case 2 consisted of a 12 feet high wall, 4,672 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 83% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 5,606 > 2,000, which exceeds PennDOT requirements).

- Case 3 consisted of a 14 feet high wall, 4,672 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 5,450 > 2,000, which exceeds PennDOT requirements).

- Case 4 consisted of a shortened 4 to 18 feet high wall, 3,653 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,733 > 2,000, which exceeds PennDOT requirements).

- Case 5 consisted of a shorter barrier with 12 to 18 feet high wall, 1,441 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 67% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,594 > 2,000, which exceeds PennDOT requirements).

NSA 6 (See Figure 7 and Table 9): Forty-two of fifty-three receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following three abatement options were considered for NSA 6:

- Case 1 consisted of a 10 feet high wall, 3,452 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 14 feet high wall, 3,452 feet long and was determined not to be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 3 consisted of a 20 feet high wall, 3,452 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

NSA 7 (See Figure 8 and Table 10): Twenty one of the twenty-eight receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. Following Appendix E, the athletic field Equivalent Residential Unit (ERU) is four (4) based on the assumption of usage of four (4) hours per day, 100 persons per day and available 120 days per year. As such, consideration of noise abatement within this NSA was warranted.

The following five abatement options were considered for NSA 7:

- Case 1 consisted of a 12 feet high wall, 5,159 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 62% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,642 > 2000, which exceeds PennDOT requirements).

- Case 2 consisted of a 14 feet high wall, 5,159 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 67% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 4,013 > 2,000, which exceeds PennDOT requirements).

- Case 3 consisted of a 16 feet high wall, 3,900 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 86% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,811 > 2,000, which exceeds PennDOT requirements).

- Case 4 consisted of a shortened 12 feet high wall, 2,752 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 62% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,943 < 2,000, which meets with PennDOT requirements).

- Case 5 is the abatement proposed of NSA 7 and consisted of a 9 to 12 feet high wall, 2,599 feet long and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 67% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,702 < 2,000, which meets with PennDOT requirements).

NSA 8 (See Figure 9 and Table 11): Sixteen of the twenty receptors evaluated within this NSA were predicted to have levels that have an increase over existing that at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following nine abatement options were considered for NSA 8:

- Case 1 consisted of a 10 feet high wall, 1,399 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 12 feet high wall, 1,399 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 3 consisted of a 14 feet high wall, 1,399 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 4 consisted of an 18 feet high wall, 1,399 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 5 consisted of a 20 feet high wall, 1,399 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 6 consisted of an extended 10 feet high wall, 2,534 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 7 consisted of an extended 12 feet high wall, 2,534 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 56% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,379 > 2,000, which exceeds PennDOT requirements).

- Case 8 consisted of an extended 14 feet high wall, 2,534 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 75% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,956 > 2,000, which exceeds PennDOT requirements).

- Case 9 consisted of an extended 20 feet high wall, 2,534 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,167 > 2,000, which exceeds PennDOT requirements).

Since a noise barrier is recommended for NSA 7 and the NSA 8 noise barrier is not reasonable, it should be considered to consider applying absorptive treatment to the NSA 7 barrier to protect NSA 8 (Colonial Acres) since the topic of noise has been raised by this community.

NSA 9 (See Figure 10 and Table 12): Four of the twelve receptors evaluated within this NSA were predicted to have levels that have an increase over existing that at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following three abatement options were considered for NSA 9:

- Case 1 consisted of a 10 feet high wall, 4,510 feet long and was determined to be not feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).
- Case 2 consisted of a 14 feet high wall, 4,510 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved.
- Case 3 consisted of a 16 feet high wall, 4,510 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 100% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved.

NSA 10: This NSA is not affected by the preferred alternative; NSA 10 is over 2,000 feet from the PennDOT recommended alternative (Eastern Alignment). As such, consideration of noise abatement within this NSA was not warranted.

NSA 11 (See Figure 11 and Table 13): Eighteen of the twenty-six receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following four abatement options were considered for NSA 11:

- Case 1 consisted of a 10 feet high wall, 1,830 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).
- Case 2 consisted of a 14 feet high wall, 1,830 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).
- Case 3 consisted of an 18 feet high wall, 1,830 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).
- Case 4 consisted of an 18 feet high wall, 2,778 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

NSA 12 (See Figure 13 and Table 14): Neither of the two receptors evaluated within this NSA were predicted to have levels at or above 66 dB(A) with the Build Alternative. As

such, consideration of noise abatement within this NSA was not warranted.

NSA 13 (See Figure 13 and Table 15): Thirty one of the thirty-two receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following six abatement options were considered for NSA 13:

- Case 1 consisted of a 10 feet high wall, 3,898 feet long and was determined to not be feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 14 feet high wall, 3,898 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 61% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,729 > 2,000, which exceeds PennDOT requirements).

- Case 3 consisted of a 16 feet high wall, 3,898 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 71% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,712 > 2,000, which exceeds PennDOT requirements).

- Case 4 consisted of a 18 feet high wall, 3,898 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 74% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,923 > 2,000, which exceeds PennDOT requirements).

- Case 5 consisted of a 20 feet high wall, 3,898 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 77% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 3,118 > 2,000, which exceeds PennDOT requirements).

- Case 6 is the abatement proposed of NSA 13 and consisted of a shortened 12 to 20 feet high wall, 2,659 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 74% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,997 < 2,000, which meets PennDOT requirements).

NSA 14A (See Figure 14, Figure 15, and Table 16): Sixty-seven of the seventy-four receptors evaluated within this NSA were predicted to have levels that have an increase over existing that are at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following four abatement options were considered for NSA 14A:

- Case 1 consisted of a 20 feet high wall, 4,407 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 90% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,356 < 2000, which meets with PennDOT requirements.

- Case 2 consisted of a 22 feet high wall, 4,407 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 91% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,469 < 2000, which meets with PennDOT requirements.

- Case 3 consisted of an optimized 14 to 22 feet high wall, 4,100 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 90% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,375 < 2000, which meets with PennDOT requirements.

- Case 4 is the abatement proposed of NSA 14A and consisted of a smoothed top, optimized 14 to 26 feet high wall, 4,100 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 90% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,362 < 2000, which meets with PennDOT requirements.

NSA 14B (See Figure 14 and Table 17): Thirty-two of the seventy-four receptors evaluated within this NSA were predicted to have levels that have an increase over existing that at or above 10 dB(A) with the Build Alternative. Following Appendix E, the Calvary Fellowship Church field Equivalent Residential Unit (ERU) is one (1) based on the assumption of usage of two (2) hours per day, 25 persons per day and available 208 days per year. As such, consideration of noise abatement within this NSA was warranted.

The following three abatement options were considered for NSA 14B:

- Case 1 consisted of a 14 feet high wall, 1,897 feet long and was determined to be not feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 18 feet high wall, 1,897 feet long and was determined to be not feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 3 consisted of a 20 feet high wall, 1,897 feet long and was determined to be not feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

NSA 15 (See Figure 16 and Table 18): Thirty-three of the seventy-four receptors evaluated within this NSA were predicted to have levels that have an increase over existing that at or above 10 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was warranted.

The following five abatement options were considered for NSA 15:

- Case 1 consisted of a 14 feet high wall, 4,139 feet long and was determined to be not feasible (≥5 dB(A) insertion loss not provided for ≥50% of impacted receptors).

- Case 2 consisted of a 16 feet high wall, 4,139 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 64% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved but square footage per benefited receptor SF/BR 2,136 > 2,000, which exceeds PennDOT requirements).

- Case 3 consisted of an 18 feet high wall, 4,139 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 85% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,862 < 2,000, which meets PennDOT requirements).

- Case 4 consisted of a 20 feet high wall, 4,139 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 88% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,971 < 2,000, which meets PennDOT requirements).

- Case 5 is the abatement proposed of NSA 15 and consisted of a shortened 20 feet high wall, 3,634 feet long and was determined to be feasible (≥5 dB(A) insertion loss provided for 88% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 1,723 < 2,000, which meets PennDOT requirements).

NSA 16 (See Figure 17 and Table 19): None of the twenty receptors evaluated within this NSA were predicted to have levels at or above 66 dB(A) with the Build Alternative. As such, consideration of noise abatement within this NSA was not warranted.

Parallel Barrier Noise Analyses

Recommended noise barriers were reviewed according to PennDOT noise, the guidelines state that "Absorptive-faced sound barriers will be analyzed for parallel barrier configurations where the ratio of distance between the barriers to barrier-height is less than 10:1".

Analyses were conducted to determine if there would be a need for absorptive material when considering the effects of multiple sound reflections between the recommended sound barriers at two locations containing sets of parallel barriers.

NSAs 14A and 15 (See Table 20): The recommended NSA 14A barrier is 4,100 feet in length, has an average height of 22 feet, and is located west of the SR 61 connector. The NSA 15 barrier is 3,634 feet in length, has an average height of 20 feet, and is located east of the SR 61 connector. Since such a condition has the potential to degrade the effectiveness of one or both of the barriers, four cross-sections were chosen in order to calculate the barrier height to separation ratio. However, since ratios of these four (4) sections fell below 10:1, it was decided to perform an in-depth analysis of these sections using the parallel barrier subroutine within the FHWA TNM. The analysis indicated that the degradation would range from 2.2 to 4.4 dB(A) for the receivers adjacent to the noise barriers. These values were consistent with those discussed in FHWA documentation which indicates that such degradation is not acceptable. Since predicted degradations approach and exceed 3 dBA, the application of absorptive barriers is warranted for the recommended noise barriers for NSA 14A and 15.

Undeveloped Lands

Six (6) areas of "representative" undeveloped land were assessed for this study. Noise modeling at these six areas indicate that future design year Build Alternative noise levels are projected to approach the Activity Category B (residential) NAC of 66 dBA at a distance extending approximately 120 feet within NSA 2, 225 feet within NSA 4, 143 feet within NSA 7, 325 feet within NSA 8, 112 feet within NSA 11 and 265 feet within NSA 14A from the proposed edge-of-shoulder of the roadway alignment. All noise level projections for future design year Build Alternative noise levels fall below the Activity Category E (Commercial/Industrial) NAC of 71 dBA; therefore, no impacts would be anticipated to developing residential, commercial, or industrial land uses within the design period.

Construction Noise Considerations

It is recognized that construction, while temporary in nature, will result in increased noise levels during certain periods and at certain locations. The possibility of developing construction noise specifications and/or special provisions related to construction time

periods, duration of construction activities, types of construction equipment, and/or equipment noise levels will be considered if desired by Monroe Township and Shamokin Dam Borough. Noise during construction has been discussed with both municipalities; however, to date, no specific direction has been received.

Conclusion

Based on the analysis of noise reported herein, noise impacts exist within most NSAs. Based on the evaluation of the noise levels associated with the engineering plans developed to date, noise barriers were determined to be feasible and reasonable for NSAs 1, 7, 13, 14A and 15.

Final design noise abatement public meetings will be conducted after the draft version of the Final Design Highway Traffic Noise Report is approved by EPDS and FHWA. The viewpoints of residents and property owners will be solicited as part of the public involvement process. Both property owners and renters of the receptor units that are benefited by highway traffic noise may vote on whether they are in favor of the proposed noise wall. Of all the votes tallied, 50% or greater must be in favor of the proposed noise barrier in order for the noise barrier to be considered reasonable. They will also vote upon the material and style of the wall on the non-highway side.

During the final design phase, a detailed optimization of barrier length, height, cost and location was conducted with the final design engineering process to insure compatibility and the most cost-effective and efficient barrier design. PennDOT is committed to construction of the feasible and reasonable noise abatement measures discussed above contingent upon the community input regarding desires, types, height, and location, as well as aesthetic considerations.

TABLES

Table 1 Hourly Weighted Sound Levels dB(A) For Various Land Use Activity Categories*		
Land Use Activity Category	Leq(h)	Description of Land Use Activity Category
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	67 (exterior)	Residential
C	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	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.

* PennDOT has chosen to use Leq(h) [not L10(h)] on all of its transportation improvement projects.

Table 2.1
Sound Level Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurent Traffic Counts							Measured Leq (dB)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M1-1	501 Old Trail Rd	9.12.16	9:33am	11/15 NB	495	6	27	0	0	528	57.7
				11/15 SB	699	16	37	0	0	752	
M1-2	553 Old Trail Rd	9.12.16	9:33am	11/15 NB	445	6	27	0	0	478	61.1
				11/15 SB	699	16	37	0	0	752	
M2-1A	Comfort Inn 613 N. Susquehanna Trail (pool)	9.12.16	10:10am	11/15 NB	492	54	30	0	0	576	60.7
				11/15 SB	822	39	105	0	0	966	
				522 EB	186	10	6	0	0	202	
				522 SB	266	13	41	1	0	321	
M2-1B	Comfort Inn 613 N. Susquehanna Trail	9.12.16	10:10am	11/15 NB	492	54	30	0	0	576	57.1
				11/15 SB	822	39	105	0	0	966	
				522 EB	186	10	6	0	0	202	
				522 SB	266	13	41	1	0	321	
M2-B1	723 S. Old Trail	03.27.19	11:24am	11/15 NB	118	7	34	0	0	159	57.2
				11/15 SB	121	6	40	0	0	167	
M2-B4	765 S. Old Trail	03.27.19	11:05am	11/15 NB	118	7	34	0	0	159	48.0
				11/15 SB	121	6	40	0	0	167	
M3-1	502 Airport Rd	9.13.16	7:54am	Airport Rd NB	162	0	0	6	0	168	60.7
				Airport Rd SB	48	0	0	0	0	48	
M3-2	1 Airport Rd	9.13.16	7:54am	Airport Rd NB	162	0	0	6	0	168	46.6
				Airport Rd SB	48	0	0	0	0	48	
M4-1	525 Mill Rd (Heimbach Farm Residence)	9.14.16	8:02am	Airport Rd NB	132	0	3	3	0	138	64.3
				Airport Rd SB	210	0	0	0	0	210	
				Mill Rd EB	117	6	3	0	0	126	
				Mill Rd WB	252	0	0	0	0	252	
M4-2	86 Airport Rd. (Heimbach Farm)	9.12.16	8:01am	Airport Rd NB	132	0	3	3	0	138	65.9
				Airport Rd SB	210	0	0	0	0	210	
				Mill Rd EB	117	6	3	0	0	126	
				Mill Rd WB	252	0	0	0	0	252	
M4-B12	69 Oakmont Ct	03.27.19	12:00pm	Mill Rd	120	0	1	0	1	122	49.9
				App Rd	57	2	3	0	1	63	
M5-1	337 Penns Dr.	9.14.16	2:03pm	Penns Dr NB	33	0	0	0	0	33	59.0
				Penns Dr SB	24	0	0	0	0	24	
M5-2	402 Penns Dr.	9.14.16	2:01pm	Penns Dr NB	20	0	0	1	0	21	48.3
				Penns Dr SB	21	0	0	0	0	21	
M5-3	494 Penns Dr (The Polcyn's)	9.14.16	1:33pm	Penns Dr NB	33	3	0	0	0	36	47.9
				Penns Dr SB	24	0	0	0	0	24	

Table 2.2
Sound Level Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurent Traffic Counts							Measured Leq (dB)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M5-4	730 Attig Rd	9.14.16	1:33pm	Attig Rd	5	0	0	0	0	5	45.4
M5-5	700 Penns Dr	9.14.16	1:02pm	Penns Dr NB	17	2	0	0	0	19	44.6
				Penns Dr SB	16	1	0	0	0	17	
M5-6	844 Penns Dr (offset)	9.14.16	1:02pm	Penns Dr NB	17	2	0	0	0	19	44.3
				Penns Dr SB	16	1	0	0	0	17	
M6-1	End of Limerick cul-de-sac (future development)	9.14.16	11:22am	Background							48.2
M6--2	44 Kingswood Dr	9.14.16	12:22pm	Background							45.9
M6-3	38 Kingswood Dr	9.14.16	12:22pm	Background							40.9
M6-B34	299 Attig Rd	03.27.19	12:42pm	Background							52.0
M7-2	167 Municipal Dr (Selinsgrove Municipal Fields)	9.14.16	8:42am	Background							44.2
M7-3	5539 Park Rd	9.14.16	3:45pm	Fisher Rd NB	117	0	0	12	0	129	58.0
				Fisher Rd SB	99	0	0	9	0	108	
				Park Rd NB	42	0	0	0	6	48	
				Park Rd SB	21	3	0	3	1	28	
M7-4	5553 Park Rd	9.14.16	3:51pm	Park Rd NB	42	0	0	0	6	48	44.8
				Park Rd SB	15	0	0	9	0	24	
M7-5	Fisher Rd	9.14.16	3:14pm	Fisher Rd NB	114	0	0	3	3	120	58.8
				Fisher Rd SB	87	6	0	6	0	99	
M7-6	272 Morning Star Dr (possible take for drainage bed)	9.14.16	3:10pm	Fisher Rd NB	87	3	3	3	0	96	45.4
				Fisher Rd SB	81	0	0	3	3	87	
M8-2	446 Fisher Rd	9.14.16	2:37pm	Fisher Rd NB	87	2	0	0	0	89	49.0
				Fisher Rd SB	63	3	0	0	6	72	
M8-3	(Undelveloped Lot) at the time of noise measurement in 2016	9.14.16	2:39pm	Fisher Rd NB	87	2	0	0	0	89	44.0
				Fisher Rd SB	63	3	0	0	6	72	
M9-1	1109 Stetler Rd	9.14.16	12:10pm	Stetler NB	15	0	0	0	0	15	45.8
				Stetler SB	6	0	0	0	0	6	
M9-2	759 11th Ave	9.14.16	11:26am	11th Ave NB	18	0	0	0	0	18	58.8
				11th Ave SB	33	0	0	0	0	33	
M9-3	23 Miller Dr	9.14.16	11:26am	11th Ave NB	18	0	0	0	0	18	40.4
				11th Ave SB	33	0	0	0	0	33	
M10.-1	955 11th Ave	9.14.16	12:01pm	11th Ave NB	54	3	6	0	0	63	59.9
				11th Ave SB	42	0	0	0	0	42	
M11-1	1823 Sunbury Rd	9.15.16	7:58am	Sunbury Rd EB	3	0	6	0	0	9	44.6
				Sunbury Rd WB	18	0	3	0	0	21	

Table 2.3
Sound Level Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurent Traffic Counts							Measured Leq (dB)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M11-2	1862 Sunbury Dr.	9.15.16	8:02am	11/15 NB	447	6	57	6	9	525	55.0
				11/15 SB	477	18	51	12	3	561	
				Sunbury Rd EB & WB	21	0	9	0	0	30	
M11-3	1713 Sunbury Rd	9.15.16	6:14pm	Sunbury Rd EB	6	0	0	0	0	6	40.7
				Sunbury Rd WB	9	0	0	0	0	9	
M12-1	6577 US 15	9.13.16	1:07pm	11th Ave NB	474	36	45	15	3	573	54.3
				11th Ave SB	429	9	54	0	3	495	
M12-2	6570 US 15	9.13.16	1:07pm	11th Ave NB	474	36	45	15	3	573	62.6
				11th Ave SB	429	9	54	0	3	495	
M13-1	110 Granger Rd	9.13.16	4:40pm	11/15 NB	618	18	60	3	9	708	45.8
				11/15 SB	624	21	24	2	0	671	
M13-2	1164 Granger Rd	9.13.16	4:40pm	11/15 NB	618	18	60	3	9	708	46.1
				11/15 SB	624	21	24	2	0	671	
M13-3	20 Mark Dr	9.13.16	2:05pm	11/15 NB	537	27	27	3	3	597	44.0
				11/15 SB	489	24	24	1	0	538	
M13-4	16 Mark Dr	9.13.16	2:01pm	11/15 NB	537	27	27	3	3	597	52.7
				11/15 SB	489	24	24	1	0	538	
M13-5	15 Mark Dr	9.13.16	2:46pm	11/15 NB	450	27	51	0	6	534	45.5
				11/15 SB	516	12	51	12	12	603	
M13-6	11 Mark Dr	9.13.16	3:19pm	11/15 NB	432	9	39	3	0	483	45.2
				11/15 SB	465	9	36	6	3	519	
M13-7	13 Mark Dr	9.13.16	3:05pm	11/15 NB	432	9	39	3	0	483	44.4
				11/15 SB	465	9	36	6	3	519	
M13-8	9 Mark Dr	9.13.16	3:36pm	11/15 NB	510	21	36	0	9	576	45.0
				11/15 SB	630	36	18	9	9	702	
M14-1	18 Weatherfield Dr (2300' away from closest existing roadway)	9.13.16	11:46am	11/15 NB	1119	33	144	15	3	1314	46.6
				11/15 SB	765	27	135	12	9	948	
				OFF RAMP WB	558	27	9	0	6	600	
				ON RAMP EB	123	3	9	0	3	138	
M14-2	Between 19 &15 Weatherfield Dr (2300' away from closest existing roadway)	9.13.16	11:46am	11/15 NB	1119	33	144	15	3	1314	45.7
				11/15 SB	765	27	135	12	9	948	
				OFF RAMP WB	558	27	9	0	6	600	
				ON RAMP EB	123	3	9	0	3	138	
M14-3	40 West 8th Ave	9.13.16		11/15 NB	1068	42	144	15	3	1272	45.9
				11/15 SB	924	60	120	9	9	1122	
				OFF RAMP WB	462	15	21	0	24	522	
				ON RAMP EB	180	9	21	0	6	216	
M14-4	Between 24 & 26 West 8th Ave	9.13.16	10:19am	11/15 NB	1053	63	15	18	3	1152	44.2
				11/15 SB	762	18	99	6	0	885	
				OFF RAMP WB	465	12	21	0	0	498	
				ON RAMP EB	117	15	6	0	0	138	

Table 2.4
Sound Level Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurent Traffic Counts							Measured Leq (dB)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M14-5	16 8th Ave	9.13.16	9:40am	11/15 NB	957	48	126	15	9	1155	46.6
				11/15 SB	660	33	114	3	0	810	
				OFF RAMP WB	552	15	9	0	3	579	
				ON RAMP EB	138	3	9	0	6	156	
M14-6	12 8th Ave	9.13.16	9:33am	11/15 NB	957	48	126	15	9	1155	50.1
				11/15 SB	660	33	114	3	0	810	
				OFF RAMP WB	552	15	9	0	3	579	
				ON RAMP EB	138	3	9	0	6	156	
M14-7A	Econolodge, 3249 Susequehanna Trail	9.13.16	7:08am	11/15 NB	1113	33	126	9	9	1290	55.3
				11/15 SB	996	36	138	12	3	1185	
M14-7B	Econolodge, 3249 Susequehanna Trail	9.13.16	7:08am	11/15 NB	1113	33	126	9	9	1290	56.1
				11/15 SB	996	36	138	12	3	1185	
M15-1	41 Jonathan Rd	9.12.16	3:43pm	11/15 NB	786	33	84	12	12	927	44.8
				11/15 SB	1281	75	117	9	3	1485	
				OFF RAMP WB	564	6	12	0	0	582	
				ON RAMP EB	234	12	6	0	0	252	
M15-2	27 Jonathan Rd	9.12.16	3:09pm	11/15 NB	675	36	117	0	3	831	51.9
				11/15 SB	909	36	123	6	9	1083	
				OFF RAMP WB	567	24	12	0	6	609	
				ON RAMP EB	222	12	15	9	3	261	
M15-3	102 5th Ave	9.12.16	2:40pm	11/15 NB	756	33	117	12	18	936	58.7
				11/15 SB	1056	60	108	9	6	1239	
				OFF RAMP WB	501	15	18	0	6	540	
				ON RAMP EB	216	21	12	3	0	252	
M15-4	120 Main St	9.12.16	2:40pm	11/15 NB	756	33	117	12	18	936	60.4
				11/15 SB	1056	60	108	9	6	1239	
				OFF RAMP WB	501	15	18	0	6	540	
				ON RAMP EB	216	21	12	3	0	252	
M16-1	22 Rome Ct	9.12.16	4:23pm	11th Ave NB	783	9	114	3	0	909	47.6
				11th Ave SB	1023	36	34	3	6	1102	
M16-2	30 Rome Ct	9.12.16	4:23pm	11th Ave NB	783	9	114	3	0	909	45.1
				11th Ave SB	1023	36	34	3	6	1102	
M16-3	36 Rome Ct	9.12.16	4:55pm	11th Ave NB	816	48	96	0	9	969	42.8
				11th Ave SB	1386	48	186	0	21	1641	
M17-1	2 Helen St	9.12.16	12:31pm	11/15 NB	738	24	144	12	6	924	60.4
				11/15 SB	1086	60	129	0	1	1276	
				8th Ave SB	42	1	1	0	0	44	
				8th Ave NB	65	0	0	0	2	67	
M17-2	28 Helen St	9.12.16	12:58am	11/15 NB	819	54	105	0	6	984	56.2
				11/15 SB	939	36	150	3	15	1143	
				61 EB on ramp	573	33	15	0	15	636	
				61 EB	225	0	5	1	0	231	
				61 WB off ramp	111	0	6	6	0	123	
				61 WB	444	15	1	0	0	460	

Table 2.5
Sound Level Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period	Hourly Traffic Based on Concurent Traffic Counts							Measured Leq (dB)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M17-3	44 Helen St	9.12.16	11:56am	11/15 NB	840	30	144	0	0	1014	55.1
				11/15 SB	930	33	147	0	0	1110	
				61 EB on ramp	444	0	12	0	3	459	
				61 EB	201	15	15	0	0	231	
				61 WB off ramp	141	0	9	0	0	150	
				61 WB	558	30	15	0	0	603	
M17-4	47 Helen St	9.12.16	11:25am	11/15 NB	750	30	78	0	6	864	56.2
				11/15 SB	822	54	168	0	0	1044	
				61 EB on ramp	420	0	30	0	9	459	
				61 EB	195	15	8	3	3	224	
				61 WB off ramp	120	0	24	0	3	147	
				61 WB	447	15	27	0	0	489	
M17-5	Jack H. Treas Park (Recreational Park)	9.12.16	11:26am	11/15 NB	750	30	78	0	6	864	49.4
				11/15 SB	822	54	168	0	0	1044	
				61 EB on ramp	420	0	30	0	9	459	
				61 EB	195	15	8	3	3	224	
				61 WB off ramp	120	0	24	0	3	147	
				61 WB	447	15	27	0	0	489	
M17-6	Helen St Cemetary	9.12.16	11:54am	11/15 NB	840	30	144	0	0	1014	48.2
				11/15 SB	930	33	147	0	0	1110	
				61 EB on ramp	444	0	12	0	3	459	
				61 EB	201	15	15	0	0	231	
				61 WB off ramp	141	0	9	0	0	150	
				61 WB	558	30	15	0	0	603	

Table 3.1
Measurements Validation

Site ID Number	Address of Measurement Site	TNM Model Calibration Noise Levels in dBA			Explanation of Non-Calibrated Sites
		Modeled Leq(h)	Measured Leq	Difference	
M1-1	501 Old Trail Rd	58.1	57.7	0.4	
M1-2	553 Old Trail Rd	62.3	61.1	1.2	
M2-1A	Comfort Inn 613 N. Susquehanna Trail (pool)	59.9	60.7	-0.8	
M2-1B	Comfort Inn 613 N. Susquehanna Trail	55.7	57.1	-1.4	
M2-B1	723 S. Old Trail	57.7	57.2	0.5	
M2-B4	765 S. Old Trail	48.2	48.0	0.2	
M3-1	502 Airport Rd	60.3	60.7	-0.4	
M3-2	1 Airport Rd	47.2	46.6	0.6	
M4-1	525 Mill Rd (Heimbach Farm Residence)	61.1	64.3	-3.2	This is a very active working Dairy farm, with cows mooing, golf carts & four wheelers transporting employees around and compressors and various other machinery etc. operating intermittenly
M4-2	86 Airport Rd. (Heimbach Farm)	62.6	65.9	-3.3	
M4-B12	96 Oakmont Ct	49.6	49.9	-0.3	
M5-1	337 Penns Dr	57.1	59.0	-1.9	
M5-2	402 Penns Dr	47.7	48.3	-0.6	
M5-3	494 Penns Dr (The Polcyn's)	47.2	47.9	-0.7	
M5-4	730 Attig Rd	40.6	45.4	-4.8	Notes on Data Sheet indicate an abundance of cicada noise and leaves rustling in the trees, as well as birds chirping in the area. Also air conditioning units as well as dogs barking off and on troughout the readings increased noise levels.
M5-5	700 Penns Dr	38.9	44.6	-5.7	
M5-6	844 Penns Dr (offset)	34.6	44.3	-9.7	
M6-1	494 Penns Dr (The Polcyn's)	47.2	47.9	-0.7	the site was an Undelveloped Lot at the time of noise measurement in 2016, but it was developed later. Hence added as a validation site.
M6-B34	299 Attig Rd	45.9	52.0	-6.1	Notes on Data Sheets indicate neighbors dog barking
M7-3	5539 Park Rd	60.5	58.0	2.5	
M7-4	5553 Park Rd	48.7	44.8	3.9	Notes on Data Sheet indicates insect noise (Cicadas) Helicopter & plane flyovers,

Table 3.2
Measurements Validation

Site ID Number	Address of Measurement Site	TNM Model Calibration Noise Levels in dBA			Explaination of Non-Calibrated Sites
		Modeled Leq(h)	Measured Leq	Difference	
M7-5	Fisher Rd (Take)	60.2	58.8	1.4	
M7-6	272 Morning Star Dr (possible take for drainage bed)	44.2	45.4	-1.2	
M8-2	446 Fisher Rd	50.9	49.0	1.9	
M8-3	(Undelveloped Lot) at the time of noise measurement in 2016	41.3	44.0	-2.7	
M9-1	1109 Stetler Rd	45.8	45.8	0.0	
M9-2	759 11th Ave	56.2	58.8	-2.6	
M9-3	23 Miller Dr	39.2	40.4	-1.2	
M10-1	955 11th Ave	60.7	59.9	0.8	
M11-1	1823 Sunbury Rd	44.7	44.6	0.1	
M11-2	1862 Sunbury Dr	56.4	55.0	1.4	
M11-3	1713 Sunbury Rd	35.6	40.7	-5.1	Notes on Data Sheet indicates birds chirping and distant dog barking
M12-1	6577 US 15	55.6	54.3	1.3	
M12-2	6570 US 15	62.9	62.6	0.3	
M13-1	110 Granger Rd	45.7	45.8	-0.1	
M13-2	1164 Granger Rd	46.7	46.1	0.6	
M13-3	20 Mark Dr	44.4	44.0	0.4	
M13-4	16 Mark Dr	45.2	52.7	-7.5	Notes on Data Sheet indicates AC unit kicking on, helicopter flyover, dog barking inside, can hear highway in distance
M13-5	15 Mark Dr	42.7	45.5	-2.8	
M13-6	11 Mark Dr	44.7	45.2	-0.5	
M13-7	13 Mark Dr	42.3	44.4	-2.1	
M13-8	9 Mark Dr	44.6	45.0	-0.4	

Table 3.3
Measurements Validation

Site ID Number	Address of Measurement Site	TNM Model Calibration Noise Levels in dBA			Explaination of Non-Calibrated Sites
		Modeled Leq(h)	Measured Leq	Difference	
M14-1	18 Weatherfield Dr (2300' away from closest existing roadway)	39.7	46.6	-6.9	Notes on Data Sheet indicates wind in trees, insect noise (cicadas) and leave rustling
M14-2	Between 19 &15 Weatherfield Dr (2300' away from closest existing roadway)	39.1	45.7	-6.6	Notes on Data Sheet indicates construction noise at mulitple buildings, birds chirping & wind gusts
M14-3	40 West 8th Ave	41.6	45.9	-4.3	Notes on Data Sheet indicates dogs inside barking, construction on municipal building, wind in trees
M14-4	Between 24 & 26 West 8th Ave	44.3	44.2	0.1	
M14-5	16 8th Ave	47.4	46.6	0.8	
M14-6	12 8th Ave	49.1	50.1	-1.0	
M14-7A	Econolodge, 3249 Susequehanna Trail	57.8	55.3	2.5	
M14-7B	Econolodge, 3249 Susequehanna Trail	56.3	56.1	0.2	
M15-1	41 Jonathan Rd	45.6	44.8	0.8	
M15-2	27 Jonathan Rd	50.5	51.9	-1.4	
M15-3	102 5th Ave	52.8	58.7	-5.9	Notes on Data Sheet indicates slow bassby of helicopter flyover, intermitten dog barking loudly inside residence
M15-4	120 Main St	61.8	60.4	1.4	
M16-1	22 Rome Ct	39.5	47.6	-8.1	Notes on Data Sheet indicates Pedestrian walk by talking on cell, boy on dirt bike passed meter and into woods several times, kids heard playing
M16-2	30 Rome Ct	41.4	45.1	-3.7	Notes on Data Sheet boy on dirt bike passed meter and into woods several times, dog barking in backyard
M16-3	36 Rome Ct	44.8	42.8	2.0	
M17-1	2 Helen St	62.0	60.4	1.6	
M17-2	28 Helen St	59.0	56.2	2.8	
M17-3	44 Helen St	56.5	55.1	1.4	
M17-4	47 Helen St	53.8	56.2	-2.4	
M17-5	Jack H. Treas Park (Recreational Park)	51.8	49.4	2.4	
M17-6	Helen St Cemetary	53.6	48.2	5.4	Notes on Data Sheet indicates Resident raking leaves nearby

Table 4. NSA 1
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 10' Barrier		Case2: 12' Barrier		Case 3: 14' Barrier		Case 4: 16' Barrier		Case 5: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 1	R1-1 (M1-1)	1	59	63	4	60	3	60	4	59	4	59	4	60	3
	R1-2 (M1-2)	1	63	66	4	61	5	61	6	60	6	60	6	61	5
	R1-3	1	61	66	5	60	6	59	7	59	7	58	8	59	7
	R1-4	1	60	65	5	59	6	59	7	58	7	58	8	59	6
	R1-5	1	58	63	5	60	3	59	4	59	4	59	4	60	3
	R1-6	1	57	62	5	60	2	59	3	59	3	59	3	60	2
	R1-7	1	57	61	5	59	2	59	2	59	3	59	3	59	2
	R1-8	1	56	60	4	59	1	58	2	58	2	58	2	59	1
	R1-9	1	55	59	4	57	1	57	2	57	2	57	2	57	1
	R1-10	1	59	62	4	61	2	60	2	60	2	60	2	61	2
	R1-11	1	61	63	3	62	1	62	1	62	1	62	1	62	1
	R1-12	1	55	57	2	57	1	56	1	56	1	56	1	57	1
	R1-13	1	57	59	1	58	0	58	1	58	1	58	1	58	1
	R1-14	1	51	57	6	56	0	56	1	56	1	56	1	56	0
	R1-15	1	64	65	1	65	0	65	0	65	0	65	0	65	0
FHWA TNM Results															
Number of Impacted Receptors				2		2		2		2		2		2	
Feasibility Evaluation															
Impacted Receptors receiving≥ 5 dB Insertion Loss (I.L.)							2		2		2		2		2
Percent of Impacted Receptors Receiving≥ 5 dB I.L.							100%		100%		100%		100%		100%
Is this percentage≥ 50%?; If yes, barrier is feasible.							**Yes**		**Yes**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation															
Number of Non-impacted receptors receiving≥ 5 dB I.L. (Benefited Receptors)							1		1		1		1		1
Total Number of receptors receiving≥ 5 dB I.L. (Benefited Receptors)							3		3		3		3		3
Number of receptors receiving≥ 7 dB I.L. (Meeting NRDG)							0		2		2		2		1
Does at least one Benefited Receptor Receive≥ 7 dB I.L.?							**No**		**Yes**		**Yes**		**Yes**		**Yes**
Barrier Height (feet)							10		12		14		16		10 to 14
Barrier Length (feet)							777		777		777		777		595
Barrier square footage (SQft)							5699		7254		8808		10363		5557
Barrier square footage per benefited receptor (SF/BR)							1900		2418		2936		3454		1852
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable							**No**		**No**		**No**		**No**		**Yes**
Average I.L. per Benefited Receptor (dB)															6
															Recommended Barrier

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 4 _ NSA 1
Smoothed Top Barrier

	STA	X	y	Z	Barrier Height Modeled	Top Barrier Elevation	Smoothed Top Barrier Elevation	Barrier Height Proposed
NSA 1	24+00.2810	2,217,142.80	238,270.40	462.1	10	472	**473**	11
	24+99.9128	2,217,201.50	238,190.80	459.5	12	472	**472**	13
	26+00.2052	2,217,257.50	238,108.50	456.9	12	469	**469**	12
	26+99.7193	2,217,309.80	238,024.70	454.3	12	466	**467**	13
	28+00.0432	2,217,358.80	237,938.00	451.8	12	464	**464**	12
	28+99.9456	2,217,404.50	237,850.00	448	14	462	**462**	14
	30+00.0997	2,217,446.30	237,759.80	446	14	460	**460**	14

Table 5. NSA 2
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)	
				Future Build No-Barrier	
				Noise Level dB(A)	I.O.E dB
NSA 2	R2-1A (M2-1A) Hotel	1	60	65	4
	R2-1B (M2-1B) Hotel	1	57	66	9
	R2B-1	1	56	59	3
	R2B-2	1	55	58	4
	R2B-3	1	54	58	4
	R2B-4	1	53	57	4
	R2B-5	1	52	56	4
	R2B-6	1	56	59	3

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

All noise levels were calculated to the tenth of a dB(A), then rounded for presentation purposes.

Table 6. NSA 3
Preferred Alternative
Summary of Barrier Noise Analysis

NSAs	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)									
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 18' Barrier		Case 4: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 3	R3-1 (M3-1)	1	62	64	2	64	0	64	1	64	1	64	1
	R3-2 (M3-2)	1	49	64	15	60	4	58	6	57	7	58	7
	R3-3	1	59	62	3	61	1	61	1	61	2	61	1
	R3-4	1	61	68	7	64	4	64	5	64	5	64	5
FHWA TNM Results													
Number of Impacted Receptors				2		2		2		2		2	
Feasibility Evaluation													
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							0		2		2		2
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							0%		100%		100%		100%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation													
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									0		0		0
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									2		2		2
Number of receptors receiving ≥ 7 dB I.L. (Meeting NRDG)									0		1		1
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?									**No**		**Yes**		**Yes**
Barrier Height (feet)									14		18		10 to 18
Barrier Length (feet)									3668		3668		2614
Barrier square footage (SQft)									51358		66031		43276
Barrier square footage per benefited receptor (SF/BR)									25679		33016		21638
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable									**No**		**No**		**No**
Average I.L. per Benefited Receptor (dB)													

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 7. NSA 4
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)									
				Future Build No-Barrier		Case 1: 10' Barrier		Case 12 14' Barrier		Case 3: 18' Barrier		Case 4: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 4	R4-1 (M4-1)	1	58	67	10	65	2	64	3	64	3	64	3
	R4-2 (M4-2)	1	63	69	6	68	0	68	0	68	0	68	0
	R4-3	1	54	65	11	63	1	63	2	62	2	62	3
	R4-4	1	56	65	8	64	1	63	1	63	2	63	2
	R4-5	1	61	65	4	65	0	65	1	65	1	65	1
	R4-6	1	61	65	4	65	0	65	0	65	0	65	1
	R4-7	1	61	64	4	64	0	64	0	64	0	64	0
	R4-8	1	55	64	8	63	1	62	2	62	2	62	2
	R4-9	1	53	60	7	59	1	58	2	58	2	58	2
	R4-10	1	53	59	6	58	1	58	1	58	1	58	1
	R4B-1	1	54	64	10	62	2	61	3	61	4	61	4
	R4B-2	1	52	64	12	62	2	61	3	61	4	60	4
	R4B-3	1	52	58	5	57	0	57	1	57	1	57	1
	R4B-4	1	61	65	4	65	0	65	0	65	0	65	0
	R4B-5	1	61	64	4	64	0	64	0	64	0	64	0
	R4B-6	1	61	64	4	64	0	64	0	64	0	64	0
	R4B-7	1	61	65	4	65	0	65	0	65	0	65	0
	R4B-8	1	62	65	4	65	0	65	0	65	0	65	0
	R4B-9	1	56	62	6	62	0	62	0	62	0	62	0
	R4B-10	1	46	55	9	54	1	52	3	52	3	52	3
	R4B-11	1	49	57	8	56	1	54	3	54	3	54	3
	R4B-12	1	49	59	10	57	2	56	4	55	4	55	4
	R4B-13	1	46	59	13	57	2	55	5	54	5	54	5
	R4B-14*	1	45	58	13	55	2	53	5	53	5	52	5
	R4B-15*	1	45	55	10	53	2	52	4	51	4	51	5
	R4B-16*	1	45	55	10	53	2	52	4	51	4	51	4
	R4B-17*	1	45	55	10	53	2	51	4	51	4	51	4
	R4B-18	1	45	55	10	54	1	53	2	53	3	53	3
	R4B-19	1	54	61	7	61	0	60	0	60	1	60	1
	R4B-20	1	48	56	7	55	1	54	2	54	2	54	2
	R4B-21	1	49	55	6	55	1	54	1	54	2	54	2
	R4B-22	1	49	55	6	54	1	54	1	54	1	54	1
	R4B-23	1	49	54	6	54	1	53	1	53	1	53	1
	R4B-24	1	48	54	6	54	1	53	1	53	1	53	1
	R4B-25	1	47	54	7	54	0	53	1	53	1	53	1
	R4B-26	1	45	53	7	52	0	52	1	52	1	52	1
	R4B-27*	1	45	51	6	50	1	50	1	50	1	50	1
	R4B-28*	1	45	49	4	48	1	48	1	48	1	48	1
	R4B-29*	1	45	48	3	47	1	47	1	46	2	46	2
	R4B-30*	1	45	47	2	46	1	46	2	45	2	45	2
	R4B-31*	1	45	46	1	46	1	45	2	45	2	45	2
	R4B-32*	1	45	45	0	45	1	44	2	44	2	44	2
	R4B-33*	1	45	45	0	44	1	44	2	43	2	43	2
	R4B-34*	1	45	46	1	45	1	44	2	44	2	44	2
	R4B-35*	1	45	46	1	45	1	44	2	44	2	44	2
	R4B-36*	1	45	47	2	46	1	45	2	45	2	45	2
	R4B-37*	1	45	48	3	47	1	46	2	46	2	46	2
	R4B-38*	1	45	49	4	48	1	47	2	47	2	47	2
	R4B-39*	1	45	50	5	49	1	49	2	48	2	48	2
	R4B-40*	1	45	51	6	50	1	50	2	49	2	49	2
	R4B-41*	1	45	52	7	51	1	50	2	50	2	50	2
	R4B-42*	1	45	52	7	51	1	50	2	50	2	50	2
	R4B-43*	1	45	53	8	52	1	51	2	50	2	50	2
	R4B-44*	1	45	54	9	52	1	51	3	51	3	51	3
	R4B-45*	1	45	53	8	52	1	51	3	50	3	50	3
	R4B-46*	1	45	53	8	52	2	50	3	50	3	50	4
	R4B-47*	1	45	54	9	52	2	51	4	50	4	50	4
	R4B-48*	1	45	54	9	52	2	50	3	50	4	50	4
	R4B-49*	1	45	52	7	51	1	50	3	50	3	49	3
	R4B-50	1	45	54	9	53	1	52	2	52	2	52	2
	R4B-51*	1	45	53	8	52	1	52	1	51	2	51	2
	R4B-52*	1	45	51	6	50	1	50	1	50	2	50	2
	R4B-53*	1	45	50	5	49	1	48	2	48	2	48	2
	R4B-54*	1	45	49	4	48	1	47	2	47	2	47	2
	R4B-55*	1	45	48	3	47	1	47	2	46	2	46	2
	R4B-56*	1	45	47	2	47	1	46	2	46	2	46	2
	R4B-57*	1	45	47	2	46	1	46	2	45	2	45	2
	R4B-58*	1	45	46	1	46	1	45	2	45	2	45	2

Table 7. NSA 4
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)									
				Future Build No-Barrier		Case 1: 10' Barrier		Case 12 14' Barrier		Case 3: 18' Barrier		Case 4: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 4	R4B-59*	1	45	46	1	45	1	44	2	44	2	44	2
	R4B-60*	1	45	46	1	46	1	45	2	44	2	44	2
	R4B-61*	1	45	47	2	46	1	45	2	45	2	45	2
	R4B-62*	1	45	48	3	47	1	46	2	46	2	45	2
	R4B-63*	1	45	49	4	48	1	47	2	46	2	46	2
	R4B-64*	1	45	50	5	49	2	48	3	48	3	48	3
	R4B-65*	1	45	52	7	50	2	49	3	49	3	48	3
	R4B-66*	1	45	52	7	50	2	49	3	48	3	48	3
	R4B-67*	1	45	52	7	51	2	50	3	49	3	49	3
	R4B-68*	1	45	53	8	51	2	50	3	49	3	49	4
	R4B-69*	1	45	53	8	51	2	50	3	49	4	49	4
	R4B-70*	1	45	52	7	51	1	49	3	49	3	49	3
	R4B-71*	1	45	51	6	50	1	49	3	48	3	48	3
	R4B-72*	1	45	52	7	50	1	49	3	49	3	49	3
	R4B-73*	1	45	52	7	50	1	49	3	49	3	49	3
	R4B-74*	1	45	50	5	49	1	48	2	48	2	48	2
	R4B-75*	1	45	49	4	48	1	47	2	47	2	47	2
	R4B-76*	1	45	49	4	48	1	47	2	47	2	47	2
	R4B-77*	1	45	48	3	47	1	46	2	46	2	46	2
	R4B-78*	1	45	47	2	47	1	46	2	46	2	45	2
	R4B-79*	1	45	50	5	49	1	48	3	47	3	47	3
	R4B-80*	1	45	50	5	49	1	48	2	48	3	48	3
	R4C-1	1	54	64	9	63	1	62	2	62	2	61	2
	R4C-2	1	56	65	9	63	2	62	3	62	3	62	3
FHWA TNM Results													
Number of Impacted Receptors				12		12		12		12		12	
Feasibility Evaluation													
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							0		2		2		3
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							0%		17%		17%		25%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**No**		**No**		**No**
Reasonableness Evaluation													
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)													
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)													
Number of receptors receiving ≥ 7 dB I.L. (Meeting NRDG)													
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?													
Barrier Height (feet)													
Barrier Length (feet)													
Barrier square footage (SQft)													
Barrier square footage per benefited receptor (SF/BR)													
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable													
Average I.L. per Benefited Receptor (dB)													

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)
Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

Table 8. NSA 5
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 12' Barrier		Case 3: 14' Barrier		Case 4: Optimized Barrier		Case 5: Short Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 5	R5-1 (M5-1)	1	59	61	3	58	4	57	4	57	4	57	4	61	1
	R5-2 (M5-2)	1	49	61	12	57	4	56	5	55	5	56	5	60	1
	R5-3 (M5-3)	1	47	58	11	54	4	54	4	53	5	53	5	56	2
	R5-4 (M5-4)	1	45	60	16	55	5	55	6	55	6	55	6	55	6
	R5-5 (M5-5)	1	42	60	18	54	6	54	6	53	7	53	7	53	7
	R5-6 (M5-6)	1	38	58	20	52	6	51	7	50	8	52	6	52	6
	R5-7	1	37	58	21	52	6	51	7	51	8	53	6	52	6
	R5-8	1	48	58	10	53	5	53	6	52	6	53	5	53	5
	R5-9	1	45	60	15	54	6	54	6	54	6	54	6	54	6
	R5-10	1	43	58	15	53	5	52	6	52	6	52	6	52	6
	R5-11	1	46	57	11	53	4	53	4	52	5	52	5	53	4
	R5-12	1	49	61	12	57	4	56	5	55	6	56	5	60	1
	R5-13	1	56	61	5	58	4	57	4	57	4	57	4	61	1
	R5-14	1	58	61	3	59	3	58	3	58	3	59	3	61	1
	R5-15	1	53	57	4	55	2	55	3	54	3	55	3	57	1
	R5-16	1	51	55	4	53	2	53	2	53	2	53	2	54	1
	R5-17	1	51	54	3	52	1	52	2	52	2	52	2	52	2
	R5-18	1	52	58	6	55	4	54	4	54	4	54	4	54	4
	R5-19	1	58	58	1	56	2	56	2	56	2	56	2	56	2
	R5-20	1	45	56	11	51	5	50	6	50	6	50	5	50	5
	R5-21	1	51	56	5	52	4	52	4	52	4	52	4	52	4
	R5-22	1	53	57	4	54	2	54	3	54	3	55	2	55	2
	R5-23	1	54	57	3	55	2	55	2	55	2	55	2	55	2
FHWA TNM Results															
Number of Impacted Receptors				12		12		12		12		12		12	
Feasibility Evaluation															
Impacted Receptors receiving≥ 5 dB Insertion Loss (I.L.)						8		10		12		12		8	
Percent of Impacted Receptors Receiving≥ 5 dB I.L.						67%		83%		100%		100%		67%	
Is this percentage ≥ 50%?; If yes, barrier is feasible.						**Yes**		**Yes**		**Yes**		**Yes**		**Yes**	
Reasonableness Evaluation															
Number of Non-impacted receptors receiving≥ 5 dB I.L. (Benefited Receptors)						0		0		0		0		0	
Total Number of receptors receiving≥ 5 dB I.L. (Benefited Receptors)						8		10		12		12		8	
Number of receptors receiving≥ 7 dB I.L. (Meeting NRDG)						0		2		3		1		1	
Does at least one Benefited Receptor Receive≥ 7 dB I.L.?						**No**		**Yes**		**Yes**		**Yes**		**Yes**	
Barrier Height (feet)								12		14		4 to 18		12 to 18	
Barrier Length (feet)								4672		4672		3653		1441	
Barrier square footage (SQft)								56059		65403		44799		20750	
Barrier square footage per benefited receptor (SF/BR)								5606		5450		3733		2594	
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable								**No**		**No**		**No**		**No**	
Average I.L. per Benefited Receptor (dB)															

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving≥ 5dB(A)
Non-Impacted Receivers receiving≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 9. NSA 6
Preferred Alternative
Summary of Barrier Noise Analysis

	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)							
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 6	R6-1*	1	45	59	14	57	1	57	2	57	2
	R6-2*	1	45	65	20	64	1	63	2	62	3
	R6-3*	1	45	63	18	62	1	62	2	60	3
	R6-4*	1	45	58	13	57	1	57	1	57	1
	R6-5*	1	45	57	12	56	1	56	1	56	1
	R6-6*	1	45	55	10	55	1	55	1	54	1
	R6-7*	1	45	62	17	61	1	60	2	59	2
	R6-8*	1	45	61	16	60	1	60	2	59	2
	R6-9*	1	45	61	16	60	1	60	1	59	2
	R6-10*	1	45	62	17	61	1	60	2	59	2
	R6-11*	1	45	61	16	60	1	60	2	59	2
	R6-12*	1	45	63	18	62	1	61	2	60	3
	R6B-1*	1	45	54	9	53	1	53	1	53	1
	R6B-2*	1	45	53	8	53	1	53	1	53	1
	R6B-3*	1	45	53	8	53	1	52	1	52	1
	R6B-4*	1	45	53	8	53	0	53	1	53	1
	R6B-5	1	45	54	9	54	0	54	0	54	0
	R6B-6	1	49	56	8	56	0	56	0	56	0
	R6B-7	1	47	55	8	55	0	55	0	55	0
	R6B-8*	1	45	61	16	60	1	59	2	59	2
	R6B-9*	1	45	60	15	59	1	59	1	59	2
	R6B-10*	1	45	59	14	59	1	58	1	58	1
	R6B-11*	1	45	59	14	59	1	59	1	58	1
	R6B-12*	1	45	59	14	58	1	58	1	58	1
	R6B-13*	1	45	58	13	57	1	57	1	57	1
	R6B-14*	1	45	57	12	57	1	57	1	56	1
	R6B-15	1	45	57	12	56	0	56	0	56	1
	R6B-16	1	47	57	10	57	0	57	0	56	0
	R6B-17	1	59	64	5	64	0	64	0	64	0
	R6B-18*	1	45	62	17	61	1	61	2	60	3
	R6B-19*	1	45	61	16	60	1	60	2	59	2
	R6B-20*	1	45	60	15	60	1	59	1	59	2
	R6B-21*	1	45	60	15	59	1	59	1	58	1
	R6B-22*	1	45	59	14	58	1	58	1	58	1
	R6B-23*	1	45	57	12	57	1	57	1	57	1
	R6B-24*	1	45	57	12	56	1	56	1	56	1
	R6B-25*	1	45	56	11	56	0	56	1	56	1
	R6B-26*	1	45	56	11	56	0	56	0	56	1
	R6B-27	1	49	58	9	58	0	58	0	57	0
	R6B-28	1	55	62	7	62	0	62	0	62	0
	R6B-29*	1	45	62	17	59	3	59	3	58	4
	R6B-30*	1	45	58	13	57	1	56	2	56	2
	R6B-31*	1	45	57	12	57	1	56	1	56	1
	R6B-32*	1	45	57	12	56	0	56	1	56	1
	R6B-33*	1	45	56	11	55	0	55	1	55	1
	R6B-34*	1	45	55	10	55	0	55	1	55	1
	R6B-35*	1	45	55	10	55	0	55	0	55	0
	R6D-4-1*	1	45	59	14	57	1	57	2	57	2
	R6D-5*	1	45	58	13	57	1	56	1	56	2
	R6D-6*	1	45	57	12	56	1	56	1	56	1
	R6D-7*	1	45	55	10	54	1	54	1	54	1
	R6D-8*	1	45	55	10	54	1	54	1	54	1
	R6D-9*	1	45	54	9	54	0	54	0	54	1
FHWA TNM Results											
Number of Impacted Receptors				42		42		42		42	
Feasibility Evaluation											
Impacted Receptors receiving≥ 5 dB Insertion Loss (I.L.)							0		0		0
Percent of Impacted Receptors Receiving≥ 5 dB I.L.							0%		0%		0%
Is this percentage≥ 50%?; If yes, barrier is feasible.							**No**		**No**		**No**
Reasonableness Evaluation											
Number of Non-impacted receptors receiving≥ 5 dB I.L. (Benefited Receptors)											
Total Number of receptors receiving≥ 5 dB I.L. (Benefited Receptors)											
Number of receptors receiving≥ 7 dB I.L. (Meeting NRDG)											
Does at least one Benefited Receptor Receive≥ 7 dB I.L.?											
Barrier Height (feet)											
Barrier Length (feet)											
Barrier square footage (SQft)											
Barrier square footage per benefited receptor (SF/BR)											
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable											
Average I.L. per Benefited Receptor (dB)											

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

Table 10. NSA 7
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 12' Barrier		Case 2: 14' Barrier		Case 3: Short 16' Barrier		Case 4: Short 12' Barrier		Case 5: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss (dB)	Noise Level dB(A)	Insertion Loss (dB)
NSA 7	R7-02* (M7-02) Athletic Fields	4	45	57	12	53	4	52	4	52	5	56	1	56	1
	R7-03 (M7-03)	1	57	67	11	64	3	64	3	64	3	64	3	64	3
	R7-04 (M7-04)	1	53	66	12	62	4	61	5	61	5	62	4	61	5
	R7-05 (M7-05) TAKE														
	R7-06 (M7-06) TAKE														
	R7-07	1	58	65	7	64	1	64	1	64	1	64	1	64	1
	R7-08	1	54	62	8	61	2	60	2	60	2	61	2	61	2
	R7-09	1	56	64	8	63	2	62	2	62	2	63	2	63	2
	R7-10	1	56	65	10	63	3	63	3	63	3	63	2	63	2
	R7-11	1	61	61	0	55	6	54	7	54	7	55	6	56	6
	R7-12	1	53	63	11	57	7	56	7	56	7	57	7	57	6
	R7-13	1	54	60	6	54	6	53	7	53	7	55	5	55	5
	R7-14	1	53	60	7	54	6	53	7	53	7	55	5	55	5
	R7-15	1	53	61	8	54	7	54	7	53	8	55	6	55	6
	R7-16	1	48	60	12	53	6	53	7	52	7	54	5	54	5
	R7-17	1	46	61	15	54	7	53	8	52	8	54	7	54	7
	R7-18	1	45	61	16	54	7	53	8	53	8	54	7	54	7
	R7-19*	1	45	59	14	53	7	52	7	51	8	54	6	54	5
	R7-20*	1	45	57	12	51	6	51	7	50	7	52	5	52	5
	R7-21	1	49	58	9	52	6	52	6	51	6	53	5	53	5
	R7-22*	1	45	58	13	52	6	51	6	51	7	53	5	53	5
	R7-23*	1	45	58	13	52	6	51	7	51	7	53	5	53	5
	R7-24*	1	45	57	12	51	6	50	7	50	7	52	5	52	5
	R7-25*	1	45	57	12	51	6	50	7	50	7	51	6	51	6
	R7-26*	1	45	60	15	54	6	53	7	53	7	54	6	54	5
	R7-27*	1	45	58	13	54	4	54	4	55	3	55	3	56	2
	R7-28*	1	45	62	17	56	6	55	7	56	7	57	5	58	5
FHWA TNM Results															
Number of Impacted Receptors				21		21		21		21		21		21	
Feasibility Evaluation															
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							13		14		18		13		14
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							62%		67%		86%		62%		67%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**Yes**		**Yes**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation															
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)							4		4		4		4		4
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)							17		18		22		17		18
Number of impacted receptors receiving ≥ 7 dB I.L. (Meeting NRDG)							5		15		16		3		3
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?							**Yes**		**Yes**		**Yes**		**Yes**		**Yes**
Barrier Height (feet)							12		12	15.85	7 to 16		12	11.8	9 to 12
Barrier Length (feet)							5159		5159		3900		2752		2599
Barrier square footage (SQft)							61913		72232		61837		33028		30637
Barrier square footage per benefited receptor (SF/BR)							3642		4013		2811		1943		1702
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable							**No**		**No**		**No**		**Yes**		**Yes**
Average I.L. per Benefited Receptor (dB)													6		5
															Recommended Barrier

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 10 _ NSA 7
Smoothed Top Barrier

	X	y	Z	Barrier Height Modeled	Top Barrier Elevation	Smoothed Top Barrier Elevation	Barrier Height Proposed
NSA 7	2,216,370.30	248,392.60	594.90	12	607	**607**	12
	2,216,417.50	248,410.10	595.15	12	607	**607**	12
	2,216,464.80	248,427.60	595.40	12	607	**607**	12
	2,216,510.50	248,444.60	595.65	12	608	**608**	12
	2,216,556.30	248,461.70	595.90	12	608	**608**	12
	2,216,603.50	248,479.80	596.15	12	608	**608**	12
	2,216,651.00	248,498.00	596.40	12	608	**608**	12
	2,216,697.50	248,515.30	596.65	12	609	**609**	12
	2,216,744.30	248,532.70	596.90	12	609	**609**	12
	2,216,792.00	248,550.50	597.15	12	609	**609**	12
	2,216,840.00	248,568.30	597.40	12	609	**609**	12
	2,216,887.30	248,585.30	597.65	12	610	**610**	12
	2,216,934.50	248,602.50	597.90	12	610	**610**	12
	2,216,980.00	248,620.20	598.15	12	610	**610**	12
	2,217,025.50	248,638.00	598.40	12	610	**640**	42
	2,217,073.00	248,655.40	598.65	12	611	**611**	12
	2,217,120.30	248,672.90	598.90	12	611	**611**	12
	2,217,166.50	248,690.60	599.15	12	611	**611**	12
	2,217,212.50	248,708.40	599.40	12	611	**611**	12
	2,217,259.00	248,725.70	599.65	12	612	**612**	12
	2,217,305.80	248,743.00	599.90	12	612	**612**	12
	2,217,354.00	248,761.10	600.15	12	612	**612**	12
	2,217,402.00	248,779.30	600.40	12	612	**612**	12
	2,217,448.00	248,796.50	600.65	12	613	**613**	12
	2,217,494.30	248,813.70	600.90	12	613	**613**	12
	2,217,539.80	248,831.30	601.30	12	613	**613**	12
	2,217,585.30	248,849.00	601.70	12	614	**614**	12
	2,217,632.50	248,866.80	601.80	12	614	**614**	12
	2,217,679.50	248,884.80	601.90	12	614	**614**	12
	2,217,726.50	248,903.10	602.15	12	614	**614**	12
	2,217,773.50	248,921.50	602.40	12	614	**614**	12
	2,217,820.50	248,938.60	602.65	12	615	**615**	12
	2,217,867.30	248,955.80	602.90	12	615	**615**	12
	2,217,913.50	248,973.30	603.20	12	615	**615**	12
	2,217,960.00	248,990.90	603.50	12	616	**616**	13
	2,218,007.50	249,008.90	604.00	12	616	**616**	12
	2,218,055.00	249,027.00	604.50	12	617	**617**	13
	2,218,101.50	249,044.20	604.75	12	617	**617**	12
	2,218,147.80	249,061.50	605.00	12	617	**617**	12
	2,218,194.00	249,079.00	605.45	12	617	**617**	12
	2,218,240.30	249,096.50	605.90	12	618	**618**	12
	2,218,288.00	249,114.70	606.50	12	619	**619**	13
	2,218,335.50	249,133.00	607.10	12	619	**619**	12
	2,218,381.50	249,150.40	607.70	12	620	**620**	12
	2,218,427.50	249,167.90	608.30	12	620	**620**	12
	2,218,475.00	249,185.20	609.00	12	621	**621**	12
	2,218,522.50	249,202.50	609.70	11	621	**621**	11
	2,218,569.00	249,220.30	610.50	11	622	**622**	12
	2,218,615.50	249,238.10	611.30	11	622	**622**	11
	2,218,662.50	249,255.70	612.15	10	622	**622**	10
	2,218,709.80	249,273.30	613.00	9	622	**622**	9
	2,218,756.00	249,290.80	613.95	9	623	**623**	9
	2,218,802.30	249,308.30	614.90	9	624	**624**	9

Table 11. NSA 8
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)																	
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 12' Barrier		Case 3: 14' Barrier		Case 4: 18' Barrier		Case 5: 20' Barrier		Case 6: Extended 10' Barrier		Case 7: Extended 12' Barrier		Case 8: Extended 14' Barrier		Case 9: Extended 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 8	R8-01 (M8-02)	1	48	62	13	58	4	57	5	57	5	57	5	56	5	57	5	56	6	55	6	55	7
	R8-02* (M8-03)	1	45	66	21	63	3	63	3	63	4	62	4	62	4	61	5	61	5	60	6	60	7
	R8-03	1	50	63	12	58	5	57	5	57	6	57	6	57	6	57	6	56	7	56	7	55	8
	R8-04	1	49	65	16	62	3	62	3	61	4	61	4	61	4	61	4	60	5	60	5	59	6
	R8-05	1	48	63	16	60		60	3	60	4	59	4	59	4	60	4	59	4	59	4	58	5
	R8-06	1	46	62	17	58	4	58	4	58	4	57	5	57	5	58	4	58	4	58	4	57	5
	R8-07*	1	45	65	20	63	3	63	3	62	3	62	3	62	3	61	4	61	5	60	5	60	6
	R8-08*	1	45	64	19	62	2	61	3	61	3	61	3	61	3	60	4	60	4	59	5	59	6
	R8-09*	1	45	62	17	59	3	59	3	59	3	59	3	59	3	57	5	57	5	57	5	56	6
	R8-10	1	56	61	5	59	2	58	3	58	3	58	3	58	3	59	2	58	3	58	3	58	3
	R8-11	1	52	62	10	58	4	58	4	57	5	57	5	57	5	58	4	58	4	57	5	57	5
	R8-12	1	53	60	7	58	2	57	3	57	3	57	3	57	3	57	3	56	4	56	4	56	4
	R8-13	1	51	61	10	59	3	58	3	58	4	58	4	58	4	58	4	57	5	56	5	56	6
	R8-14	1	51	63	13	58	5	58	6	58	6	57	6	57	6	57	6	56	7	56	8	55	8
	R8-15	1	54	59	5	57	2	57	2	56	3	56	3	56	3	57	2	56	3	56	3	56	3
	R8-16*	1	45	62	17	60	2	59	2	59	2	59	3	59	3	58	3	58	4	58	4	57	5
	R8-17*	1	45	61	16	59	2	59	2	58	2	58	3	58	3	56	4	56	5	56	5	55	6
	R8-18*	1	45	61	16	57	4	57	4	57	4	56	5	56	5	57	4	57	4	57	4	56	5
	R8-19	1	45	61	16	58	4	57	4	57	5	56	5	56	5	58	4	57	4	57	5	56	5
	R8-20	1	46	55	9	52	2	52	3	51	3	51	4	51	4	52	2	51	3	51	3	51	4
FHWA TNM Results																					
Number of Impacted Receptors				16		16		16		16		16		16		16		16		16		16	
Feasibility Evaluation																					
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							2		3		5		7		5		5		9		12		16
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							13%		19%		31%		44%		31%		31%		56%		75%		100%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**No**		**No**		**No**		**No**		**No**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation																					
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)																			0		0		0
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)																			9		12		16
Number of receptors receiving ≥ 7 dB I.L. (Meeting NRDG)																			2		2		2
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?																			**Yes**		**Yes**		**Yes**
Barrier Height (feet)																			12		14		20
Barrier Length (feet)																			2534		2534		2534
Barrier square footage (SQft)																			30407		35477		50678
Barrier square footage per benefited receptor (SF/BR)																			3379		2956		3167
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable																			**No**		**No**		**No**
Average I.L. per Benefited Receptor (dB)																							

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 12. NSA 9
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)							
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 16' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 9	R9-1 (M9-1)	1	53	58	5	57	2	56	2	56	3
	R9-2 (M9-2)	1	60	62	2	61	1	61	1	61	1
	R9-3 (M9-3)	1	46	57	11	54	3	52	5	51	5
	R9-4	1	44	59	15	56	3	55	4	54	5
	R9-5	1	59	61	2	60	1	60	1	60	1
	R9-6	1	58	61	3	60	1	59	2	59	2
	R9-7	1	60	62	2	61	1	61	1	61	1
	R9-8	1	60	63	3	61	2	61	2	61	2
	R9-9	1	60	63	3	61	2	61	2	61	2
	R9-10	1	53	57	4	55	2	53	4	53	4
	GR9	1	44	65	21	61	3	60	5	59	6
	GR3	1	48	59	11	55	4	54	5	54	5
FHWA TNM Results											
Number of Impacted Receptors				4		4		4		4	
Feasibility Evaluation											
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							0		3		4
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							0%		75%		100%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**Yes**		**Yes**
Reasonableness Evaluation											
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									0		0
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									3		4
Number of receptors receiving ≥ 7 dB I.L. (Meeting NRDG)									0		0
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?									No		No
Barrier Height (feet)									14		16
Barrier Length (feet)											
Barrier square footage (SQft)											
Barrier square footage per benefited receptor (SF/BR)											
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable											
Average I.L. per Benefited Receptor (dB)											

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 13. NSA 11
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)									
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 18' Barrier		Case 4: 18' Barrier (Extended)	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 11	R11-01* (M11-01)	1	45	66	21	64	3	62	5	59	7	59	7
	R11-02 (M11-02)	1	51	61	10	60	1	59	2	59	2	59	2
	R11-03* (M11-03)	1	45	60	15	59	1	58	2	58	2	56	5
	R11-04*	1	45	62	17	61	1	60	2	58	4	58	5
	R11-05 *	1	45	60	15	59	1	58	2	57	3	56	4
	R11-06*	1	45	59	14	59	1	58	1	58	1	55	5
	R11-07	1	46	59	12	59	0	59	0	59	0	55	3
	R11-08*	1	45	59	14	59	0	59	0	59	0	55	4
	R11-09	1	50	60	10	59	1	59	1	58	1	58	1
	R11-10	1	49	61	12	60	1	59	1	59	2	59	1
	R11-11	1	49	58	9	58	0	58	0	58	0	56	3
	R11-12	1	51	59	8	58	0	58	0	58	0	57	2
	R11-13*	1	45	55	10	55	0	55	0	55	1	52	4
	R11-14	1	50	58	7	58	0	58	0	58	0	56	2
	R11-15	1	46	54	8	54	0	54	0	53	0	52	1
	R11-16*	1	45	56	11	55	0	55	0	55	0	54	2
	R11-17*	1	45	58	13	58	0	58	0	58	0	56	2
	GR-5	1	46	57	11	57	0	57	0	57	0	55	2
	GR-6*	1	45	59	14	59	0	59	0	59	0	57	3
	GR-7*	1	45	59	14	59	0	59	0	59	0	55	4
	GR-13*	1	45	57	12	57	0	57	0	57	0	56	2
	GR14	1	46	57	11	57	0	57	0	57	0	56	1
	GR15	1	50	58	8	58	0	58	0	58	0	58	1
	GR16	1	50	57	7	57	0	57	0	57	0	57	1
	GR17	1	50	57	7	57	0	57	0	57	0	57	1
	GR-18*	1	45	52	7	52	0	52	0	52	0	52	1
FHWA TNM Results													
Number of Impacted Receptors				18		18		18		18		18	
Feasibility Evaluation													
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							0		1		1		4
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							0%		6%		6%		22%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**No**		**No**		**No**
Reasonableness Evaluation													
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)													
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)													
Number of receptors receiving ≥ 7 dB I.L. (Meeting NRDG)													

Table 13. NSA 11
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)									
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 18' Barrier		Case 4: 18' Barrier (Extended)	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?													
Barrier Height (feet)													
Barrier Length (feet)													
Barrier square footage (SQft)													
Barrier square footage per benefited receptor (SF/BR)													
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable													
Average I.L. per Benefited Receptor (dB)													

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 14. NSA 12
Preferred Alternative
Summary of Barrier Noise Analysis

NSAs	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)	
				Future Build No-Barrier	
				Noise Level dB(A)	I.O.E dB
NSA 12	R12-1 (M12-1)	1	54	62	8
	R12-2 (M12-2)	1	64	64	0

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

Noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 15. NSA 13
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)													
				Future Build No-Barrier		Case 1: 10' Barrier		Case 2: 14' Barrier		Case 3: 16' Barrier		Case 4: 18' Barrier		Case 5: 20' Barrier		Case 6: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 13	R13-01* (M13-01)	1	45	63	18	62	1	62	1	61	2	61	2	61	2	63	0
	R13-02 (M13-02)	1	45	62	17	61	2	59	4	58	5	57	6	55	7	56	7
	R13-03* (M13-03)	1	45	61	16	58	3	55	7	54	7	53	8	52	9	52	9
	R13-04* (M13-04)	1	45	65	20	60	5	58	7	57	8	57	8	56	9	56	9
	R13-05* (M13-05)	1	45	61	16	56	4	53	8	52	9	51	9	51	10	51	10
	R13-06 (M13-06)	1	45	64	20	58	6	55	9	55	10	54	10	54	11	54	11
	R13-07* (M13-07)	1	45	62	17	58	5	54	8	54	9	53	10	52	10	53	10
	R13-08 (M13-08)	1	45	62	17	57	5	54	8	54	9	53	9	53	10	53	10
	R13-09*	1	45	59	14	57	3	56	3	56	4	56	4	56	4	59	0
	R13-10*	1	45	59	14	58	1	58	2	58	2	58	2	58	2	59	0
	R13-11*	1	45	61	16	61	1	60	1	60	1	60	2	60	2	61	0
	R13-12*	1	45	59	14	58	1	58	1	58	1	58	1	57	1	59	0
	R13-13*	1	45	57	12	56	0	56	1	56	1	56	1	56	1	56	0
	R13-14*	1	45	60	15	59	1	58	2	57	3	57	3	56	3	57	3
	R13-15*	1	45	62	17	59	3	57	4	57	5	56	6	55	6	55	6
	R13-16*	1	45	61	16	57	3	54	7	53	8	52	8	52	9	52	9
	R13-17*	1	45	60	15	56	4	52	7	52	8	51	9	50	10	51	9
	R13-18*	1	45	62	17	56	6	53	9	52	10	51	11	51	11	51	11
	R13-19*	1	45	64	19	58	7	55	9	55	9	55	10	54	10	54	10
	R13-20	1	45	64	18	57	6	55	9	54	10	54	10	53	11	54	10
	R13-21*	1	45	60	15	56	4	53	7	52	8	51	9	51	9	51	9
	R13-22*	1	45	58	13	55	4	52	6	52	7	51	8	50	8	51	8
	R13-23*	1	45	58	13	55	3	52	6	52	7	51	7	51	8	51	7
	R13-24*	1	45	58	13	56	2	54	4	54	4	54	5	53	5	53	5
	R13-25*	1	45	59	14	57	2	55	3	55	4	54	4	54	5	54	4
	R13-26*	1	45	56	11	54	3	52	4	52	5	52	5	51	5	52	5
	R13-27*	1	45	57	12	53	3	51	5	51	6	50	6	50	7	50	6
	R13-28*	1	45	57	12	53	4	50	6	50	7	49	7	49	8	49	7
	R13-29*	1	45	56	11	53	3	50	6	49	7	49	7	48	8	49	8
	R13-30*	1	45	58	13	54	4	51	7	50	8	49	8	49	9	49	9
	R13-31*	1	45	56	11	53	3	51	5	51	6	50	6	50	7	50	6
	R13-32*	1	45	53	8	50	3	47	6	46	6	46	7	46	7	46	7
FHWA TNM Results																	
Number of Impacted Receptors				31		31		31		31		31		31		31	
Feasibility Evaluation																	
Impacted Receptors receiving≥ 5 dB Insertion Loss (I.L.)							7		19		22		23		24		23
Percent of Impacted Receptors Receiving≥ 5 dB I.L.							23%		61%		71%		74%		77%		74%
Is this percentage≥ 50%?; If yes, barrier is feasible.							**No**		**Yes**		**Yes**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation																	
Number of Non-impacted receptors receiving≥ 5 dB I.L. (Benefited Receptors)									1		1		1		1		1
Total Number of receptors receiving≥ 5 dB I.L. (Benefited Receptors)									20		23		24		25		24
Number of receptors receiving≥ 7 dB I.L. (Meeting NRDG)									10		13		18		21		19
Does at least one Benefited Receptor Receive≥ 7 dB I.L.?									**Yes**		**Yes**		**Yes**		**Yes**		**Yes**
Barrier Height (feet)									13		17		18		20	18	12 to 20
Barrier Length (feet)									3898		3898		3898		3898		2659
Barrier square footage (SQft)									54570		62366		70161		77957		47923
Barrier square footage per benefited receptor (SF/BR)									2729		2712		2923		3118		1997
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable									**No**		**No**		**No**		**No**		**Yes**
Average I.L. per Benefited Receptor (dB)																	8
																	Recommended Barrier

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

Rxx-xx* denotes that the background sound level measurement was applied
All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

Table 15 _ NSA 13

Smoothed Top Barrier

	X	y	Z	Barrier Height Modeled	Top Barrier Elevation	Smoothed Top Barrier Elevation	Barrier Height Proposed
NSA 13	2,218,950.80	262,424.10	809.3	12	821	**821**	12
	2,219,003.50	262,332.20	799.7	12	812	**812**	12
	2,219,061.30	262,244.30	786.4	14	800	**800**	14
	2,219,126.50	262,160.50	769.3	16	785	**785**	16
	2,219,185.00	262,120.90	760	18	778	**779**	19
	2,219,221.00	262,027.20	759.1	20	779	**779**	20
	2,219,258.30	261,935.60	758.1	20	778	**778**	20
	2,219,297.80	261,844.40	756.9	20	777	**777**	20
	2,219,339.30	261,752.70	755.4	20	775	**775**	20
	2,219,378.30	261,661.30	753.6	20	774	**774**	20
	2,219,418.50	261,569.90	751.5	20	772	**772**	21
	2,219,457.80	261,476.90	749.2	20	769	**770**	21
	2,219,472.50	261,432.50	746.9	20	767	**770**	23
	2,219,478.80	261,323.70	759	20	779	**779**	20
	2,219,518.80	261,234.80	750.1	20	770	**770**	20
	2,219,572.30	261,148.10	741	20	761	**761**	20
	2,219,633.50	261,065.40	736.1	20	756	**756**	20
	2,219,677.30	260,977.10	733.1	20	753	**753**	20
	2,219,716.30	260,884.00	730.1	20	750	**750**	20
	2,219,756.80	260,795.10	727.1	20	747	**747**	20
	2,219,803.50	260,698.90	724.2	20	744	**745**	21
	2,219,842.80	260,608.20	721.6	16	738	**745**	23
	2,219,846.50	260,502.70	734.9	16	751	**751**	16
	2,219,863.50	260,399.50	743.1	16	759	**759**	16
	2,219,896.80	260,304.80	742.5	16	759	**759**	17
	2,219,934.50	260,210.70	740.4	16	756	**756**	16
	2,219,980.30	260,122.50	731.4	16	747	**749**	18
	2,220,036.30	260,040.90	723.1	16	739	**743**	20

Table 16. NSA 14A
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Eastern Build (2046)									
				Future Build No-Barrier		Case 1: 20' Barrier		Case 2: 22' Barrier		Case 3: Optimized Barrier		Case 4: Smoothed Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 14A	R14-01 (M14-01)	1	40	59	19	51	7	51	8	51	7	51	8
	R14-02 (M14-02)	1	40	56	17	50	6	50	6	50	6	50	6
	R14-03 (M14-03)	1	41	56	15	51	5	51	5	51	5	51	5
	R14-8	1	39	57	17	51	6	50	7	51	6	50	6
	R14-09	1	40	57	17	51	6	50	6	51	6	50	6
	R14-10	1	40	57	17	51	6	50	6	51	6	50	6
	R14-11	1	40	57	17	51	6	50	7	51	6	50	7
	R14-12	1	40	56	16	51	5	51	5	51	5	51	5
	R14-13	1	40	56	16	51	5	51	5	51	5	51	5
	R14-14	1	40	56	16	50	6	50	6	50	6	50	6
	R14-15	1	40	56	16	52	4	52	4	52	4	52	4
	R14-16	1	40	56	16	52	4	52	4	52	4	52	4
	R14-40	1	40	56	16	51	5	51	5	51	5	51	5
	R14-68	1	42	57	15	51	7	50	7	51	7	51	7
	R14-69	1	41	58	16	51	7	50	7	51	7	51	7
	R14-70	1	40	58	17	51	7	50	7	51	7	51	7
	R14-71	1	40	58	18	51	7	51	7	51	7	51	7
	R14-72	1	40	59	19	53	6	52	7	52	6	52	7
	R14-73	1	39	58	19	51	7	51	7	51	7	51	7
	R14-74	1	39	57	18	51	7	51	7	51	7	51	7
	R14-75	1	39	57	18	51	7	51	7	51	7	51	7
	R14-76	1	39	57	18	51	6	51	7	51	6	51	6
	R14-77	1	46	58	11	51	7	50	7	51	7	51	7
	R14-78	1	43	58	15	51	8	50	8	50	8	50	8
	R14-79	1	41	59	19	51	8	51	8	51	8	51	8
	R14-80	1	39	60	21	53	7	52	8	52	8	52	8
	R14-81	1	39	61	22	54	7	54	7	54	7	54	7
	R14-82	1	39	61	22	55	6	54	7	54	7	54	7
	R14-83	1	39	59	20	52	7	52	7	52	7	52	7
	R14-84	1	39	58	19	52	6	51	7	52	7	52	7
	R14-85	1	39	61	22	53	8	52	9	53	8	53	8
	R14-86	1	39	65	26	57	7	57	8	57	8	57	8

Table 16. NSA 14A
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Eastern Build (2046)									
				Future Build No-Barrier		Case 1: 20' Barrier		Case 2: 22' Barrier		Case 3: Optimized Barrier		Case 4: Smoothed Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 14A	R14-87	1	39	62	23	56	6	55	7	55	7	55	7
	R14-88	1	39	59	21	53	6	53	7	53	7	53	7
	R14-89	1	40	60	20	52	8	52	8	52	8	52	8
	R14-90	1	39	63	24	54	9	54	9	54	9	54	9
	R14-91	1	39	69	30	57	11	57	12	57	12	57	12
	R14-92	1	38	69	30	60	9	59	10	59	10	59	10
	R14-93	1	38	63	25	57	7	56	8	56	8	56	8
	R14-94	1	39	59	20	53	6	53	6	53	6	53	6
	R14-95	1	39	58	19	53	6	52	6	52	6	52	6
	R14-96	1	39	58	19	52	6	52	6	52	6	52	6
	R14-97	1	40	58	18	52	7	51	7	51	7	51	7
	R14-98	1	40	57	16	50	6	50	7	50	6	50	7
	R14-99	1	41	57	16	50	6	50	7	51	6	50	7
	R14-100	1	42	57	15	50	6	50	7	50	6	50	6
	R14-101	1	44	57	13	50	6	50	7	50	6	50	6
	R14-102	1	50	57	8	52	5	52	5	52	5	52	5
	R14-103	1	51	57	6	52	4	52	5	52	4	52	4
	R14-104	1	46	61	15	52	8	52	9	52	9	52	9
	R14-105	1	50	55	5	49	6	49	6	49	6	49	6
	R14-106	1	44	56	11	50	6	50	6	50	6	50	6
	R14-107	1	42	56	13	50	6	50	6	50	6	50	6
	R14-108	1	41	56	15	50	6	50	6	50	6	50	6
	R14-109	1	40	56	16	50	6	50	6	50	6	50	6
	R14-111	1	40	56	16	50	6	50	6	50	6	50	6
	R14-112	1	40	56	16	51	5	51	5	51	5	51	5
	R14-113	1	40	56	16	51	5	51	6	51	5	51	6
	R14-114	1	40	57	17	51	6	51	7	51	6	51	7
	R14-115	1	40	59	18	51	7	51	8	51	8	51	8
	R14-116	1	40	61	21	53	8	52	9	52	9	52	9
	R14-117	1	41	56	15	53	2	53	2	53	2	53	2
	R14-118	1	41	56	15	53	3	53	3	53	3	53	3
	R14-119	1	42	57	15	53	3	53	3	53	3	53	3
	R14-120	1	41	58	17	52	6	51	7	52	6	51	7
	R14-121	1	41	58	17	52	6	52	7	52	7	52	7
	R14-122	1	41	58	17	52	6	52	7	52	6	52	7
	R14-123	1	42	59	17	52	7	52	7	52	7	52	7

Table 16. NSA 14A
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Eastern Build (2046)									
				Future Build No-Barrier		Case 1: 20' Barrier		Case 2: 22' Barrier		Case 3: Optimized Barrier		Case 4: Smoothed Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 14A	R14-124	1	41	59	18	52	7	51	7	52	7	51	7
	GR11	1	47	62	15	53	9	53	9	53	9	53	9
	GR12	1	52	61	8	54	6	54	6	54	6	54	6
	GR1	1	33	63	29	63	0	63	0	63	0	63	0
	GR1B (Farmhouse)	1	35	60	26	60	0	60	0	60	0	60	0
	GR4	1	61	65	5	61	4	61	4	61	4	61	4
FHWA TNM Results													
Number of Impacted Receptors				69		69		69		69		69	
Feasibility Evaluation													
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							62		63		62		62
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							90%		91%		90%		90%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**Yes**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation													
Number of Non-impacted receptors receiving ≥ 5 dB I.L.							3		3		3		3
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited							65		66		65		65
Number of Impacted receptors receiving ≥ 7 dB I.L.							28		44		33		40
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?							**Yes**		**Yes**		**Yes**		**Yes**
Barrier Height (feet)							20		22	21.3	14 to 22	21.6	14 to 26
Barrier Length (feet)							4407		4407		4100		4100
Barrier square footage (SQft)							88144		96959		89385		88503
Barrier square footage per benefited receptor (SF/BR)							1356		1469		1375		1362
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable							**Yes**		**Yes**		**Yes**		**Yes**
Average I.L. per Benefited Receptor (dB)							7		7		7		7
													Recommended Barrier

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 16 _ NSA 14A
Smoothed Top Barrier

	X	y	Z	Barrier Height Modeled	Top Barrier Elevation	Smoothed Top Barrier Elevation	Barrier Height Proposed
NSA 14A	2,221,675.00	251,319.80	642.6	14	657	**658**	15
	2,221,713.00	251,352.30	642.6	15	658	**658**	15
	2,221,751.30	251,384.80	642.6	15	658	**658**	15
	2,221,786.30	251,419.30	641.25	15	656	**656**	15
	2,221,821.30	251,453.70	639.9	15	655	**656**	16
	2,221,853.00	251,495.60	634.6	16	651	**651**	16
	2,221,885.00	251,537.50	629.3	17	646	**646**	17
	2,221,901.50	251,582.80	612.55	18	631	**636**	23
	2,221,918.30	251,617.30	617.48	19	636	**636**	19
	2,221,935.00	251,651.70	622.4	20	642	**642**	20
	2,221,957.80	251,673.00	621.9	21	643	**642**	20
	2,221,994.50	251,707.10	620.9	21	642	**642**	21
	2,222,031.30	251,741.10	619.9	22	642	**642**	22
	2,222,067.80	251,774.90	618.9	22	641	**641**	22
	2,222,104.50	251,808.80	617.9	22	640	**640**	22
	2,222,141.00	251,842.70	616.9	22	639	**639**	22
	2,222,178.00	251,876.60	615.9	22	638	**638**	22
	2,222,214.50	251,910.20	614.9	22	637	**637**	22
	2,222,251.30	251,944.40	613.95	22	636	**636**	22
	2,222,286.00	251,978.70	613	22	635	**635**	22
	2,222,323.00	252,010.60	612.25	22	634	**634**	22
	2,222,361.80	252,043.70	611.5	23	635	**635**	24
	2,222,399.50	252,075.80	611	23	634	**634**	23
	2,222,477.00	252,071.10	614.1	22	636	**636**	22
	2,222,522.30	252,096.00	618.42	22	640	**640**	22
	2,222,564.80	252,123.70	621.04	22	643	**643**	22
	2,222,600.30	252,158.80	618.22	22	640	**640**	22
	2,222,624.30	252,206.60	609.53	22	632	**632**	22
	2,222,625.00	252,242.60	606.56	25	632	**632**	25
	2,222,626.80	252,274.60	610.8	22	633	**633**	22
	2,222,664.30	252,308.50	611.2	22	633	**633**	22
	2,222,701.80	252,342.50	610.95	22	633	**633**	22
	2,222,739.30	252,376.40	610.7	22	633	**633**	22
	2,222,776.30	252,409.40	611.4	22	633	**633**	22
	2,222,813.30	252,442.40	612.1	22	634	**634**	22
	2,222,851.00	252,474.30	613.3	22	635	**635**	22
	2,222,889.00	252,506.20	614.5	23	638	**637**	23
	2,222,928.00	252,537.60	616.15	22	638	**638**	22
	2,222,969.30	252,567.50	617.8	22	640	**640**	22
	2,223,009.80	252,594.80	619.25	22	641	**641**	22
	2,223,049.30	252,623.70	620.7	22	643	**643**	22
	2,223,098.50	252,618.90	619.9	23	643	**643**	23
	2,223,111.50	252,616.50	622.59	22	645	**645**	22
	2,223,163.30	252,625.80	630.78	22	653	**653**	22
	2,223,208.80	252,643.90	634.44	22	656	**656**	22
	2,223,253.50	252,662.60	635.64	22	658	**658**	22
	2,223,295.50	252,680.60	633.66	22	656	**656**	22
	2,223,331.00	252,705.40	626.62	22	649	**649**	22
	2,223,359.80	252,743.80	616.75	22	639	**639**	22
	2,223,361.50	252,761.10	625.1	22	647	**647**	22
	2,223,401.00	252,795.50	619.1	22	641	**641**	22
	2,223,448.50	252,801.50	617.55	22	640	**640**	22
	2,223,496.30	252,807.60	616	24	640	**640**	24
	2,223,542.50	252,781.80	617.6	22	640	**640**	22
	2,223,552.80	252,783.10	613.79	26	640	**640**	26
	2,223,584.50	252,741.50	619.82	22	642	**642**	22
	2,223,623.50	252,716.50	626.46	22	648	**648**	22
	2,223,661.00	252,696.20	628.3	22	650	**650**	22
	2,223,697.00	252,676.30	628.95	22	651	**651**	22
	2,223,732.50	252,656.50	627.32	22	649	**649**	22
	2,223,767.50	252,636.50	624.88	22	647	**647**	22
	2,223,802.80	252,616.30	619.97	22	642	**642**	22
	2,223,838.00	252,594.60	614.67	22	637	**637**	22
	2,223,871.50	252,569.70	609.55	22	632	**632**	22
	2,223,901.00	252,540.00	606.18	22	628	**628**	22
	2,223,927.50	252,507.30	603.2	22	625	**625**	22
	2,223,952.00	252,471.30	601.5	23	625	**624**	23
	2,223,979.00	252,429.20	598.78	22	621	**621**	22
	2,224,013.00	252,390.80	593.66	22	616	**616**	22
	2,224,045.80	252,351.80	585.96	22	608	**608**	22
	2,224,086.80	252,317.40	578.14	22	600	**600**	22
	2,224,108.50	252,300.90	574.27	23	597	**597**	23
	2,224,134.30	252,284.80	574.5	23	598	**597**	23
	2,224,157.50	252,242.50	572.1	22	594	**594**	22
	2,224,181.00	252,200.30	569.6	22	592	**592**	22
	2,224,224.50	252,143.30	566.9	22	589	**589**	22
	2,224,252.00	252,098.80	562.1	23	585	**585**	23
	2,224,279.30	252,054.40	560.7	22	583	**583**	22
	2,224,308.00	252,012.60	559.15	22	581	**581**	22
	2,224,336.80	251,970.70	557.6	22	580	**580**	22
	2,224,367.80	251,929.30	556.05	22	578	**578**	22
	2,224,398.80	251,888.00	554.5	23	578	**577**	23
	2,224,433.80	251,850.20	552	22	574	**574**	22
	2,224,468.80	251,812.50	549.5	24	574	**573**	24
	2,224,503.50	251,776.00	547	22	569	**569**	22
	2,224,538.00	251,739.50	544.5	23	568	**567**	23
	2,224,576.80	251,704.90	542	22	564	**564**	22
	2,224,615.50	251,670.30	539.5	23	563	**562**	23

Table 17. NSA 14B
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Site ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2046)							
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 18' Barrier		Case 3: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 14B	R14-03 (M14-03)	1	41	56	15	52	5	51	5	51	5
	R14-07B (M14-07B)	1	56	57	0	51	5	49	7	49	8
	R14-17	1	42	56	15	52	4	52	4	52	5
	R14-18	1	42	56	14	52	4	52	4	52	4
	R14-19	1	42	56	13	52	4	52	4	52	4
	R14-20	1	43	55	13	52	4	51	4	51	4
	R14-21	1	43	54	11	51	3	51	4	50	4
	R14-22	1	43	53	10	50	3	50	3	50	4
	R14-23	1	44	53	9	51	3	50	3	50	3
	R14-24	1	45	53	9	51	3	50	3	50	3
	R14-25	1	45	54	8	51	3	50	3	50	3
	R14-26	1	46	53	8	51	3	50	3	50	3
	R14-27	1	46	54	8	51	3	50	4	50	4
	R14-28	1	47	53	7	51	2	51	3	50	3
	R14-29	1	47	54	7	52	2	51	2	51	2
	R14-30	1	51	54	3	53	2	52	2	52	2
	R14-31	1	51	53	2	52	1	51	2	51	2
	R14-32	1	52	53	2	52	2	51	2	51	2
	R14-33	1	52	54	2	52	2	51	2	51	3
	R14-34	1	52	54	2	52	2	51	3	51	3
	R14-35	1	52	54	2	52	2	52	3	51	3
	R14-36	1	53	55	2	53	2	52	3	51	3
	R14-37	1	53	55	2	53	2	52	3	52	4
	R14-38	1	53	56	3	54	2	53	3	53	4
	R14-39	1	54	57	3	54	2	53	3	53	4
	R14-41	1	41	56	15	53	3	52	3	52	3
	R14-42	1	41	55	14	52	3	52	3	52	4
	R14-43	1	42	55	14	52	4	52	4	52	4
	R14-44	1	42	55	13	51	3	51	3	51	4
	R14-45	1	42	54	12	51	3	51	3	51	3
	R14-46	1	43	54	11	51	3	50	3	50	3
	R14-47	1	43	53	10	50	3	50	3	50	3
	R14-48	1	44	53	10	50	3	50	3	50	3

Table 17. NSA 14B
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Site ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2046)							
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 18' Barrier		Case 3: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 14B	R14-49	1	44	53	9	50	3	50	3	50	3
	R14-50	1	45	53	8	51	2	50	3	50	3
	R14-51	1	45	53	7	51	2	50	3	50	3
	R14-52	1	47	52	5	51	2	51	2	51	2
	R14-53	1	51	53	2	51	1	51	2	51	2
	R14-54	1	52	54	2	53	1	53	1	53	1
	R14-55	1	55	55	1	55	0	55	1	55	1
	R14-56	1	57	57	0	57	1	57	1	57	1
	R14-57	1	54	57	3	53	4	52	5	51	6
	R14-58	1	55	57	2	54	4	52	5	52	6
	R14-59	1	56	58	2	54	4	52	5	52	6
	R14-60	1	57	58	2	54	5	53	6	52	7
	R14-61	1	58	59	1	54	5	53	6	52	7
	R14-62	1	54	57	3	54	4	52	5	52	6
	R14-63	1	56	58	2	54	4	52	5	52	6
	R14-64	1	56	58	2	54	4	52	6	52	6
	R14-65	1	57	59	1	54	5	53	6	52	7
	R14-66	1	59	60	1	54	5	53	7	52	7
	R14-67	1	50	63	13	55	8	53	10	53	11
	R14-68	1	42	57	15	56	2	56	2	56	2
	R14-69	1	41	58	17	56	2	56	2	56	2
	R14-70	1	40	58	18	56	3	55	3	55	3
	R14-71	1	40	58	18	55	3	55	3	55	3
	R14-77	1	46	57	11	57	1	57	1	57	1
	R14-78	1	43	58	16	57	1	57	1	57	1
	R14-79	1	41	59	19	57	3	57	3	57	3
	R14-98	1	40	57	17	55	2	55	2	55	2
	R14-99	1	41	57	16	55	2	55	2	55	2
	R14-100	1	42	56	15	55	2	55	2	55	2
	R14-101	1	44	57	13	55	1	55	1	55	1
	R14-102	1	50	57	7	56	1	56	1	56	1
	R14-103	1	51	57	6	56	1	56	1	56	1
	R14-105	1	50	55	5	54	1	54	1	54	1
	R14-106	1	44	55	11	54	1	54	1	54	1
	R14-107	1	42	56	13	54	1	54	1	54	2

Table 17. NSA 14B
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Site ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2046)							
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 18' Barrier		Case 3: 20' Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
	R14-108	1	41	56	15	54	2	54	2	54	2
	R14-109	1	40	56	16	54	2	54	2	54	2
	R14-110	1	41	56	15	53	2	53	2	53	3
FHWA TNM Results											
Number of Impacted Receptors				32		32		32		32	
Feasibility Evaluation											
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							2		2		3
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							6%		6%		9%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**No**		**No**
Reasonableness Evaluation											
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited											
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)											
Number of Impacted receptors receiving ≥ 7 dB I.L. (Meeting NRDG)											
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?											
Barrier Height (feet)											
Barrier Length (feet)											
Barrier square footage (SQft)											
Barrier square footage per benefited receptor (SF/BR)											
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable											
Average I.L. per Benefited Receptor (dB)											

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 18. NSA 15
Preferred Alternative
Summary of Barrier Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 16' Barrier		Case 3: 18' Barrier		Case 4: 20' Barrier		Case 5: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 15	R15-1 (M15-1)														
	R15-2 (M15-2)														
	R15-3 (M15-3)	1	55	59	4	54	6	53	6	52	7	52	8	52	8
	R15-4 (M15-4)	2	62	64	2	58	6	58	6	58	6	58	6	58	6
	R15-5	1	45	53	8	49	4	49	4	49	4	48	4	48	4
	R15-6	1	45	53	8	49	4	49	4	49	5	48	5	48	5
	R15-7	1	46	54	8	50	4	50	5	50	5	49	5	49	5
	R15-8	1	47	55	9	51	5	51	5	50	5	50	6	50	6
	R15-9	1	47	56	9	52	5	51	5	51	6	50	6	50	6
	R15-10	1	48	57	10	52	5	52	6	51	6	51	7	51	7
	R15-11	1	49	58	9	52	5	52	6	51	6	51	7	51	7
	R15-12	1	50	58	9	53	5	52	6	52	7	51	7	51	7
	R15-13	1	50	57	7	53	4	52	5	52	5	51	6	51	6
	R15-14	1	50	56	6	53	3	52	4	52	4	51	5	51	5
	R15-15	1	51	56	5	53	3	53	3	52	4	51	4	51	4
	R15-16	1	52	56	4	53	3	53	3	52	4	51	4	51	4
	R15-17	1	52	56	3	52	3	52	4	52	4	51	4	51	4
	R15-18	1	53	57	4	54	3	53	3	53	4	52	4	52	4
	R15-19	1	54	57	3	54	3	54	3	53	4	53	4	53	4
	R15-20	1	55	58	3	55	3	54	3	54	4	54	4	54	4
	R15-21	1	56	59	3	55	3	55	4	55	4	55	4	55	4
	R15-22	1	58	60	2	56	3	56	4	56	4	56	4	56	4
	R15-23	1	59	61	2	58	3	57	3	57	4	57	4	57	4
	R15-24	1	62	64	2	62	3	62	3	61	3	61	3	61	3
	R15-25	1	59	61	2	56	5	55	6	55	6	55	6	55	6
	R15-26														
	R15-27	1	43	49	6	46	3	46	3	46	3	46	3	46	3
	R15-28	1	44	52	7	49	3	49	3	48	3	48	3	48	3
	R15-29	1	45	52	7	49	3	49	3	48	4	48	4	48	4
	R15-30	1	46	52	6	49	3	49	3	49	4	48	4	48	4
	R15-31	1	47	53	6	50	3	50	3	50	3	49	4	49	4
	R15-32	1	47	54	6	51	3	50	3	50	4	50	4	50	4
	R15-33	1	48	54	6	51	3	51	3	51	4	50	4	50	4
	R15-34	1	49	54	6	51	3	51	3	51	4	51	4	51	4
	R15-35	1	49	54	5	52	2	51	3	51	3	50	4	50	4
	R15-36	1	50	54	4	52	2	51	3	51	3	50	3	50	3
	R15-37	1	51	54	4	52	2	51	3	51	3	51	3	51	3
	R15-38	1	52	55	3	53	2	52	3	52	3	52	3	52	3
	R15-39	1	53	56	3	53	2	53	3	53	3	53	3	53	3

Table 18. NSA 15
Preferred Alternative
Summary of Barrier Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 16' Barrier		Case 3: 18' Barrier		Case 4: 20' Barrier		Case 5: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 15	R15-40	1	54	56	3	54	2	54	3	53	3	53	3	53	3
	R15-41	1	55	57	2	55	2	55	2	55	2	54	3	54	3
	R15-42	1	56	58	2	56	2	56	2	56	2	56	2	56	2
	R15-43	1	58	59	1	58	2	57	2	57	2	57	2	57	2
	R15-44	1	60	61	1	60	1	60	1	59	1	59	1	59	1
	R15-45	1	61	62	1	61	1	61	1	61	1	61	1	61	1
NSA 15B	R15B-1 (M16-1)														
	R15B-2 (M16-2)	1	43	55	12	52	4	51	4	50	5	50	5	50	5
	R15B-3 (M16-3)	1	45	56	12	52	4	51	5	51	6	51	6	50	6
	R15B-4 (M16-1)	1	41	58	17	54	4	53	5	53	5	53	5	53	5
	R15B-5	1	42	56	14	51	4	51	5	50	5	50	6	50	6
	R15B-6	1	42	55	13	51	4	51	5	50	5	50	6	50	6
	R15B-7	1	43	56	13	52	4	51	5	50	5	50	6	50	6
	R15B-8	1	43	56	13	52	4	51	5	51	5	50	5	50	5
	R15B-9	1	44	56	12	52	4	51	5	51	5	51	5	51	5
	R15B-10	1	41	53	12	50	3	50	3	50	4	49	4	49	4
	R15B-11	1	41	53	12	50	3	50	3	50	3	49	4	49	4
	R15B-12	1	41	52	11	50	3	49	3	49	3	49	4	49	4
	R15B-13	1	42	53	11	50	3	49	3	49	4	49	4	49	4
	R15B-14	1	42	53	11	50	3	50	4	49	4	49	5	49	5
	R15B-15	1	43	54	11	50	4	50	4	49	5	49	5	49	5
	R15B-16	1	43	54	11	51	4	50	4	50	5	49	5	49	5
	R15B-17	1	43	54	11	51	4	50	4	50	5	49	5	49	5
	R15B-18	1	44	55	11	51	4	50	4	50	5	50	5	49	5
	R15B-19	1	44	55	11	51	4	51	4	50	5	50	5	50	5
	R15B-20	1	44	60	16	55	4	55	5	54	6	54	6	54	6
	R15B-21	1	43	58	15	54	4	53	5	52	6	52	6	52	6
	R15B-22	1	43	58	15	53	5	53	5	52	6	52	6	52	6
	R15B-23	1	43	58	15	53	5	52	5	52	6	51	6	51	6
	R15B-24	1	42	58	15	53	4	53	5	52	6	52	6	52	6
	R15B-25	1	42	58	17	55	3	54	4	53	5	53	6	53	6
	R15B-26	1	40	56	16	51	5	51	6	50	6	50	7	50	7
	R15B-27	1	41	61	20	54	7	53	8	53	8	52	9	52	9
	R15B-28	1	42	61	20	54	8	53	8	53	9	53	9	53	9
	R15B-29	1	42	63	20	54	8	54	9	53	9	53	10	53	10

Table 18. NSA 15
Preferred Alternative
Summary of Barrier Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)											
				Future Build No-Barrier		Case 1: 14' Barrier		Case 2: 16' Barrier		Case 3: 18' Barrier		Case 4: 20' Barrier		Case 5: Optimized Barrier	
				Noise Level dB(A)	I.O.E dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB	Noise Level dB(A)	Insertion Loss dB
NSA 15B	R15B-30	1	43	63	20	55	8	54	9	53	9	53	10	53	10
	R15B-31	1	43	62	19	54	7	54	8	53	8	53	9	53	9
	R15B-32	1	45	56	11	49	7	48	8	48	8	48	8	48	8
	R15B-33	1	44	54	10	48	6	48	6	47	7	47	7	47	7
FHWA TNM Results															
Number of Impacted Receptors				33		33		33		33		33		33	
Feasibility Evaluation															
Impacted Receptors receiving ≥ 5 dB Insertion Loss (I.L.)							11		21		28		29		29
Percent of Impacted Receptors Receiving ≥ 5 dB I.L.							33%		64%		85%		88%		88%
Is this percentage ≥ 50%?; If yes, barrier is feasible.							**No**		**Yes**		**Yes**		**Yes**		**Yes**
Reasonableness Evaluation															
Number of Non-impacted receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									10		12		13		13
Total Number of receptors receiving ≥ 5 dB I.L. (Benefited Receptors)									31		40		42		42
Number of Impacted receptors receiving ≥ 7 dB I.L. (Meeting NRDG)									6		7		8		8
Does at least one Benefited Receptor Receive ≥ 7 dB I.L.?									**Yes**		**Yes**		**Yes**		**Yes**
Barrier Height (feet)									16		18		20		17 to 20
Barrier Length (feet)									4139		4139		4139		3634
Barrier square footage (SQft)									66219		74496		82773		72383
Barrier square footage per benefited receptor (SF/BR)									2136		1862		1971		1723
Is SF/BR ≤ 2,000?; If yes, barrier is reasonable									**No**		**Yes**		**No**		**Yes**
Average I.L. per Benefited Receptor (dB)											6				6
															Recommended Barrier

Impacted (66 dB(A) or 10 dB increase over existing)
Impacted Receivers receiving ≥ 5dB(A)
Non-Impacted Receivers receiving ≥ 5dB(A)

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)

With the exception of average insertion loss values, all noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 18 _ NSA 15
Smoothed Top Barrier

	STA	X	y	Z	Barrier Height Modeled	Top Barrier Elevation	Smoothed Top Barrier Elevation	Barrier Height Proposed
NSA 15	524+00.2281	2,226,947.30	251,215.90	504.8	20	525	**530**	25
	524+99.6919	2,226,848.30	251,225.50	511.9	20	532	**532**	20
	526+00.1707	2,226,748.30	251,235.30	514	20	534	**534**	20
	526+99.4954	2,226,649.50	251,245.50	515.5	20	536	**536**	21
	527+99.9842	2,226,549.50	251,255.40	516.3	20	536	**536**	20
	528+99.9854	2,226,450.00	251,265.40	516.7	20	537	**537**	20
	530+00.4942	2,226,350.00	251,275.50	516.5	20	537	**537**	21
	530+99.9979	2,226,251.00	251,285.50	515.6	20	536	**536**	20
	531+99.3937	2,226,152.50	251,299.40	514.2	20	534	**534**	20
	533+00.0000	2,226,052.80	251,314.80	512.1	20	532	**532**	20
	534+00.1798	2,225,957.30	251,365.10	492.6	20	513	**513**	20
	11+00.4200	2,225,892.50	251,387.10	490.4	20	510	**515**	25
	11+99.4138	2,225,905.80	251,485.20	493.3	20	513	**517**	24
	12+99.9674	2,225,918.50	251,597.10	499.2	20	519	**519**	20
	14+00.1415	2,225,899.50	251,735.00	499.6	20	520	**520**	20
	14+99.9142	2,225,820.80	251,850.50	515.4	20	535	**538**	23
	15+99.9768	2,225,704.30	251,927.60	521.2	20	541	**541**	20
	16+99.6483	2,225,568.00	251,937.70	518.8	20	539	**541**	22
	18+00.1670	2,225,451.80	251,876.50	517.2	20	537	**541**	24
	13+98.7089	2,225,351.30	251,820.50	517.5	20	538	**541**	24
	14+99.6117	2,225,246.30	251,799.30	523.5	20	544	**544**	21
	16+00.4058	2,225,160.30	251,746.70	525.1	20	545	**545**	20
	17+01.4433	2,225,083.00	251,708.80	525.1	20	545	**545**	20
	18+01.3750	2,225,000.00	251,689.20	525.6	20	546	**546**	20
NSA 15	18+47.7164	2,224,960.30	251,684.80	525.6	20	546	**546**	20
	18+96.3885	2,224,917.80	251,683.10	523.3	20	543	**546**	23
	19+96.7714	2,224,831.80	251,701.70	527.3	20	547	**548**	21
	20+99.3923	2,224,735.00	251,721.50	531	20	551	**552**	21
	21+99.1199	2,224,654.00	251,775.50	536.6	20	557	**557**	20
	23+00.9423	2,224,578.00	251,839.60	541.9	20	562	**562**	20
	549+99.9286	2,224,538.30	251,878.50	544.9	20	565	**565**	20
	551+01.1725	2,224,472.80	251,951.60	549.9	20	570	**570**	20
	552+00.1030	2,224,414.30	252,027.60	554.9	20	575	**575**	20
	552+99.7834	2,224,358.80	252,106.70	559.9	20	580	**580**	20
	553+99.9039	2,224,309.00	252,190.00	564.8	20	585	**585**	20
	555+02.0756	2,224,277.50	252,284.80	567.5	20	588	**590**	23
	556+02.1795	2,224,250.30	252,377.50	576.7	17	594	**595**	18
	557+01.8297	2,224,245.00	252,476.40	598	17	615	**615**	17

Table 19. NSA 16
Preferred Alternative
Summary of Barrier Noise Analysis

NSA	Receiver ID	No. of Receptors	Existing Noise Level (2013)	Future Build (2047)	
				Future Build No-Barrier	
				Noise Level dB(A)	I.O.E dB
NSA 16	R16-01 (M17-01)	1	62	62	1
	R16-02 (M17-02)	5	59	60	1
	R16-03 (M17-03)	8	57	58	1
	R16-04 (M17-04)	1	54	55	1
	R16-05 (M17-05) Jack Treas Park	1	52	54	2
	R16-06 (M17-06) Cemetery	1	53	54	1
	R16-07	1	60	60	1
	R16-08	1	60	60	1
	R16-09	1	60	60	1
	R16-10	1	60	60	1
	R16-11	1	60	60	1
	R16-12	1	59	60	1
	R16-13	1	58	58	0
	R16-14	1	57	58	1
	R16-15	1	57	57	0
	R16-16	5	55	56	0
	R16-17	5	58	59	0
	R16-18	1	53	54	1
	R16-19	1	55	56	2
	R16-20	1	52	54	2

All noise levels are Leq(h) values and are A-weighted, expressed as dB(A)
Noise levels were calculated to the tenth of a dB(A) and then rounded for presentation purposes.

Table 20. NSAs 14A and 15
Summary of Parallel Barrier Analysis

Cross Section Number	Closest Receptors		Barrier Height			Barrier Seperation	Ratio of Width to Height	Degeradation due to Parallel Barrier	
	NSA 14A	NSA 15b	NSA 14A	NSA15b	Average			Closest Receptor	Degradation
1	R14-01	R15b-26	22	20	21	127.3	6.1 : 1	R14-01 / R16-26	4.4 / 4.2
2	R14-124	R15b-27	22	20	21	96.2	4.6 : 1	R14-124 / R16-27	3.9 / 4.1
3	R14-123	R15b-29	24	20	22	96.0	4.4 : 1	R14-123 / R16-29	2.8 / 3.1
4	N/A	R15b-31	22	20	21	104.8	5.0 : 1	R16-31	2.2

FIGURES

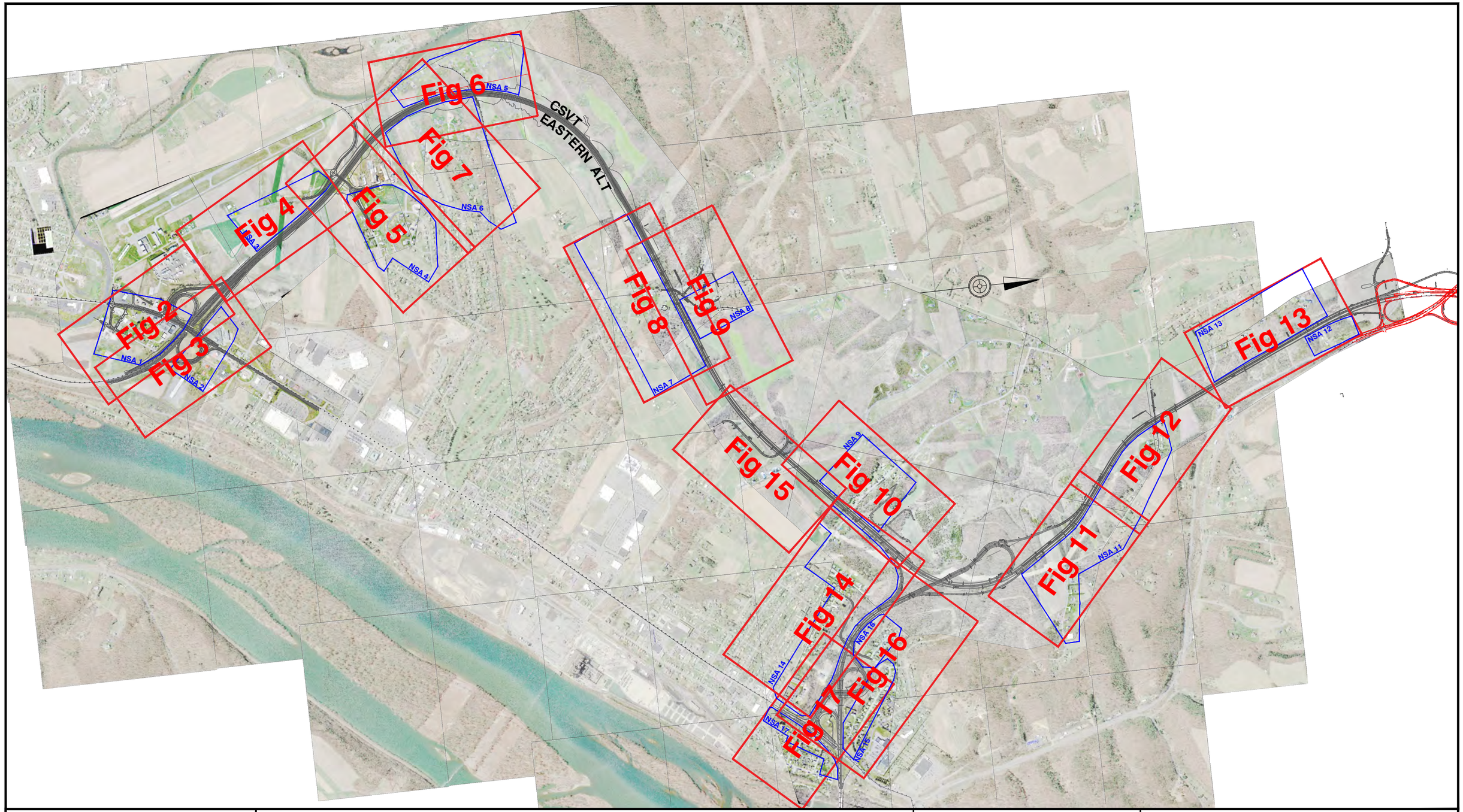

Figure Boundary

NSA Boundary

FIGURE LOCATION MAP - EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

N

Scale (Feet)

2000 1000 0 2000

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Figure 1

Map Created on 10.14.2020

Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE

CSVT Project

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S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

Scale (Feet)

200 100 0 200

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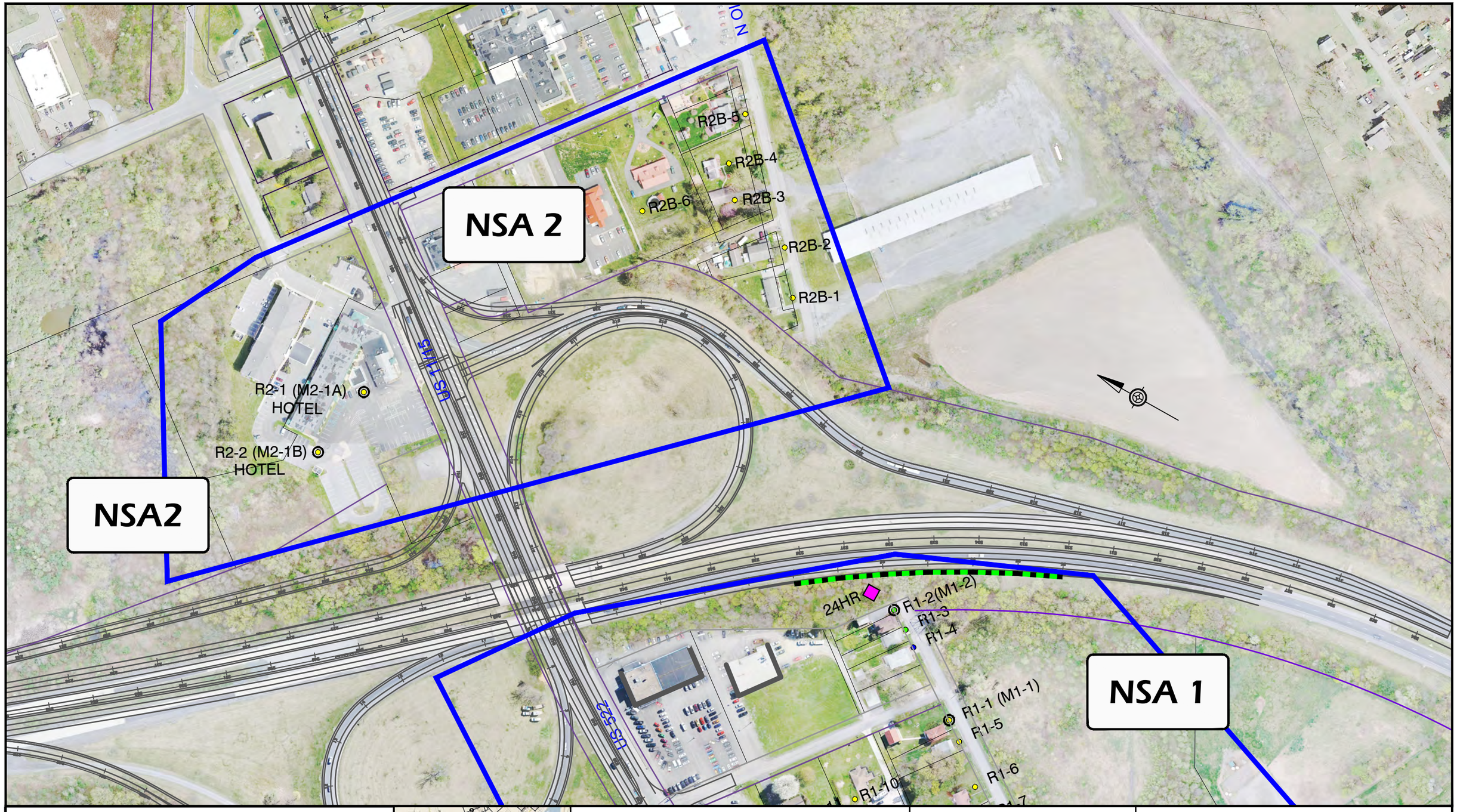
Figure 2

Map Created on 2.9.21



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

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Scale (Feet)
200 100 0 200

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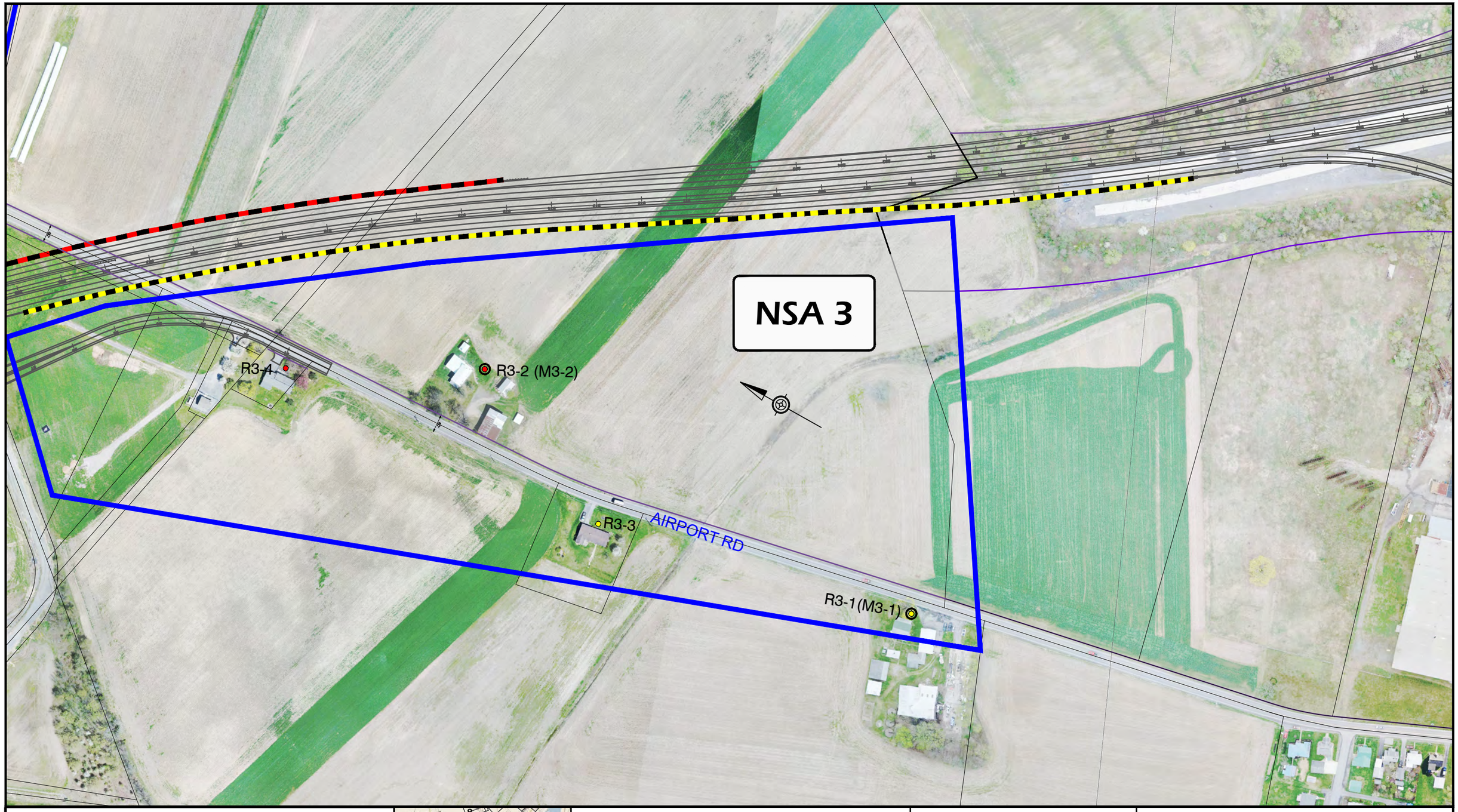
Figure 3

Map Created on 4.28.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

Scale (Feet)

200 100 0 200

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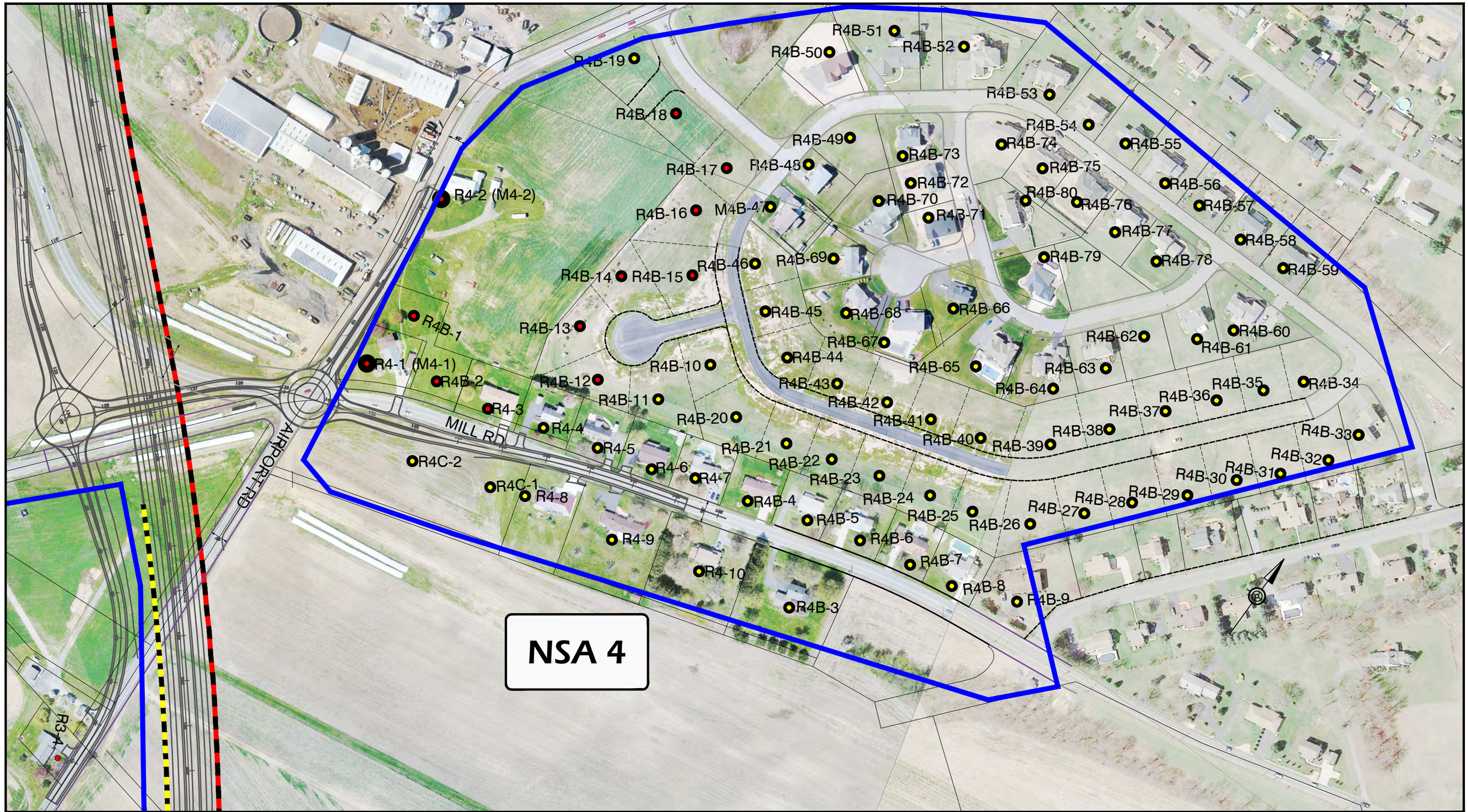
Figure 4

Map Created on 2.9.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

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Scale (Feet)
200 100 0 200

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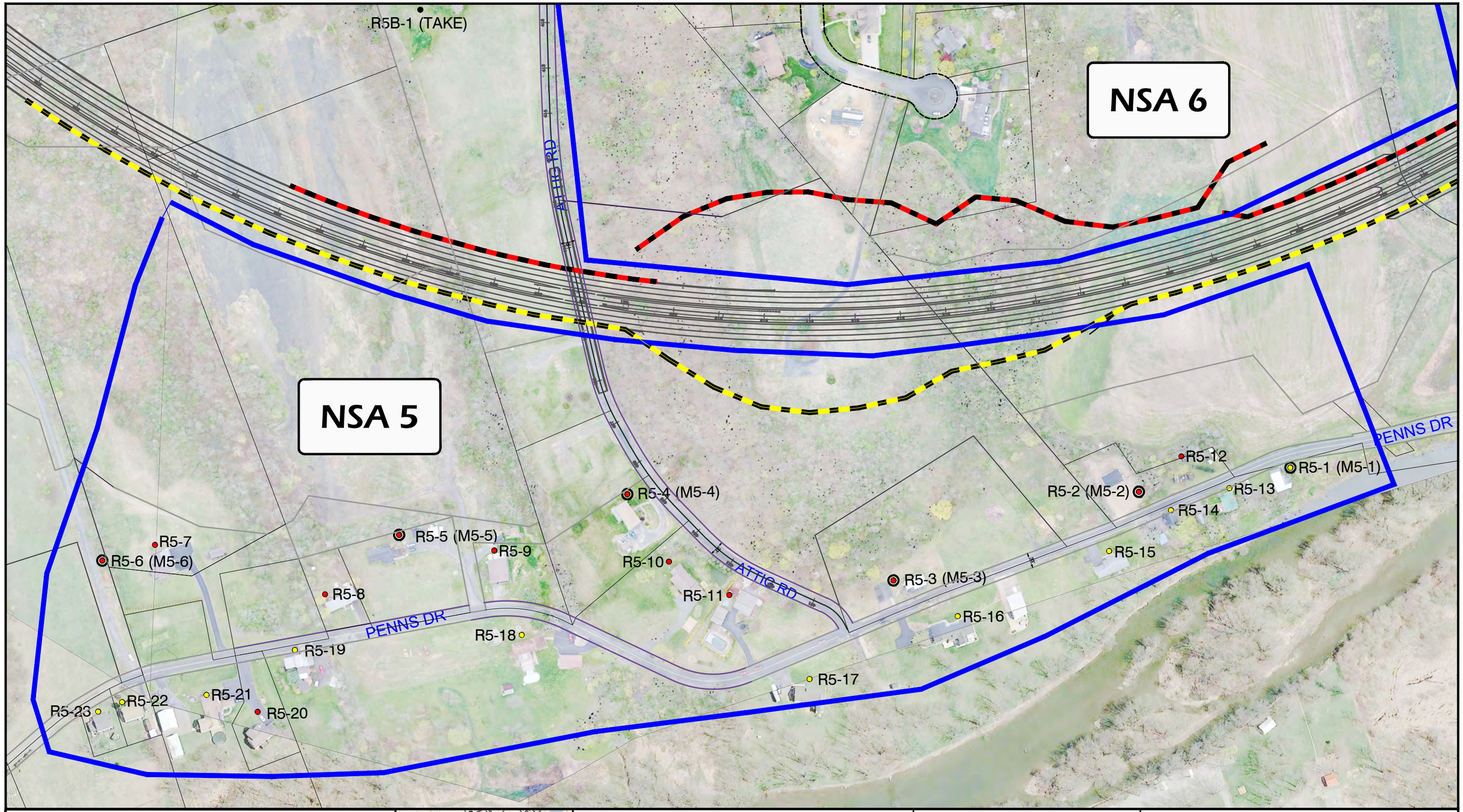
Figure 5

Map Created on 2.9.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
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Scale (Feet)
200 100 0 200

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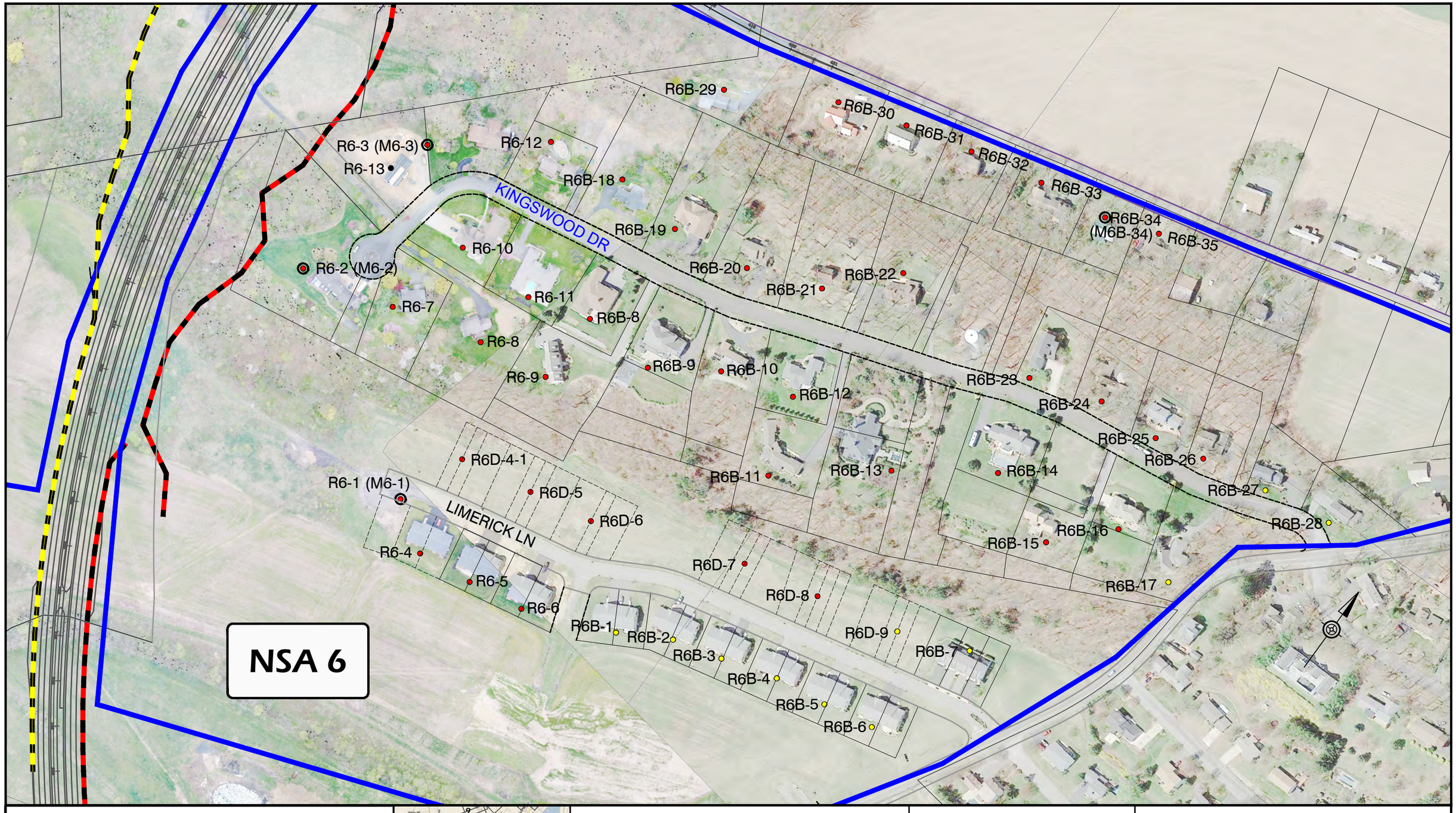
Figure 6

Map Created on 2.9.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

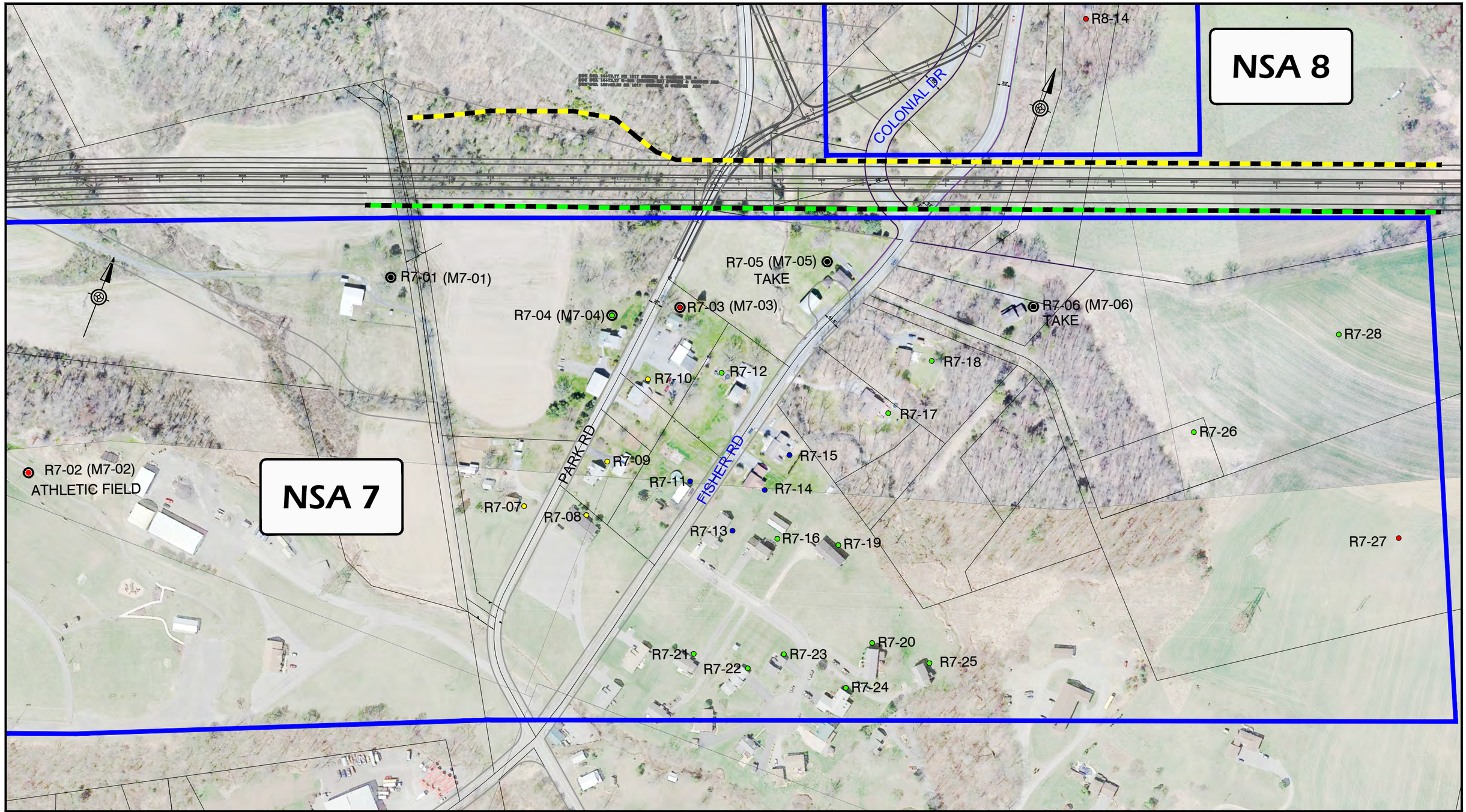
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

Scale (Feet)
200 100 0 200

Gannett Fleming

Figure 7

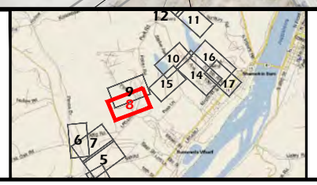
Map Created on 4.28.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable



EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

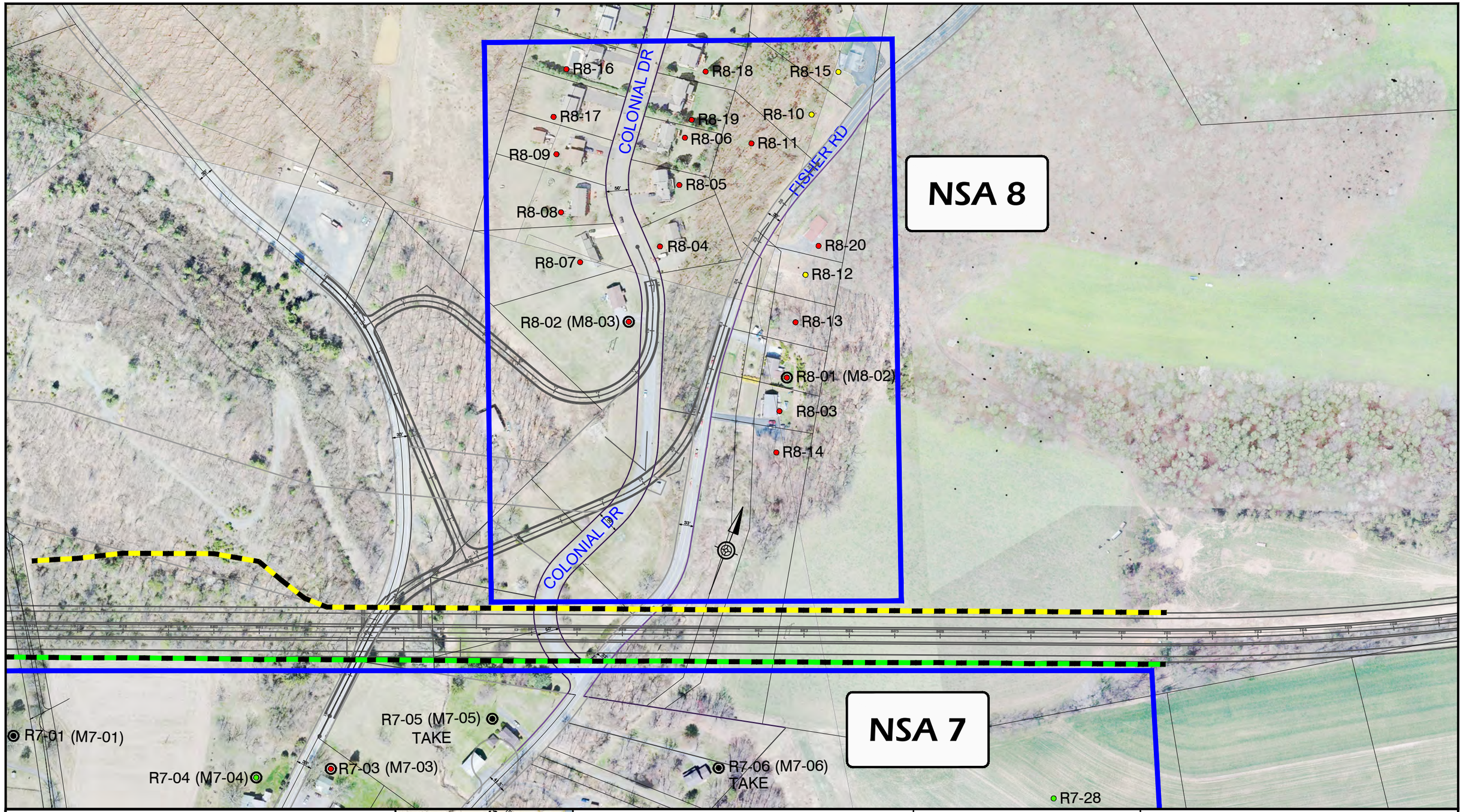
N

Scale (Feet)
200 100 0 200

Gannett Fleming

Figure 8

Map Created on 4.28.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

N

Scale (Feet)

200 100 0 200

Gannett Fleming

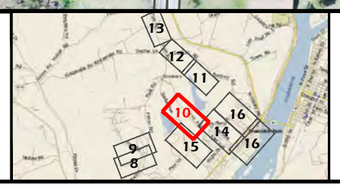
Figure 9

Map Created on 4.28.22

R9-01 (M9-01)
R9-05
R9-03 (M9-03)
R9-10
R9-04
R9-06
R9-02 (M9-02)
R9-07
R9-08
R9-09
GR9
GR3
W 11TH AVE
STETLER AVE
NSA9

- Noise Measurement Location
  - Noise Analysis Locations
    - Impacted, Benefitted
    - Impacted, Not Benefitted
    - Not Impacted, Benefitted
    - Not Impacted, Not Benefitted
  - 24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable



EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

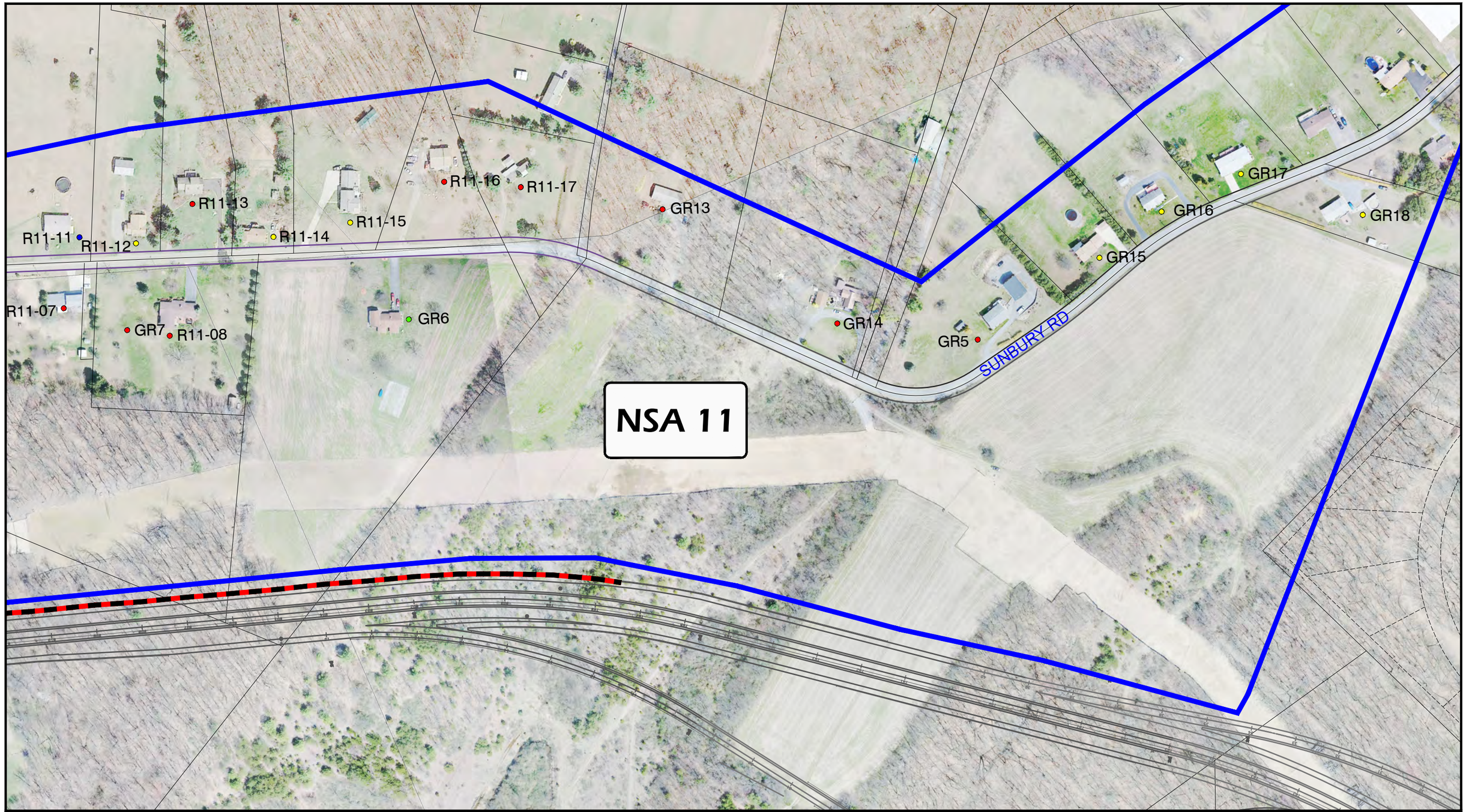
Scale (Feet)

200 100 0 200

Gannett Fleming

Figure 10

Map Created on 2.15.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

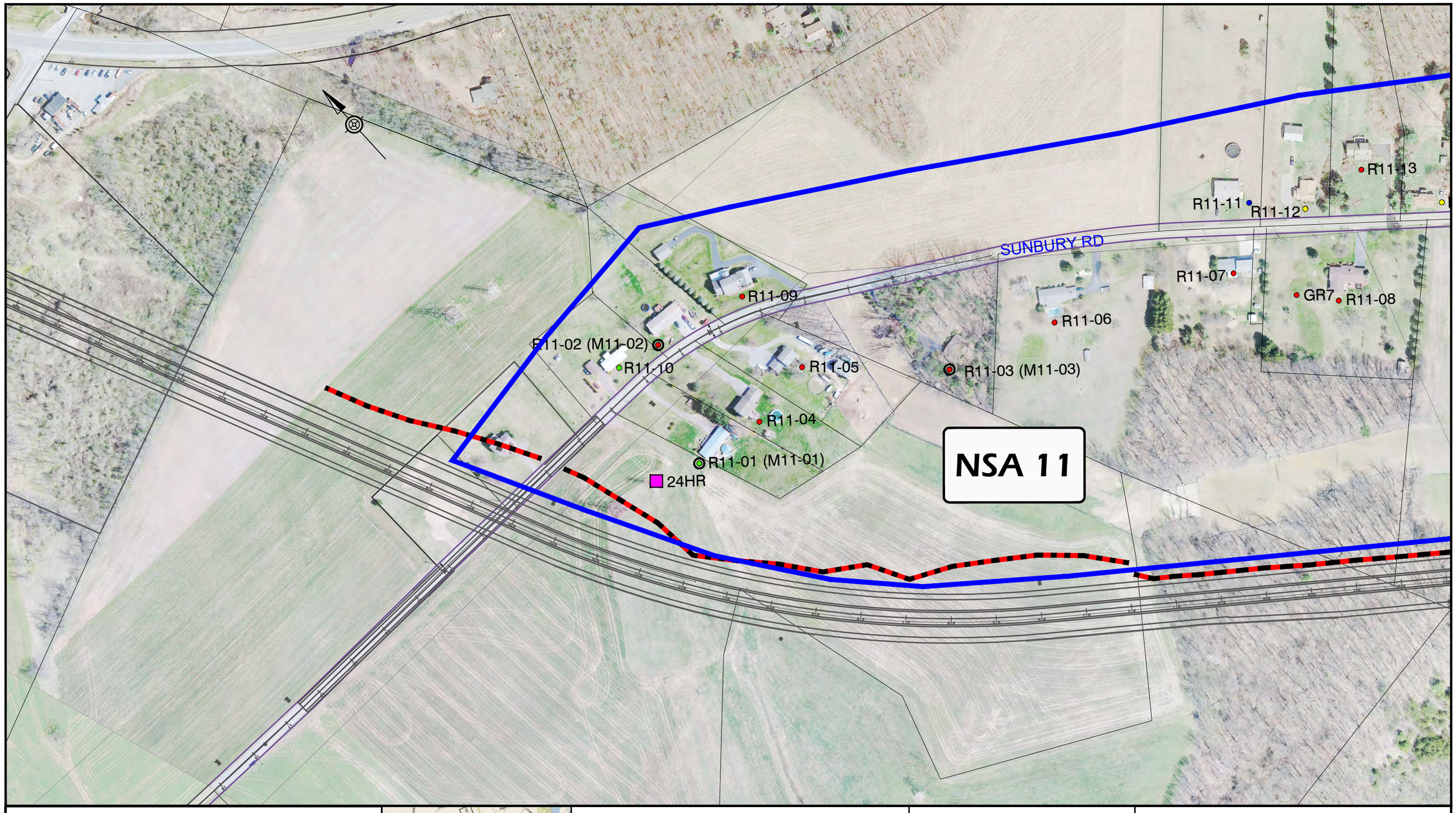
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

Scale (Feet)
200 100 0 200

Gannett Fleming

Figure 11

Map Created on 2.15.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

Scale (Feet)
200 100 0 200

Gannett Fleming

Figure 12

Map Created on 2.15.22

US 15 SB

NSA 12

NSA 13

R12-02 (M12-02)

R12-01 (M12-01)

R13-04 (M13-04)

R13-01(M13-01)

R13-19

R13-20

R13-06 (M13-06)

R13-02 (M13-02)

R13-11

R13-03 (M13-03)

R13-08 (M13-08)

R13-07 (M13-07)

R13-18

R13-16

R13-05 (M13-05)

R13-12

R13-09

R13-31

R13-21

R13-17

R13-15

MARK DR

R13-10

R13-30

R13-22

R13-23

R13-14

R13-13

R13-24

R13-25

R13-29

SHAWN LN

R13-28

R13-27

R13-32

R13-26

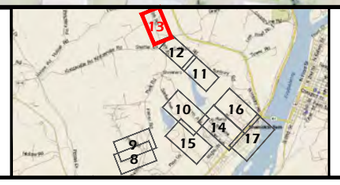
PARK RD

GRANGER RD

Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable



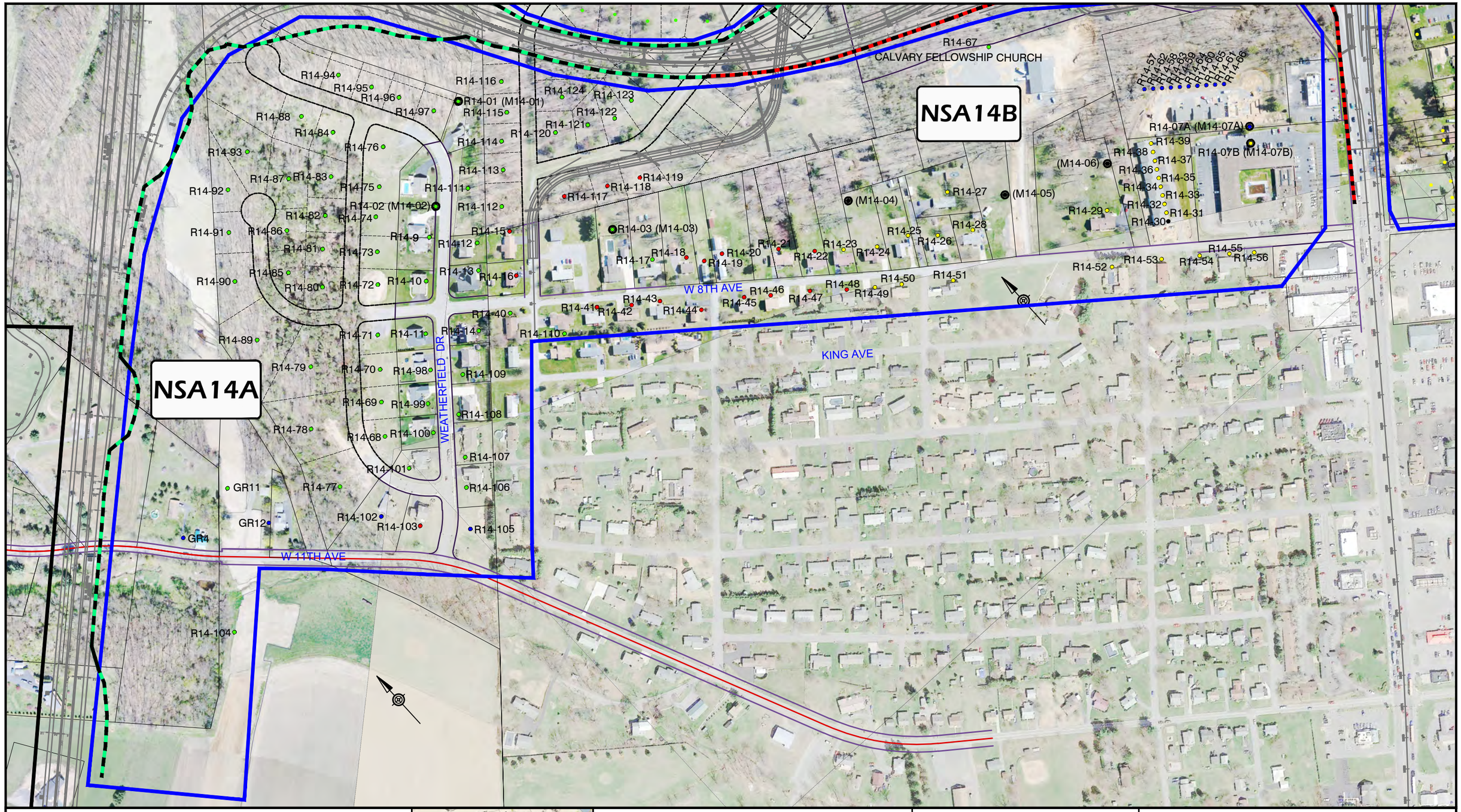
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

Scale (Feet)
200 100 0 200

Gannett Fleming

Figure 13

Map Created on 2.15.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

Scale (Feet)

250 125 0 250

Gannett Fleming

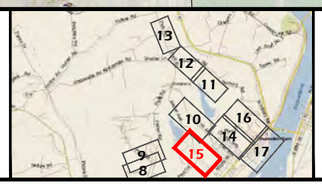
Figure 14

Map Created on 4.28.22

Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable



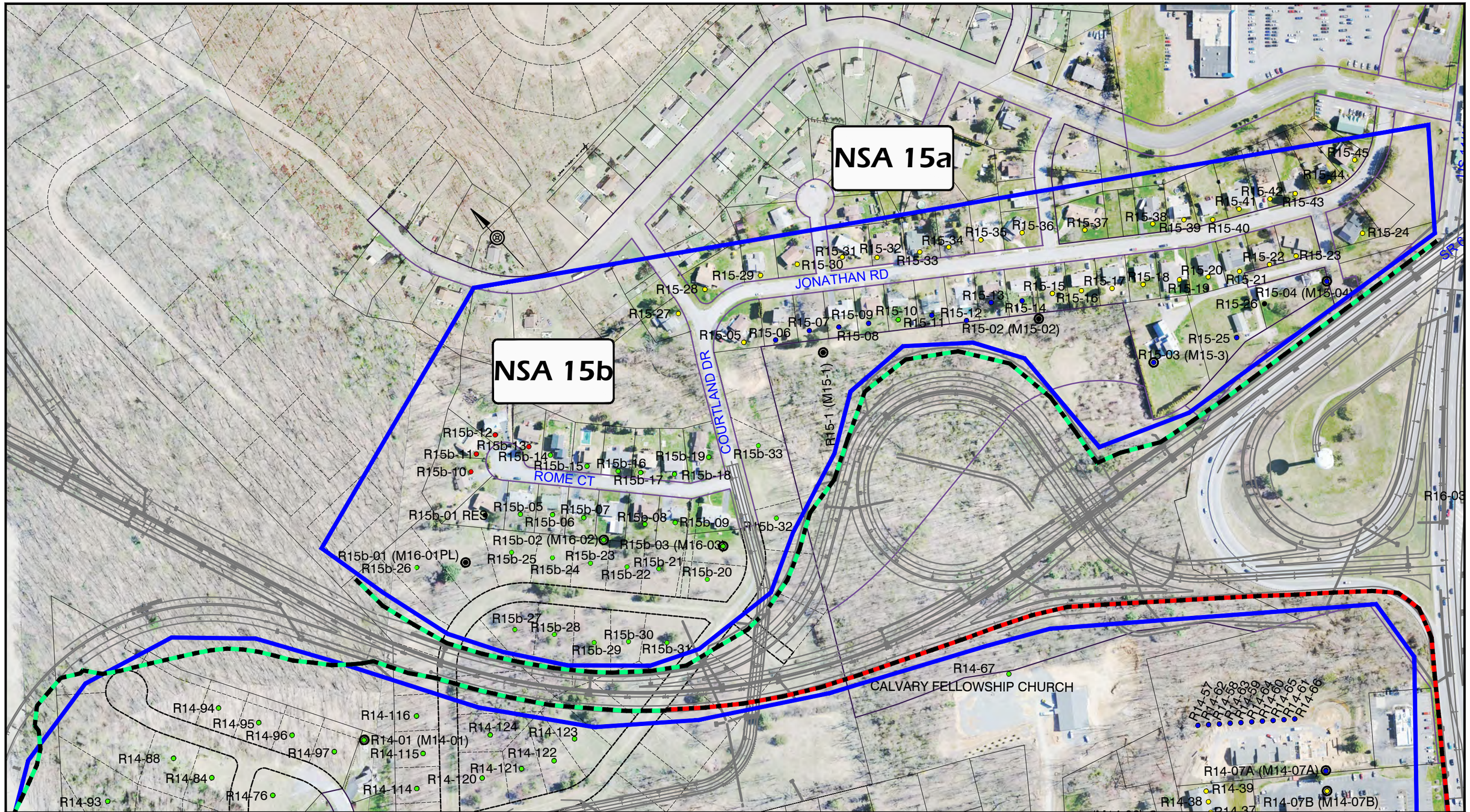
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

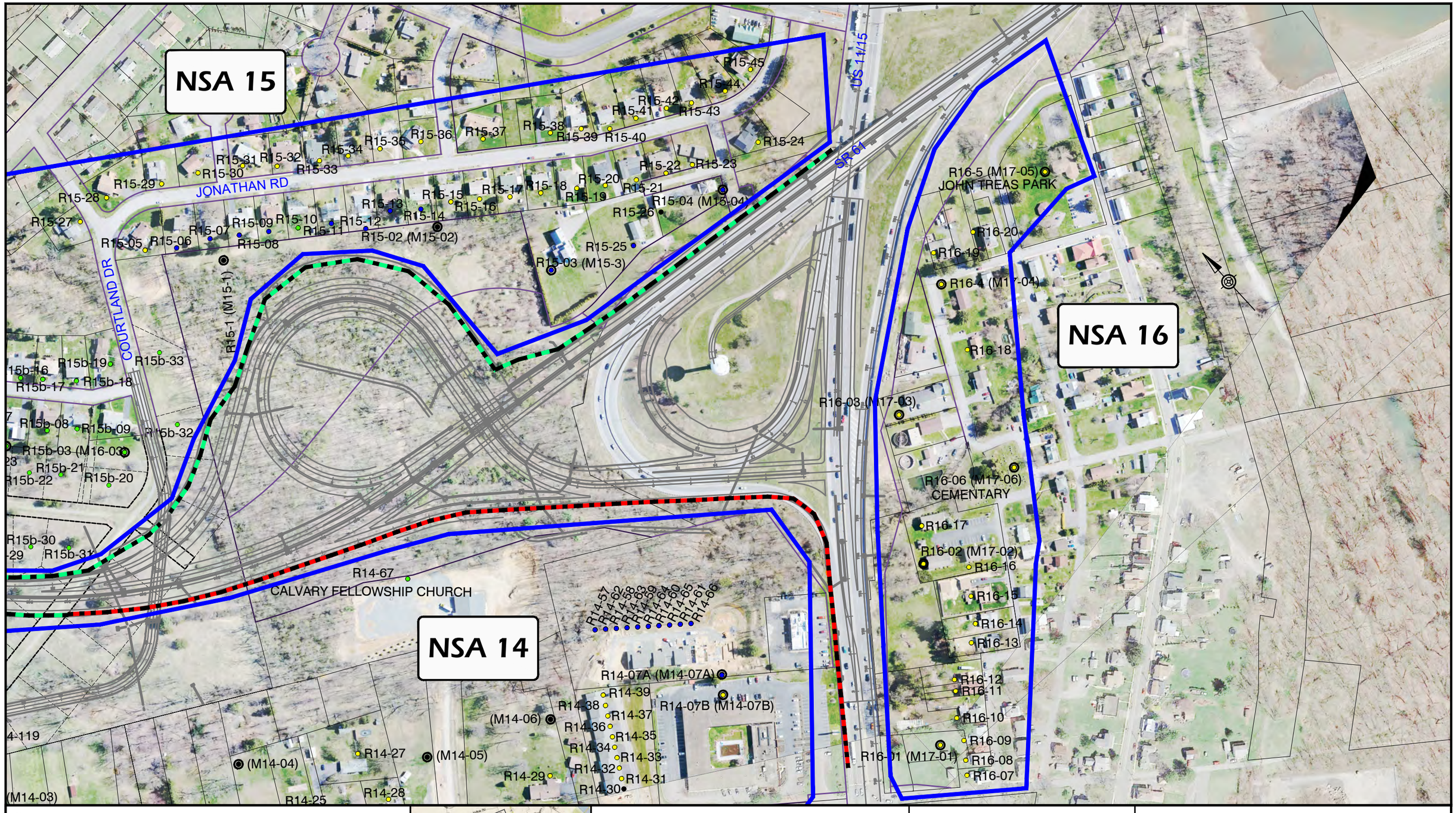
Scale (Feet)
250 125 0 250

Gannett Fleming

Figure 15

Map Created on 4.28.22


NSA 15a
NSA 15b
JONATHAN RD
COURTLAND DR
ROME CT
R15-45
R15-44
R15-42
R15-41
R15-43
R15-38
R15-39
R15-40
R15-24
R15-35
R15-36
R15-37
R15-34
R15-31
R15-32
R15-33
R15-30
R15-29
R15-28
R15-27
R15-22
R15-23
R15-20
R15-21
R15-18
R15-19
R15-15
R15-17
R15-16
R15-13
R15-14
R15-04 (M15-04)
R15-26
R15-09
R15-10
R15-12
R15-07
R15-11
R15-02 (M15-02)
R15-05
R15-06
R15-08
R15-25
R15-03 (M15-3)
R15-1 (M15-1)
R15b-12
R15b-13
R15b-11
R15b-14
R15b-19
R15b-33
R15b-10
R15b-15
R15b-16
R15b-17
R15b-18
R15b-01 RES
R15b-05
R15b-07
R15b-06
R15b-08
R15b-09
R15b-32
R15b-02 (M16-02)
R15b-03 (M16-03)
R15b-01 (M16-01PL)
R15b-26
R15b-25
R15b-23
R15b-24
R15b-21
R15b-22
R15b-20
R15b-27
R15b-28
R15b-30
R15b-29
R15b-31
R16-03
R14-67
CALVARY FELLOWSHIP CHURCH
R14-57
R14-62
R14-58
R14-63
R14-59
R14-64
R14-60
R14-65
R14-61
R14-66
R14-07A (M14-07A)
R14-39
R14-38
R14-07B (M14-07B)
R14-94
R14-95
R14-96
R14-97
R14-88
R14-84
R14-93
R14-76
R14-116
R14-01 (M14-01)
R14-115
R14-114
R14-124
R14-123
R14-122
R14-121
R14-120
SR 0
Noise Measurement Location
Noise Analysis Locations
Impacted, Benefitted
Impacted, Not Benefitted
Not Impacted, Benefitted
Not Impacted, Not Benefitted
24H Noise Measurement Location
Barriers
Feasible and Reasonable
Feasible, Not Reasonable
Not Feasible, Not Reasonable
13
12
11
10
16
14
15
17
9
8
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA
Scale (Feet)
250 125 0 250
Gannett Fleming
Figure 16
Map Created on 2.15.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable

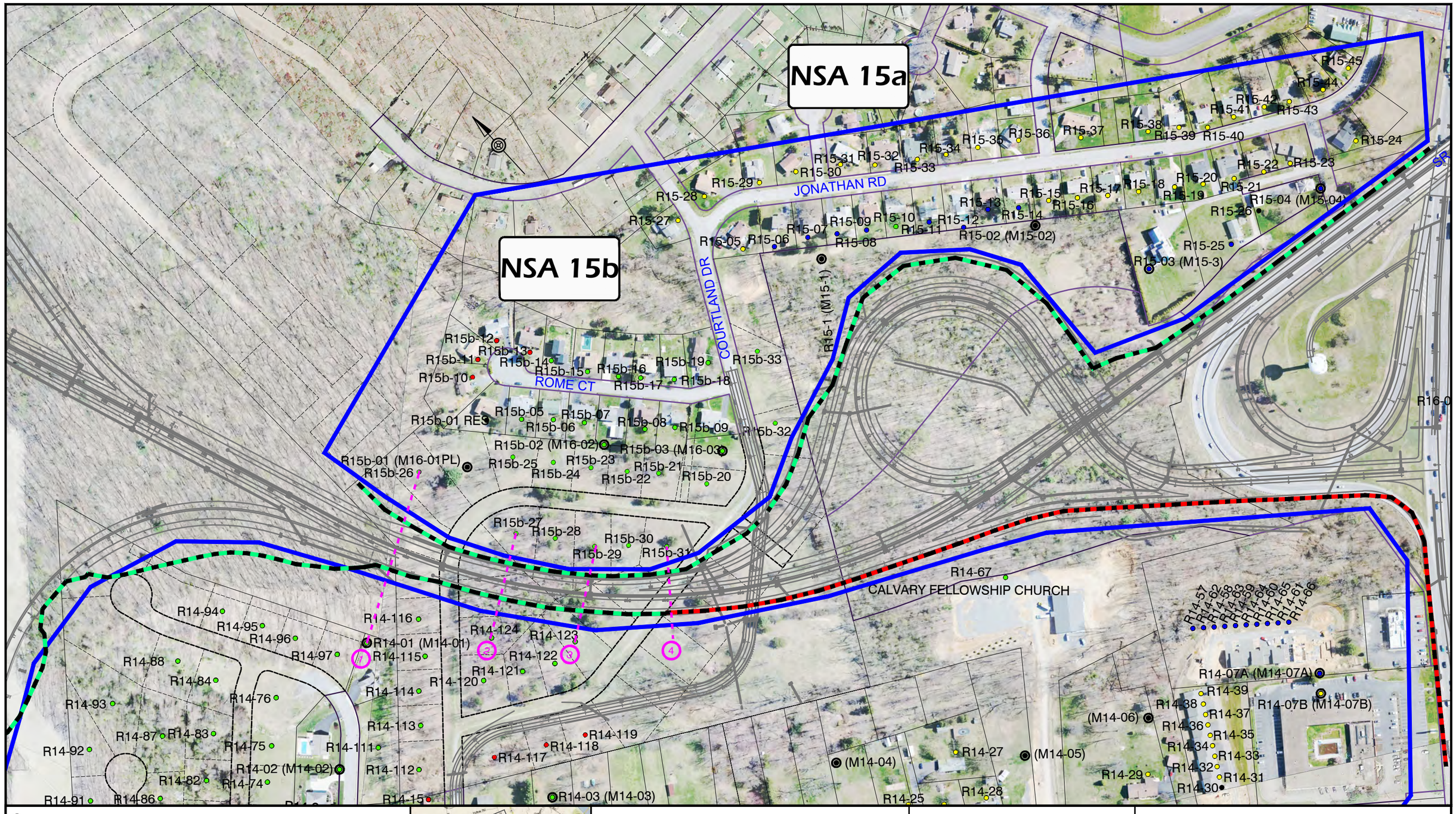
EASTERN ALTERNATIVE
CSVT Project
Pennsylvania Dept. of Transportation
S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, PA

Scale (Feet)
250 125 0 250

Gannett Fleming

Figure 17

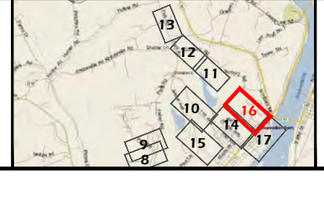
Map Created on 2.15.22



Noise Measurement Location
Noise Analysis Locations
- Impacted, Benefitted
- Impacted, Not Benefitted
- Not Impacted, Benefitted
- Not Impacted, Not Benefitted

24H Noise Measurement Location

Barriers
- Feasible and Reasonable
- Feasible, Not Reasonable
- Not Feasible, Not Reasonable
- Parallel Barrier Analysis



EASTERN ALTERNATIVE

CSVT Project

Pennsylvania Dept. of Transportation

S.R. 0015, Section 088

Snyder, Union, and Northumberland Counties, PA

Scale (Feet)

250 125 0 250

Gannett Fleming

Figure 18

Map Created on 2.28.22

Appendix A

Highway Noise Monitoring Sheet

DATE: 9-12-16

PROJECT: CSVT

JOB # 58758-C01

SITE ID R1-2

Gannett Fleming, Inc.

ADDRESS: 552 OLD TRAIL RD

Meter Storage # 319

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

Measurement Data

Photograph #'s _____

GPS PT _____

SLM Calibration before 93.8 after _____

Weather: temperature 63° wind speed 0-5 cloud cover 0

Time:	1st	start	9:33	stop	9:53	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	61.1	Lmax	78.0	Lmin	41.9	SEL	91.9
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

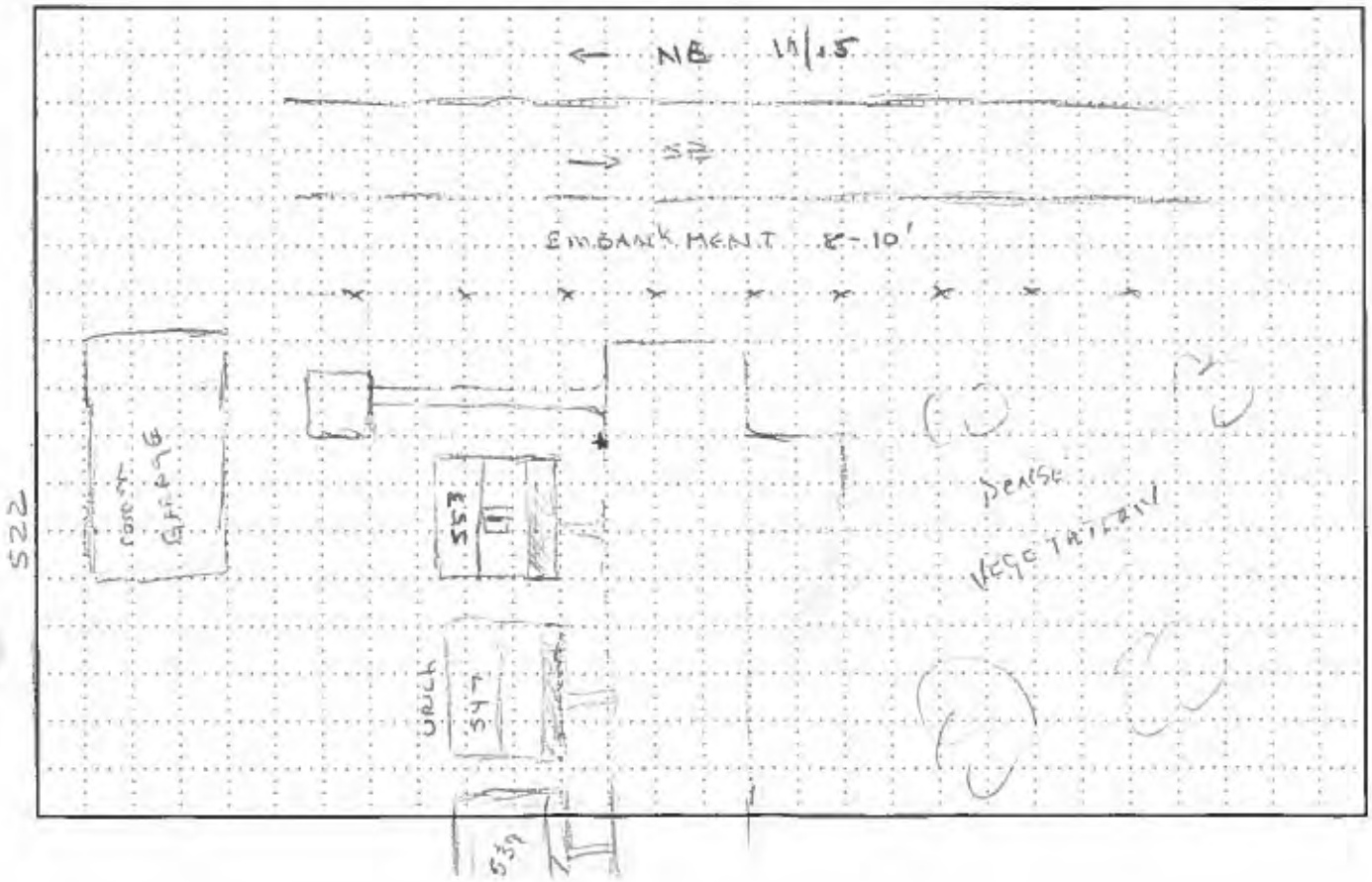
	Roadway#1		Roadway#2		Roadway#3 OVERPASS		Roadway#4	
	Direction EB		Direction WB		Direction		Direction	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	495		699		36.3			
med. trk.	6		16		18			
hvy trk.	27		37		74			
bus								
motorcycle								

NOTES: FED - PULLED IN PEPPER HORN (941)

DEF HEAD TRAFFIC - Jake brake on Decel off Ramp - Rumble strips across EOR

TRUCK SHIFTING ON/ACCEL from on Ramp

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB # 58758-C01

SITE ID M1-1

Gannett Fleming, Inc.

ADDRESS: 501 S Old Trail

Meter Storage # 0001 (#4)
* Data did not store b/c no SD card!

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after 94.0

GPS PT 40.815908, -76.8520

Weather: temperature 64.0°F wind speed 1 m/s cloud cover none clear

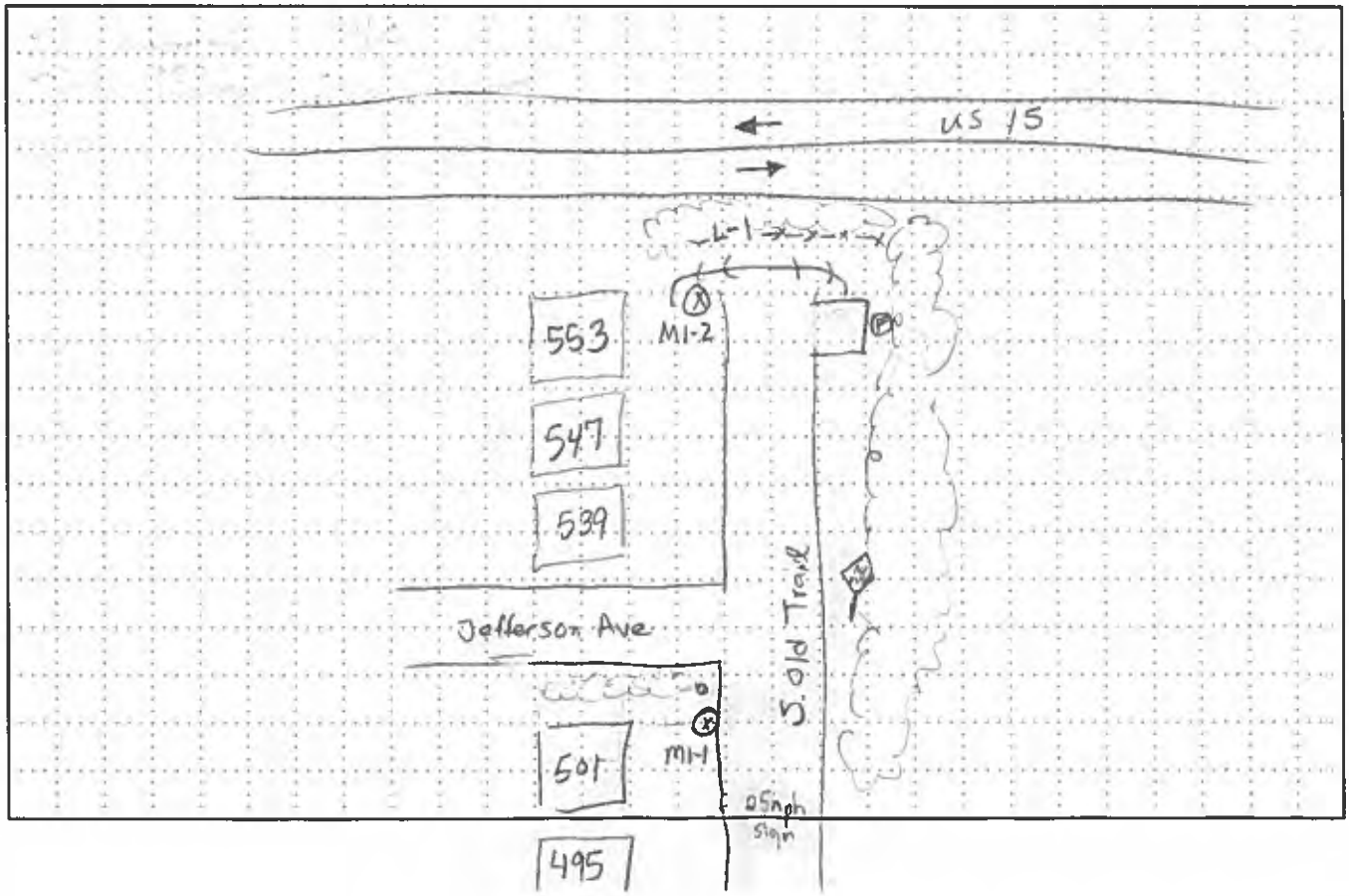
Time:	1st	start	933 am	stop	953 am	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	57.7	Lmax	78.7	Lmin	43.2	SEL	88.5
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	Old Trail		Roadway#2	Jefferson Ave		Roadway#3	522		Roadway#4	overpass WBO	
Direction			Direction			Direction	WB	EB	Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	141		auto	111		auto	195	689	auto	303	
med. trk.	1		med. trk.	1		med. trk.	6	16	med. trk.	18	
hvy trk.			hvy trk.			hvy trk.	27	37	hvy trk.	74	
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: UPS truck parks across from meter at dead end & turns around. horn on road

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M2-1A & M2-1B

Gannett Fleming, Inc.

ADDRESS: (US 15) 613 N Susquehanna Trl
Comfort Inn pool/end of bldg

Meter Storage # 001 (A) #320 (B)

TYPE ☐ Residential ☑ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after 94.0

GPS PT (A) 40.819969, -76.85200
(B) 40820071, -76.85 approx

Weather: temperature 68-1F wind speed 1.6 m/s cloud cover none

Time: A 1st start 1010:00 am stop 10.30:00 am total 20 mins
B 2nd start " stop " total "

Data: A 1st Leq 60.7 Lmax 77.5 Lmin 46.7 SEL 91.5 — M2-1A #4
B 2nd Leq 57.1 Lmax 73.9 Lmin 43.0 SEL 87.9 — M2-2B #3

Traffic Data

Roadway#1 11/15	SB 1st	2nd NB
Direction		
auto	822	492
med. trk.	39	54
hvy trk.	105	30
bus		
motorcycle		

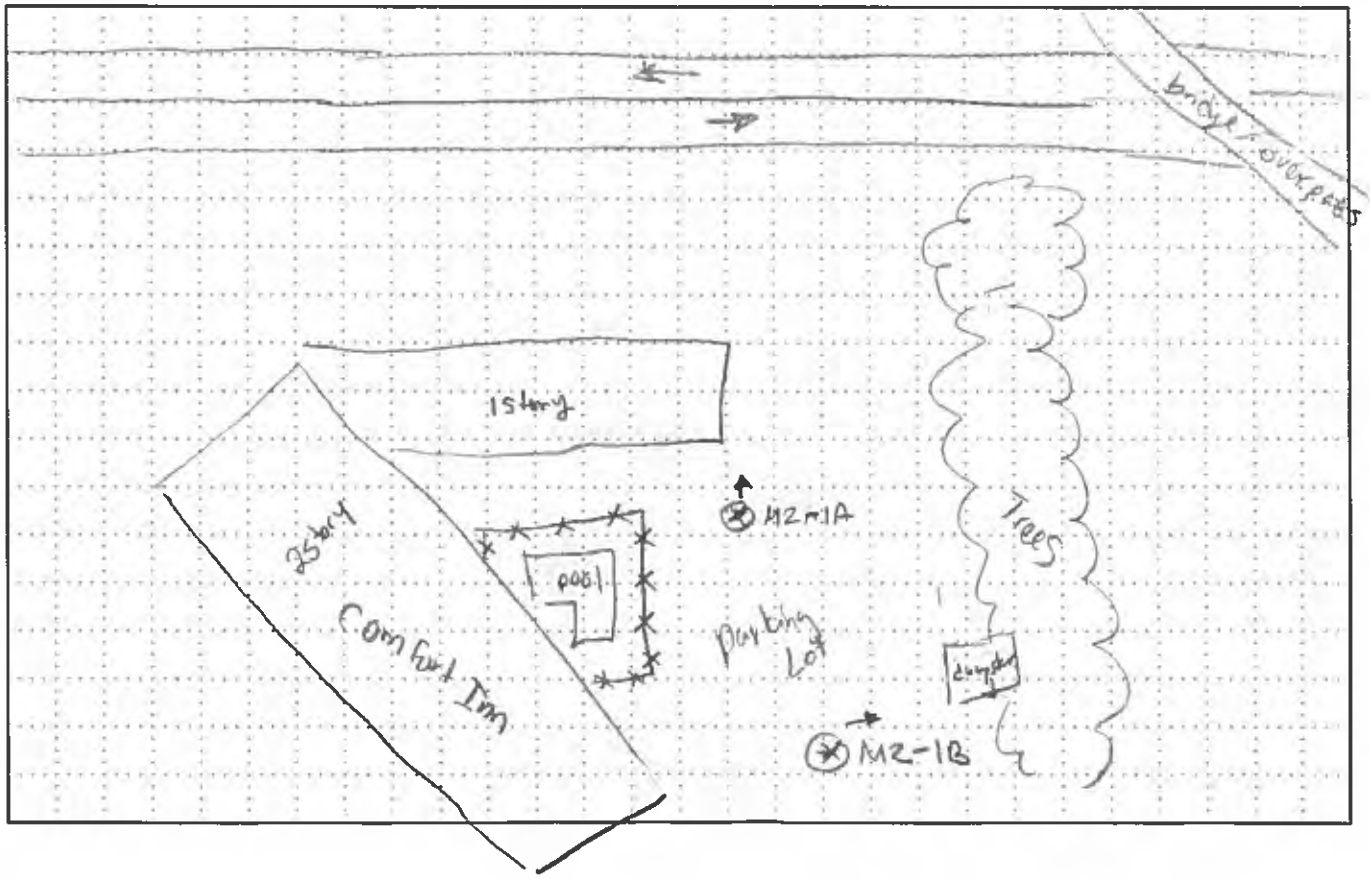
Roadway#2 US 15	1st	2nd
Direction westbound		
auto	266	798 M4
med. trk.	13	39
hvy trk.	41	123
bus	1	3
motorcycle		

Roadway#3 US 15	1st	2nd
Direction eastbound		
auto	186	558
med. trk.	10	30
hvy trk.	6	18
bus		
motorcycle		

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

NOTES: car starts in parking lot
meter #4

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3/27/19

PROJECT: Selinsgrove Byp.

JOB # 058758.1151

SITE ID R2 - B1

Gannett Fleming, Inc.

ADDRESS: 723 S. Old Trail
Selinsgrove PA 17870

Meter Storage # 67

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

Measurement Data

Photograph #'s _____

SLM NO. 4228 SLM Calibration before 93.85 after _____ GPS PT _____

Weather: temperature 38° wind speed 1.0 mph cloud cover none

Time:	1st	start	11:04	stop	11:24	total	20m		
	2nd	start		stop		total			
Data:	1st	Leq	57.2	Lmax	73.7	Lmin	41.1	SEL	88
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	15	
Direction	NB	SB
	1st	2nd
auto	118	121
med. trk.	7	6
hvy trk.	34	40
bus	0	0
motorcycle	0	0

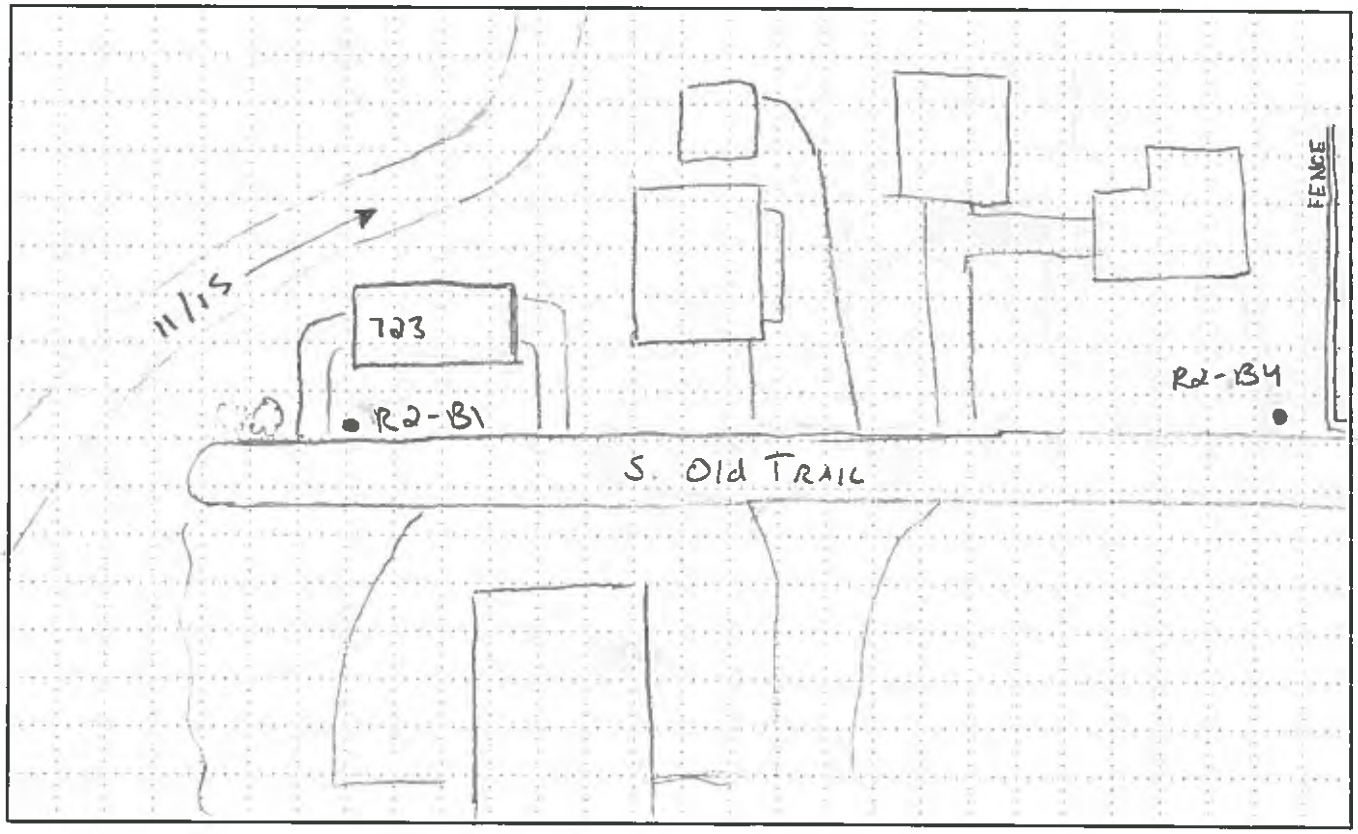
Roadway#2		
Direction		
	1st	2nd
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

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: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3/27/19

PROJECT: Selinsgrove Byp.

JOB # 058758.1151

SITE ID R2-B4

Gannett Fleming, Inc.

ADDRESS: 765 S Old Trail
Selinsgrove PA 17870

Meter Storage # 79

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

Measurement Data

Photograph #'s _____

SLM NO. 4229 SLM Calibration before 93.7 after _____ GPS PT _____

Weather: temperature 38°F wind speed 1.0mph cloud cover None

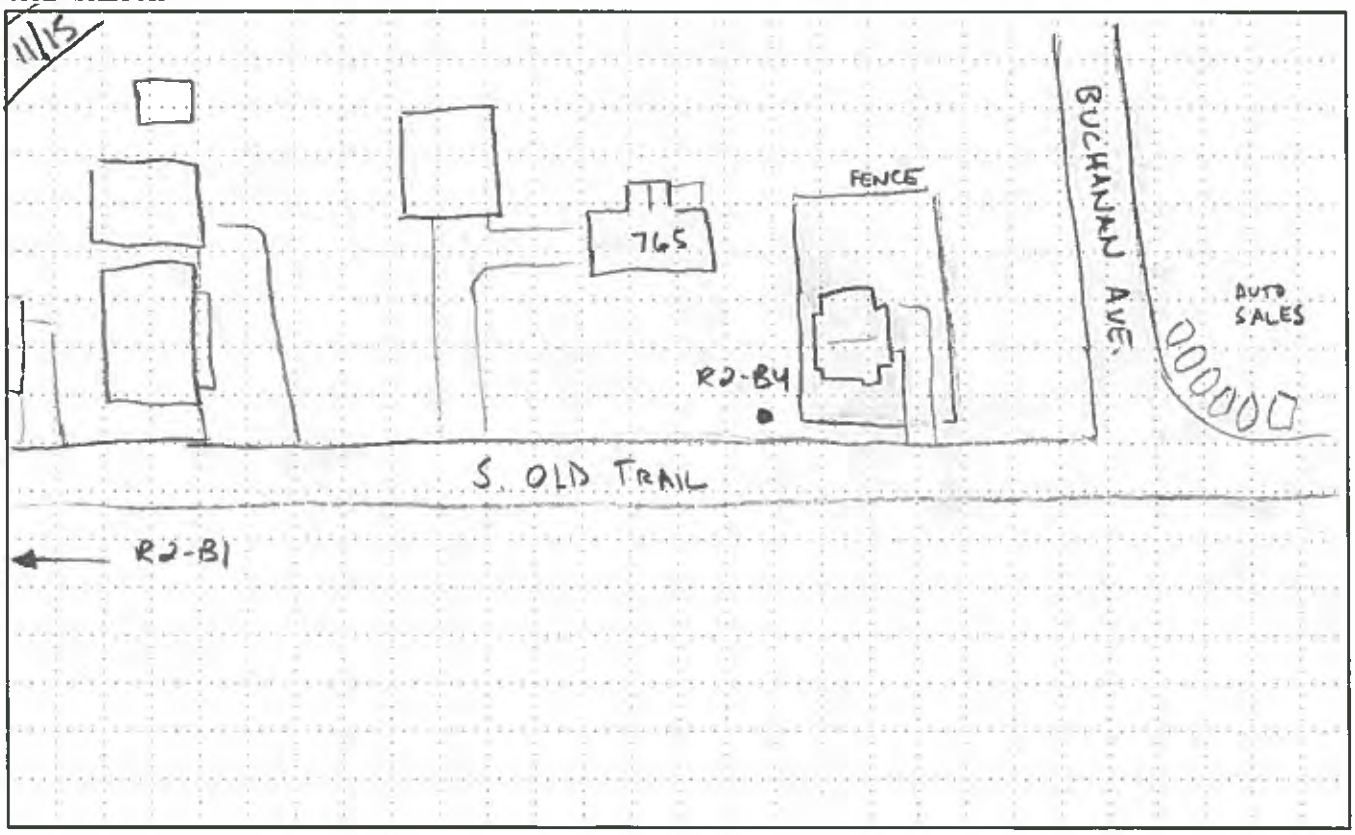
Time:	1st	start	11:05	stop	11:25	total	20m			
	2nd	start		stop		total				
Data:	1st	Leq	48.0	Lmax	56.9	Lmin	37.7	SEL	78.8	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	1S		Roadway#2			Roadway#3			Roadway#4		
Direction	NB	SB	Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	118	121	auto			auto			auto		
med. trk.	7	6	med. trk.			med. trk.			med. trk.		
hvy trk.	34	40	hvy trk.			hvy trk.			hvy trk.		
bus	0	0	bus			bus			bus		
motorcycle	0	0	motorcycle			motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CSVT

JOB #

SITE ID M32

Gannett Fleming, Inc.

ADDRESS: 91 Airport Rd

Meter Storage # 327

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT

SLM Calibration before 93.9 after

Weather: temperature wind speed cloud cover

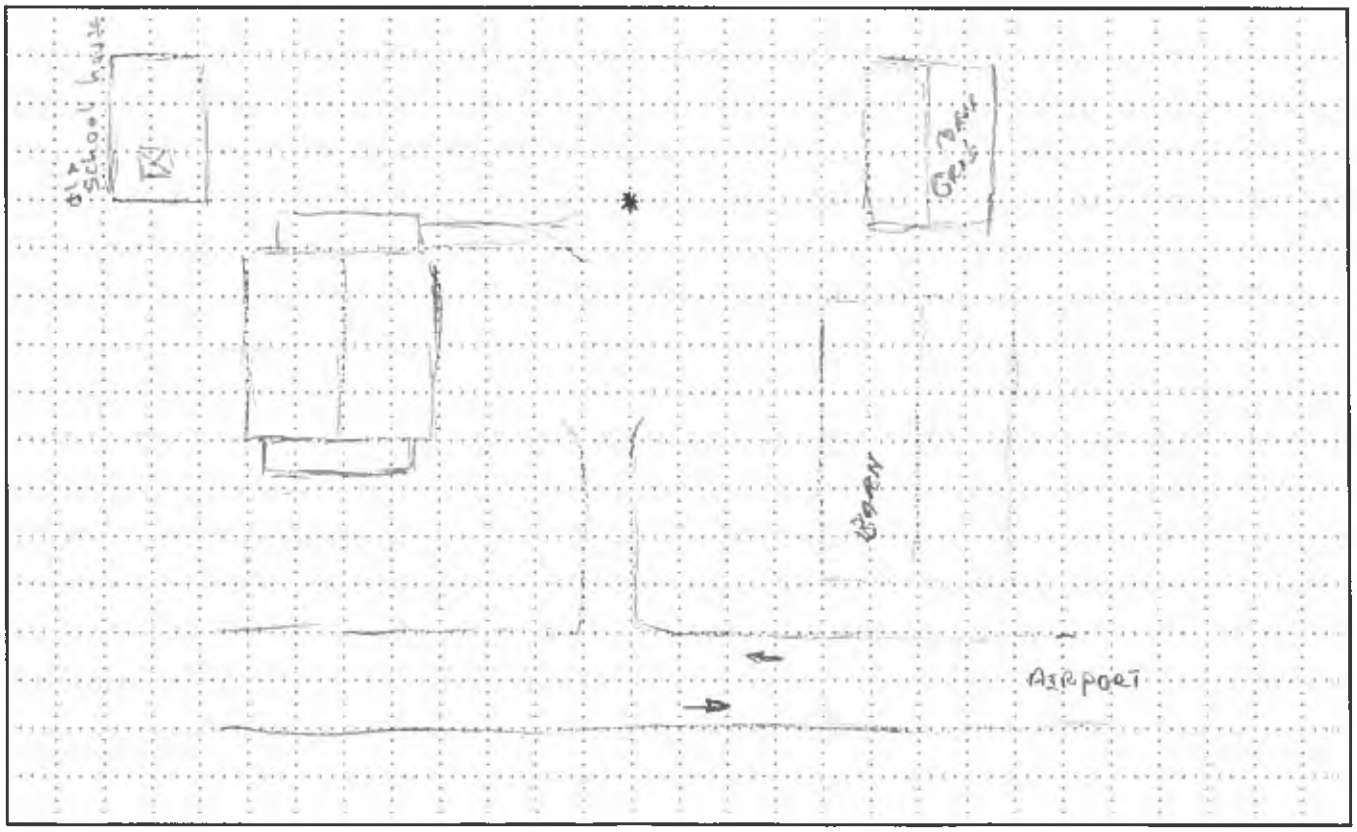
Time:	1st	start	7:54	stop	8:14	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	61.6	Lmax	59.7	Lmin	40.2	SEL	77.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	Airport Rd		Roadway#2	Airport Rd		Roadway#3			Roadway#4		
Direction	EB (N)		Direction	WB (S)		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	162		auto	49		auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus	6		bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSVT

JOB #

SITE ID M3-1

Gannett Fleming, Inc.

ADDRESS: 502 Airport Rd (Cook sometimes used in) by ACE of Signs (AOS)

Meter Storage # 0013 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.821877, -76.86083

SLM Calibration before 94.0 after

Weather: temperature 61.2°F wind speed 0.6 m/s cloud cover ~60% patchy/fluffy

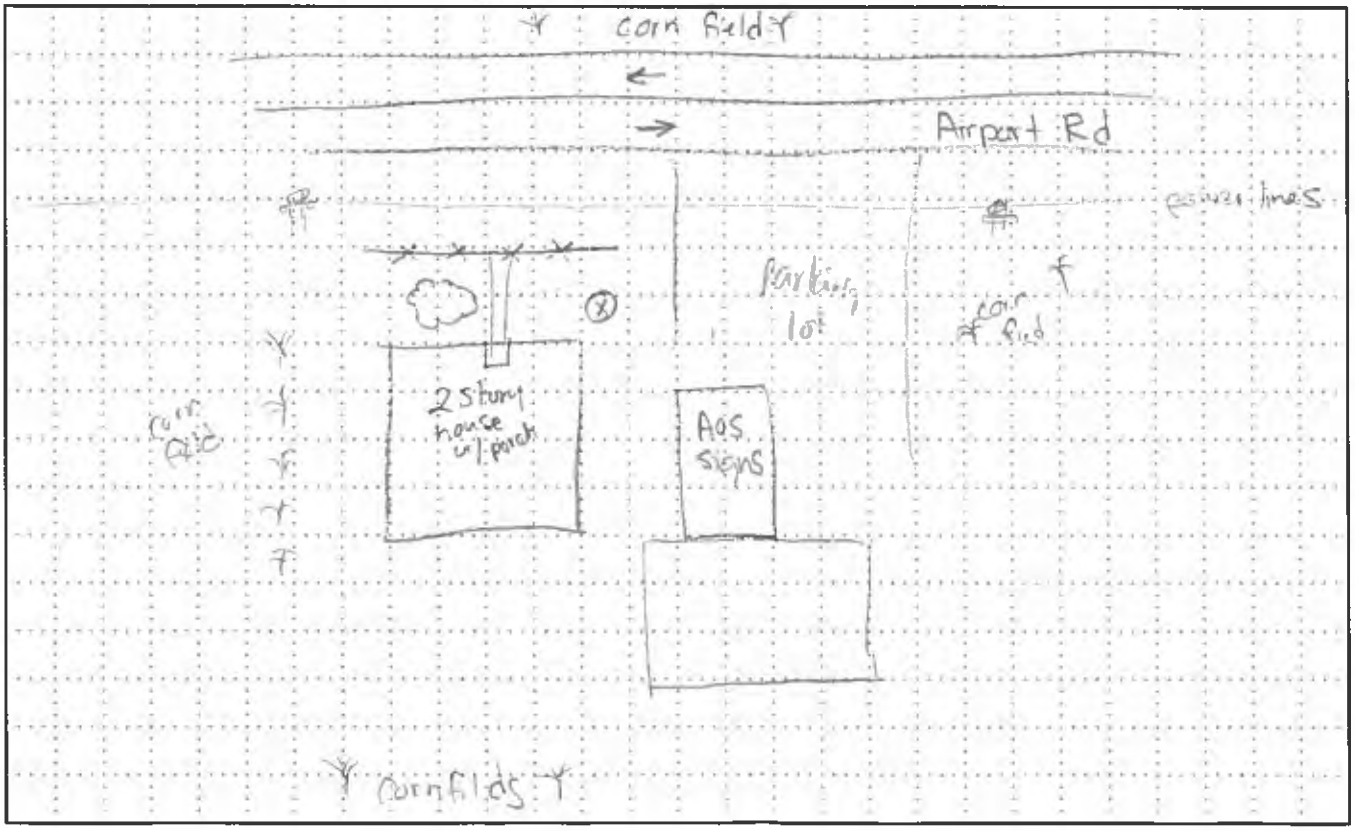
Time:	1st	start	754	stop	814	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	60.7	Lmax	76.7	Lmin	39.5	SEL	91.5	0013 (#4)
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1 Airport Rd Direction EB (S)		Roadway#2 Airport RD Direction WB (N)		Roadway#3 Direction		Roadway#4 Direction	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	162		48					
med. trk.								
hvy trk.								
bus	6							
motorcycle								

NOTES: Some activity in parking lot vehicle pulls in doors open & close and people talk (minimal impact on Leq). birds intermittent & audible paused for aircraft passes

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/10

PROJECT: CSVT

JOB #

SITE ID M4-1

Gannett Fleming, Inc.

ADDRESS: 525 Mill Rd

Meter Storage # 0022 (44)

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

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after

GPS PT 40.828928, -76.86130

Weather: temperature 76.6 wind speed 1.1 m/s gusts to 3 m/s cloud cover 10%

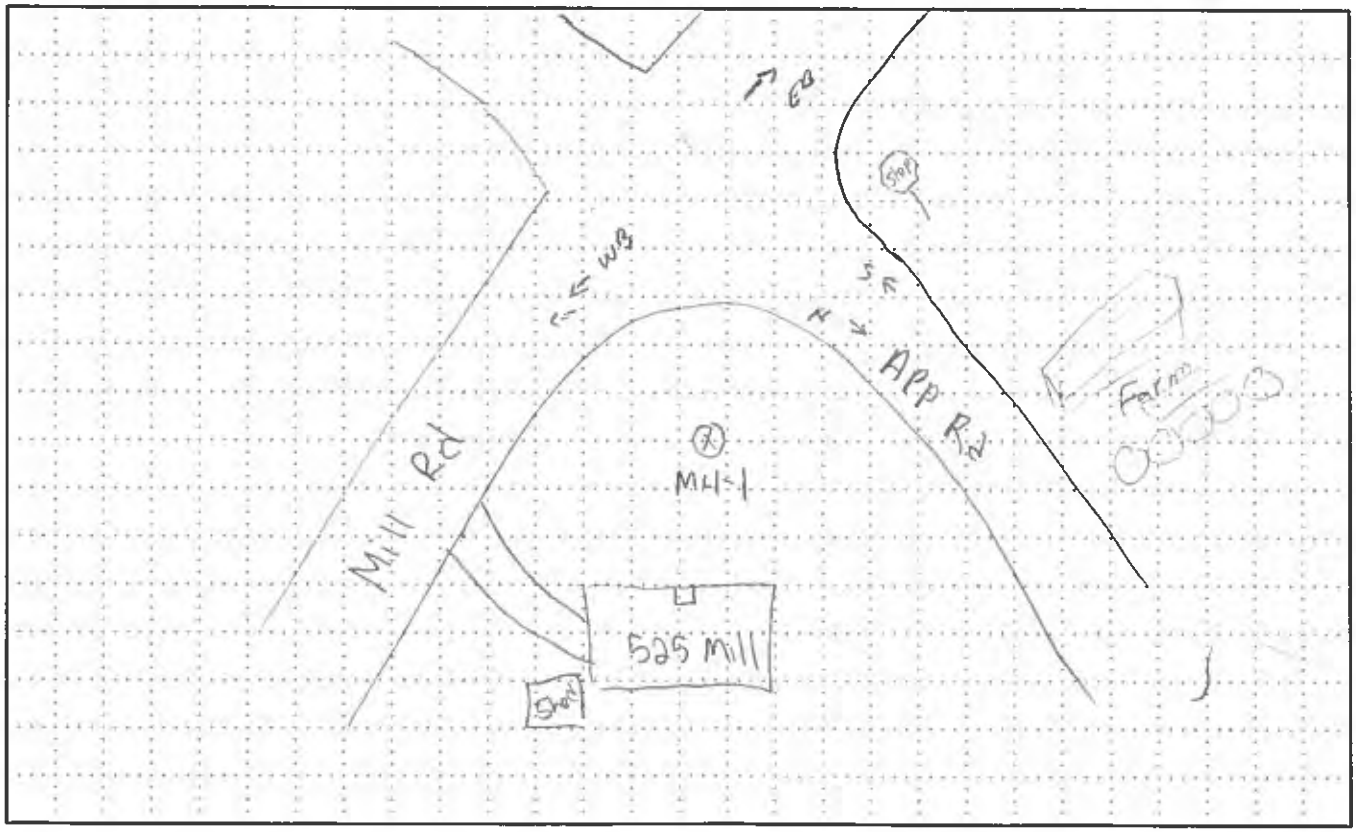
Time:	1st	start 8:02:15	stop 8:22:15	total 20min					
	2nd	start	stop	total					
Data:	1st	Leq 64.3	Lmax 79.9	Lmin 45.2	SEL 95.1				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

	Roadway#1 Mill Rd		Roadway#2 Mill Rd		Roadway#3 Airport Rd		Roadway#4 Airport Rd	
Direction	→ EB		← WB		NB		SB	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	39	117	84 (84)	252	132		210	
med. trk.	2	6			0		0	
hvy trk.	1	3			3		0	
bus					3		0	
motorcycle					0		0	

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-14-16

PROJECT: CSVT

JOB #

SITE ID M4-2

Gannett Fleming, Inc.

ADDRESS:

96 AIRPORT RD

Meter Storage # 337

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

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before 93.9 after GPS PT

Weather: temperature 59 wind speed 0. cloud cover 0

Time:	1st	start	8.01	stop	8.21	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	65.9	Lmax	86.0	Lmin	45.7	SEL	96.7
	2nd	Leq		Lmax		Lmin		SEL	

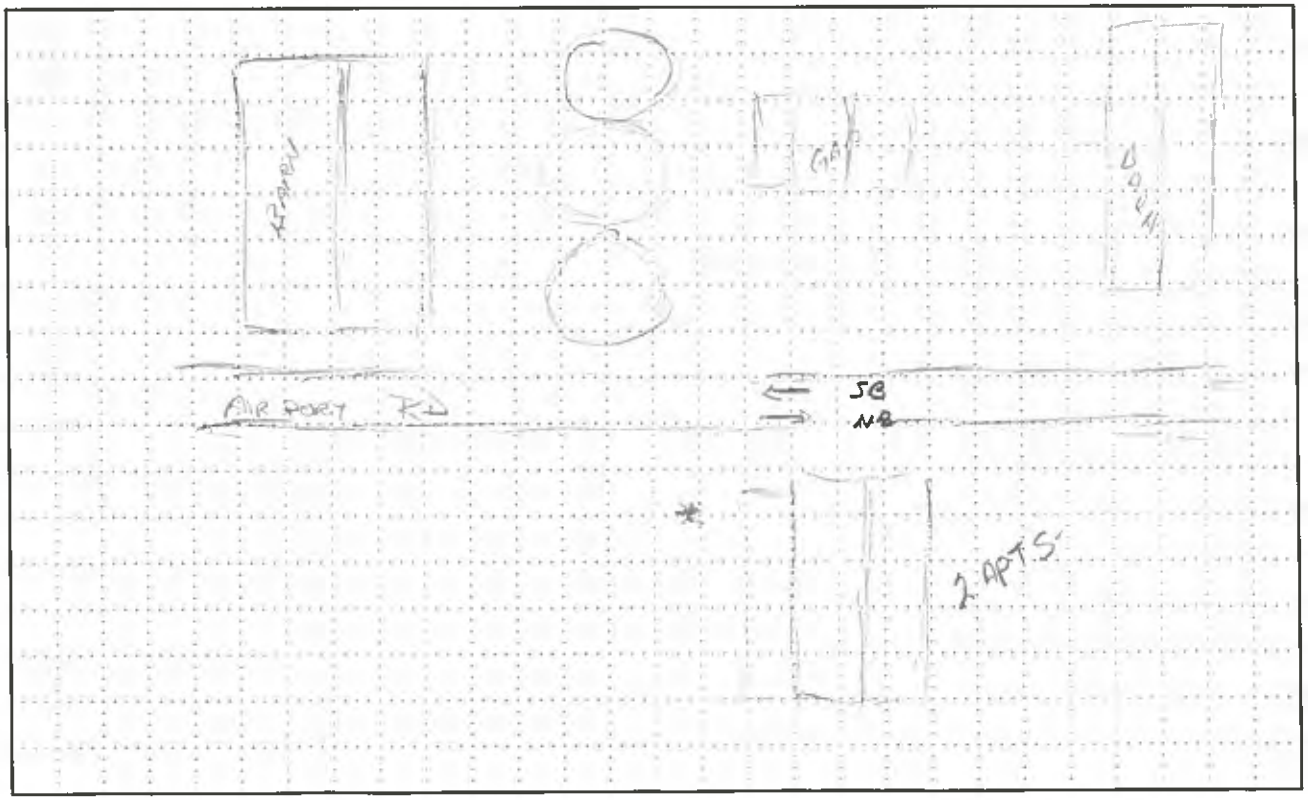
Traffic Data

	Roadway#1 AIRPORT		Roadway#2 AIRPORT NB		Roadway#3 MILL RD		Roadway#4 MILL RD	
	Direction NB		Direction SB		Direction → W		Direction ← E	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	132		210					
med. trk.	0		0					
hvy trk.	3		0					
bus	2		0					
motorcycle	0		0					

NOTES: COWS, COMPRESSOR RUNNING - FARM NOISES - GOLF CART

SPEED FROM INTERSECTION 30-35 INTO INTERSECTION 37-38

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3/27/19

PROJECT: Selinsgrove Byp.

JOB # 058.758.1151

SITE ID M4-B12

Gannett Fleming, Inc.

ADDRESS: 69 Oakmont Ct
Selinsgrove PA

Meter Storage # 80

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

Measurement Data

Photograph #'s _____

SLM NO. 4229 SLM Calibration before 93.7 after —

GPS PT 40.82991 N
76.85979 W

Weather: temperature 46 F wind speed 1.5 mph cloud cover none

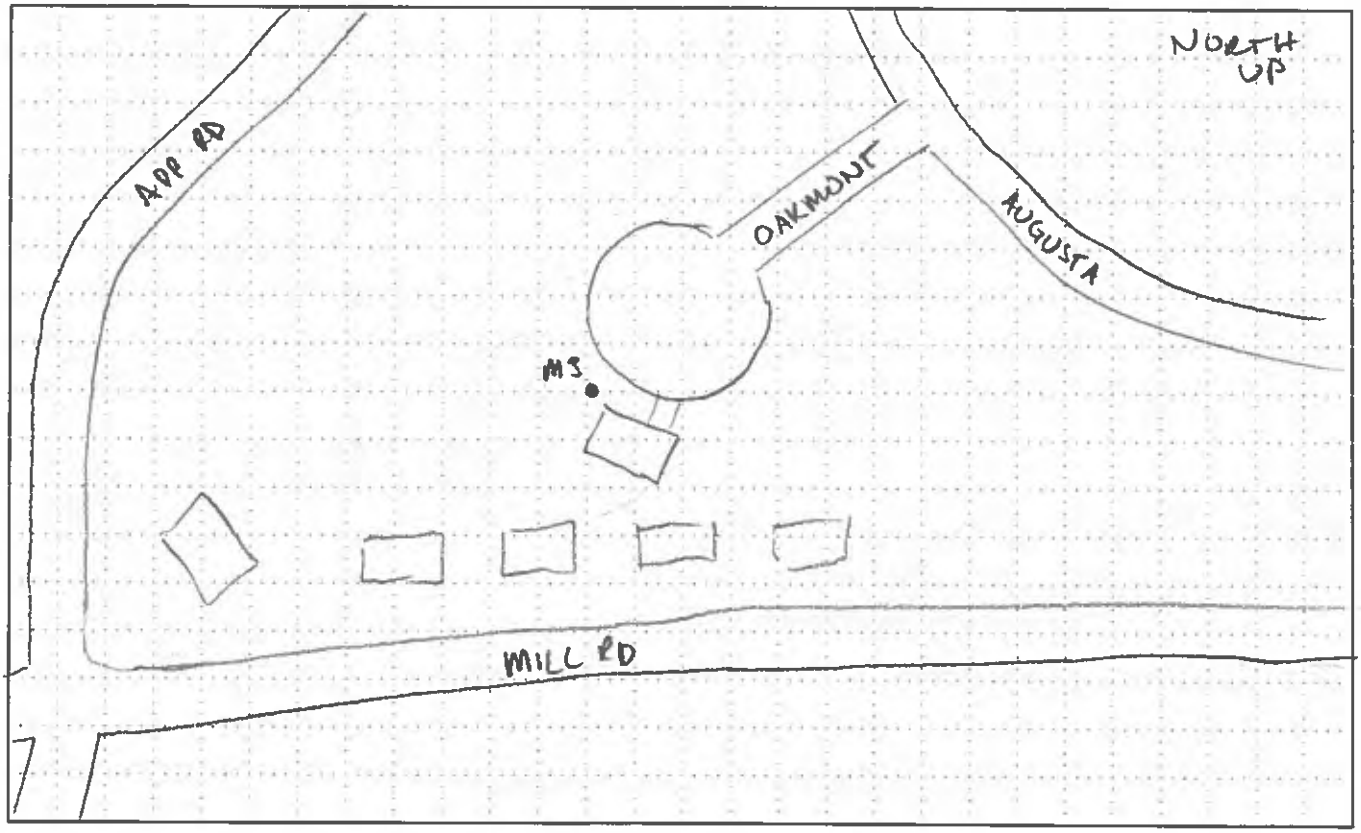
Time:	1st	start	12:00	stop	12:20	total	20m		
	2nd	start		stop		total			
Data:	1st	Leq	49.9	Lmax	71.5	Lmin	36.5	SEL	80.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

	Roadway#1		Roadway#2		Roadway#3		Roadway#4	
	Mill Rd		App					
Direction	Both		Both					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	120		57					
med. trk.	0		2					
hvy trk.	1		3					
bus	0		0					
motorcycle	1		1					

NOTES: 12:15 - Tractor running 12:18 bird chirping throughout

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M5-1

Gannett Fleming, Inc.

ADDRESS: 337 Penns Dr

Meter Storage # 0029 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.831727, -76.868478

SLM Calibration before 94.0 after

Weather: temperature 96.9° wind speed 0.8 mph cloud cover 20%

Time:	1st	start 1403	stop 1423	total 20 mins					
	2nd	start	stop	total					
Data:	1st	Leq 59.0	Lmax 79.1	Lmin 48.5	SEL 89.8				
	2nd	Leq	Lmax	Lmin	SEL				

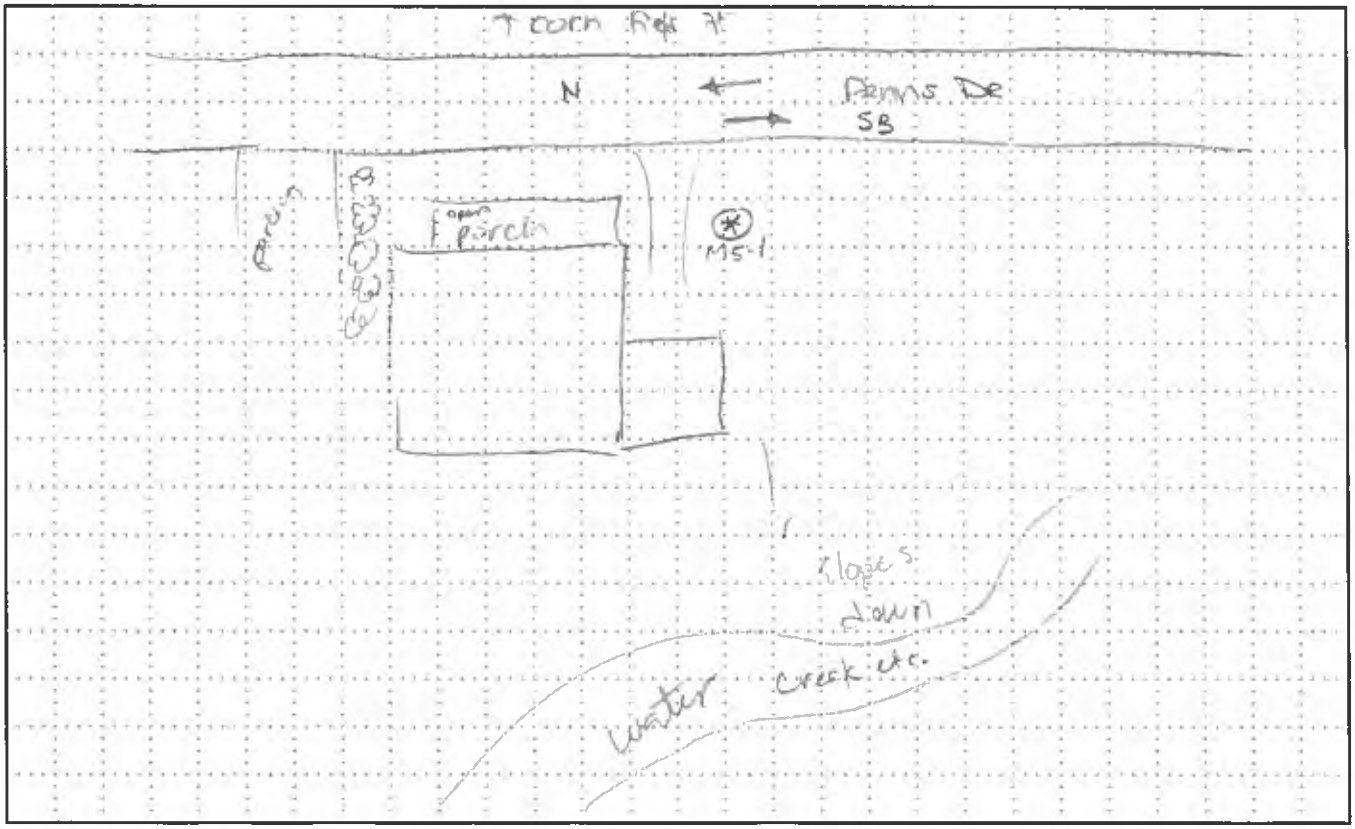
Traffic Data

Roadway#1 Penns Dr			Roadway#2 Penns Dr			Roadway#3			Roadway#4		
Direction ← NB			Direction → SB			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	|||||	33	auto	|||||	24	auto			auto		
med. trk.				med. trk.			med. trk.			med. trk.		
hvy trk.				hvy trk.			hvy trk.			hvy trk.		
bus				bus			bus			bus		
motorcycle				motorcycle			motorcycle			motorcycle		

NOTES: Window A/C on front porch, wind chimes and barking dog inside ~20Ft from rd in line w/ center of front porch & edge of house

lots of bird fr anderson porch & bird sounds

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M5-2

Gannett Fleming, Inc.

ADDRESS: 402 Pennis Dr

Meter Storage # 344

TYPE ☒ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 86 wind speed 0-5 mph cloud cover pt cldy

Time:	1st	start	2:01	stop	2:21	total				
	2nd	start		stop		total				
Data:	1st	Leq	48.3	Lmax	69.1	Lmin	35.2	SEL	79.1	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

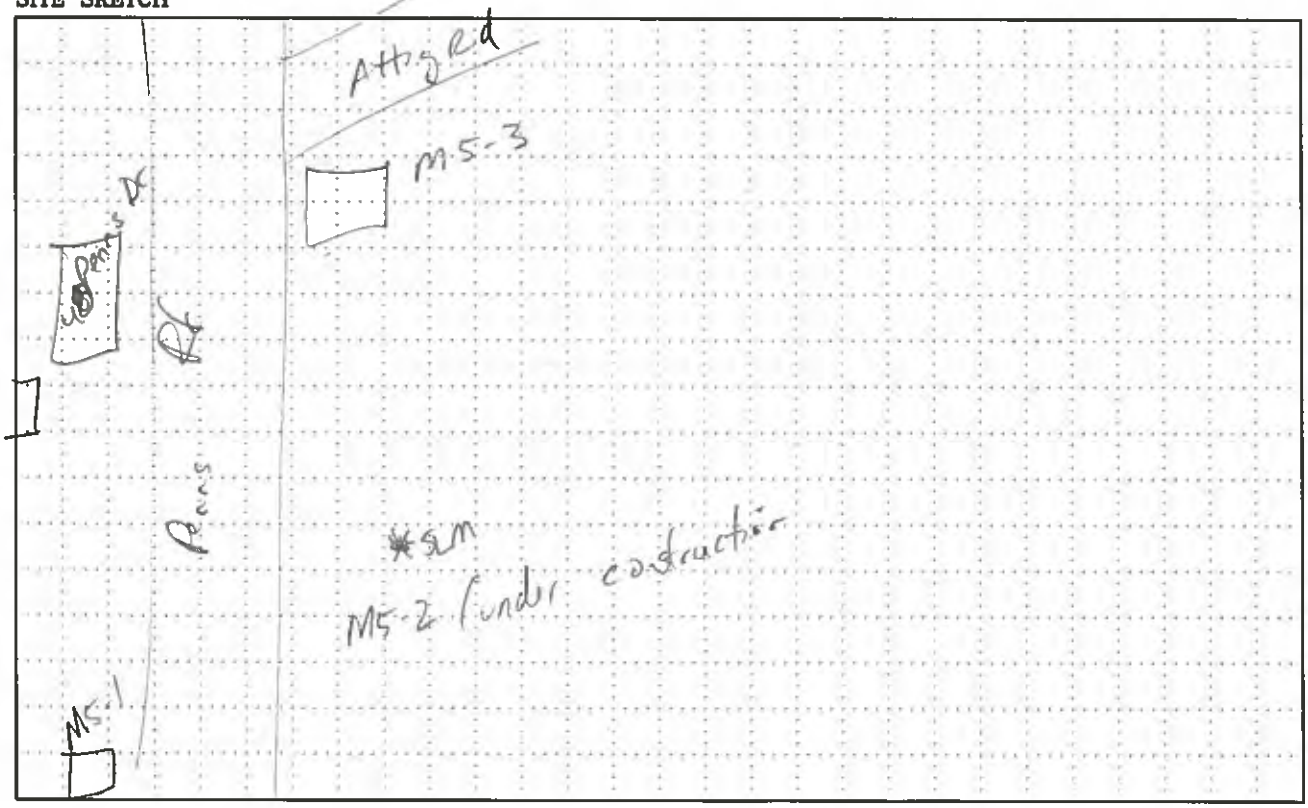
A

Roadway#1	Penns		Roadway#2			Roadway#3			Roadway#4		
Direction	Both		Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	41		auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus	1		bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

A 1111 1111 1111 1111 3 1 1

NOTES: Aircraft flyover @ 2:17 pm - paused meter, but some of the event still captured in the noise level

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M5-3

Gannett Fleming, Inc.

ADDRESS: 494 Penns Dr
The Palcyn's

Meter Storage # 0028 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after

GPS PT 40.834021, -76.869638

Weather: temperature 88.3°F wind speed 2.5 m/s gusts 5 m/s cloud cover 35%

Time:	1st	start	1333	stop	1353	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	47.9	Lmax	67.3	Lmin	38.7	SEL	78.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 Penns Dr	1st	2nd
Direction ↑ N		
auto		33
med. trk.	1	3
hvy trk.		
bus		
motorcycle		

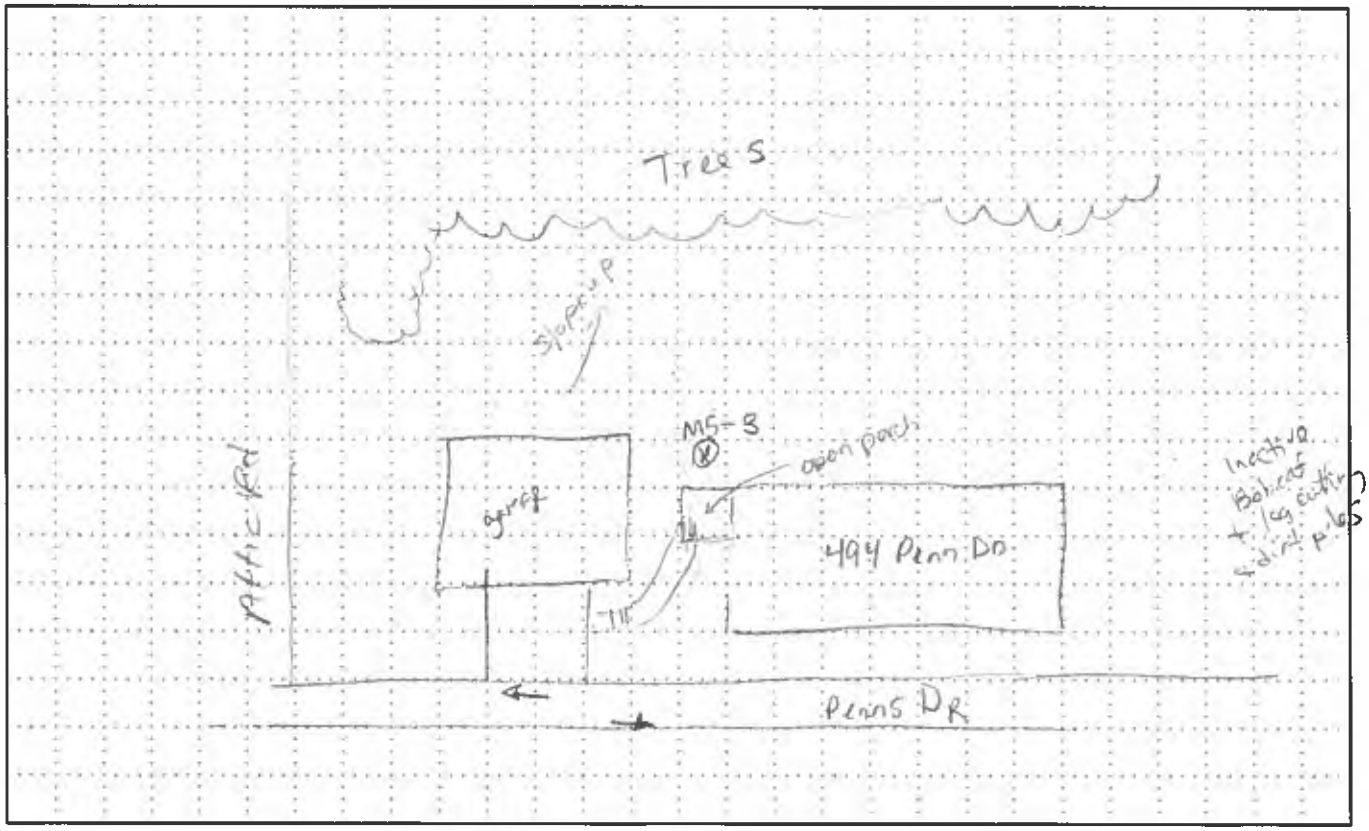
Roadway#2 Penns Dr	1st	2nd
Direction → S		
auto		24
med. trk.		
hvy trk.		
bus		
motorcycle		

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

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

NOTES: Insect noise + wind in trees

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID MS-4

Gannett Fleming, Inc.

ADDRESS: 730 Attis Rd

Meter Storage # 343

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 87 wind speed 0-8 mph cloud cover ptly cloudy

Time:	1st	start	1:33	stop	1:53	total	20 min			
	2nd	start		stop		total				
Data:	1st	Leq	45.4	Lmax	57.8	Lmin	34.4	SEL	76.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 Attis Rd	1st	2nd
Direction Both		
auto	5	
med. trk.		
hvy trk.		
bus		
motorcycle		

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

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

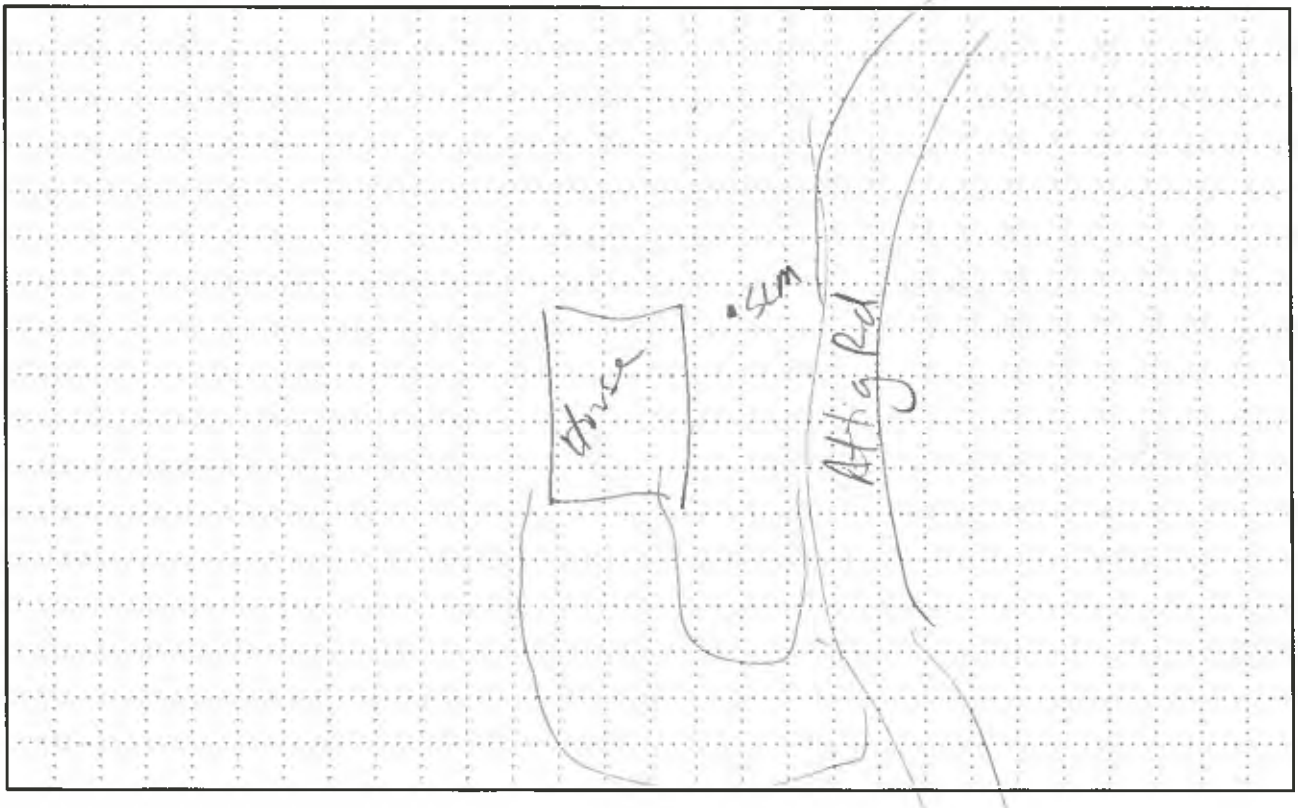
Roadway#4	1st	2nd
Direction		
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

NOTES:

Attis

HH

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID MS-5

Gannett Fleming, Inc.

ADDRESS: 700 Penns Dr

Meter Storage # 0027 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.637041, -76.8096

SLM Calibration before 94.0 after

Weather: temperature 90.1°F wind speed 1.5 m/s gusts to 4 m/s cloud cover 20%

Time:	1st	start	130200	stop	132200	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	44.6	Lmax	58.5	Lmin	40.9	SEL	75.4	
	2nd	Leq		Lmax		Lmin		SEL		

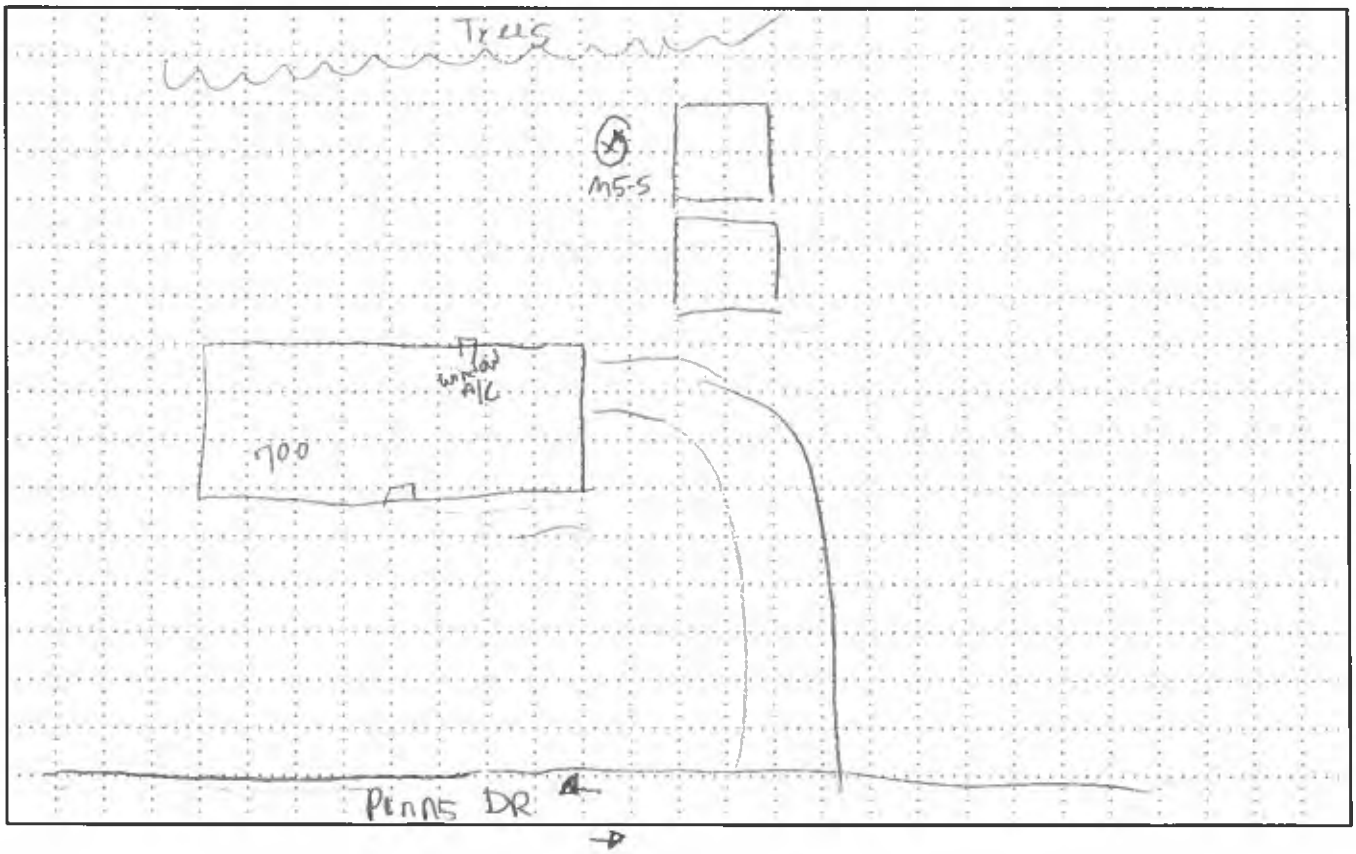
Traffic Data

(10 min count w/c of dogs)

Roadway#1	Penns Dr		Roadway#2	Penns Dr		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	11		auto	11		auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: A/C from window unit audible so meter located closer to shed dogs inside neighbors house audible at times; wind in trees, birds & insects took a while to find a spot the dogs wouldn't bark & I could still count thus only 10 min

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14

PROJECT: CSVT

JOB #

SITE ID MS-6

Gannett Fleming, Inc.

ADDRESS: OFFSET FROM 844 PENNS DR

Meter Storage # 342

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 82 wind speed 0-8 mph cloud cover sparse

Time:	1st	start 1:02	stop 1:22	total 20					
	2nd	start	stop	total					
Data:	1st	Leq 44.3	Lmax 59.4	Lmin 31.0	SEL 75.1				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

Roadway#1 Penns Rd	1st	2nd
Direction Eastbound		
auto	11	33
med. trk.	0	
hvy trk.	0	
bus	0	
motorcycle	1	3

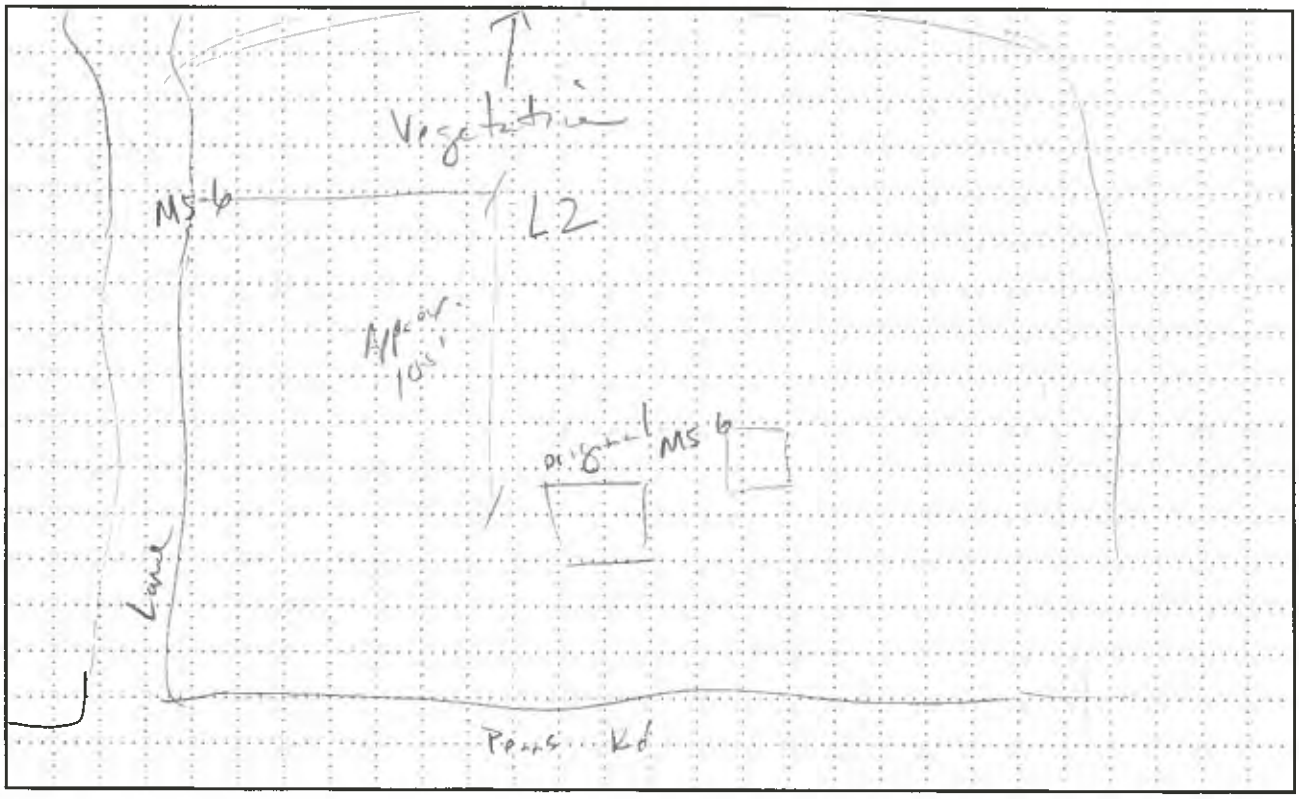
Roadway#2	1st	2nd
Direction		
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

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

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

NOTES: Slightly approx 10' above back yard at MS-6

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-14-16

PROJECT: CSVT

JOB #

SITE ID Mile 1

Gannett Fleming, Inc.

ADDRESS: LIMERICK LN.

END CUL DE SAC

Meter Storage # 338

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature 66 wind speed 0-5 cloud cover 0

Time:	1st	start	8:42	stop	9:02	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	48.2	Lmax	70.1	Lmin	46.3	SEL	79.0
	2nd	Leq		Lmax		Lmin		SEL	

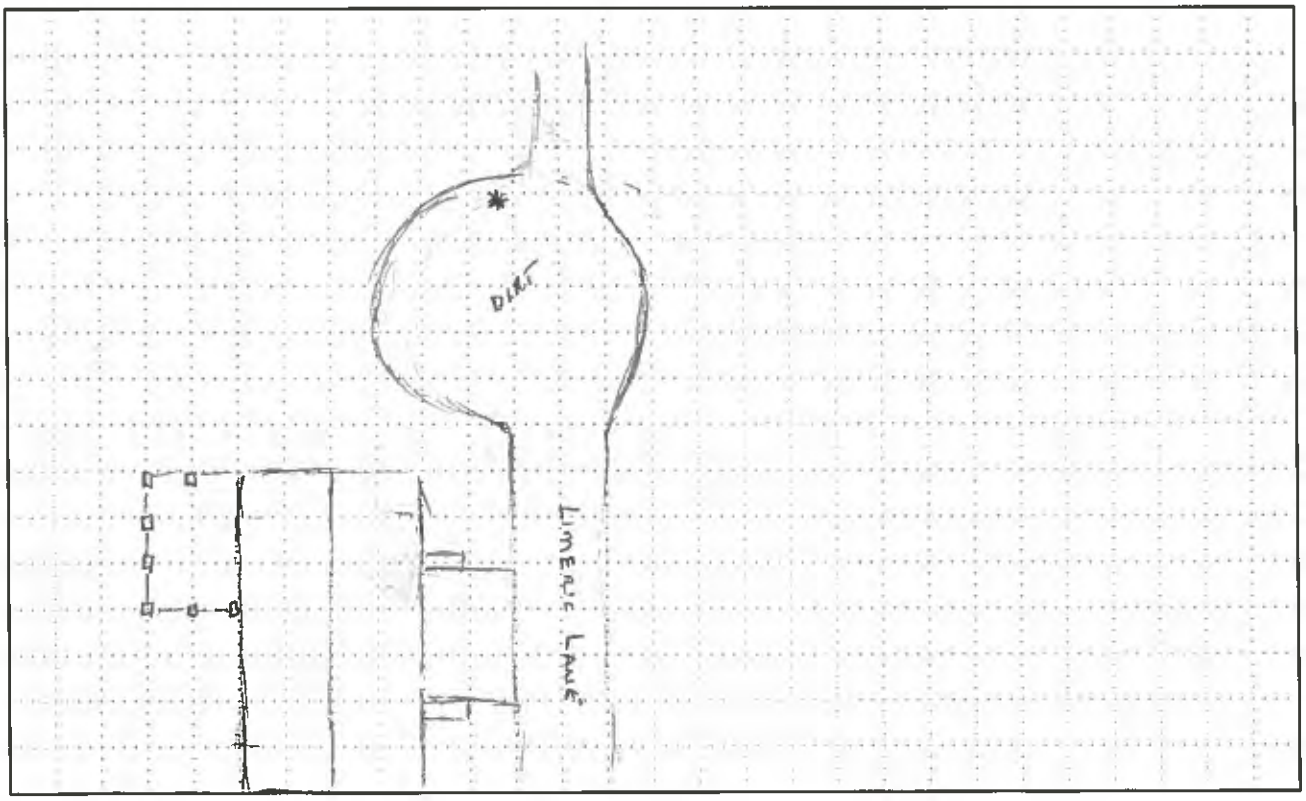
Traffic Data

	Roadway#1 AIRPORT		Roadway#2 AIRPORT		Roadway#3		Roadway#4	
	Direction NB		Direction SB		Direction		Direction	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	64		66					
med. trk.	3		0					
hvy trk.	0		0					
bus	0		6					
motorcycle	0							

NOTES: HEAD SOME TRAFFIC ON PAINE DR & DISTANT 522

BIRDS CHIRPING

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/6

PROJECT: CSVT

JOB #

SITE ID M 6-2

Gannett Fleming, Inc.

ADDRESS: 44 Kingswood Dr

Meter Storage # (#4) 0024

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.833700 -76.866192

SLM Calibration before 94.0 after

Weather: temperature 79.6°F wind speed 0.3 m/s cloud cover Clear/none

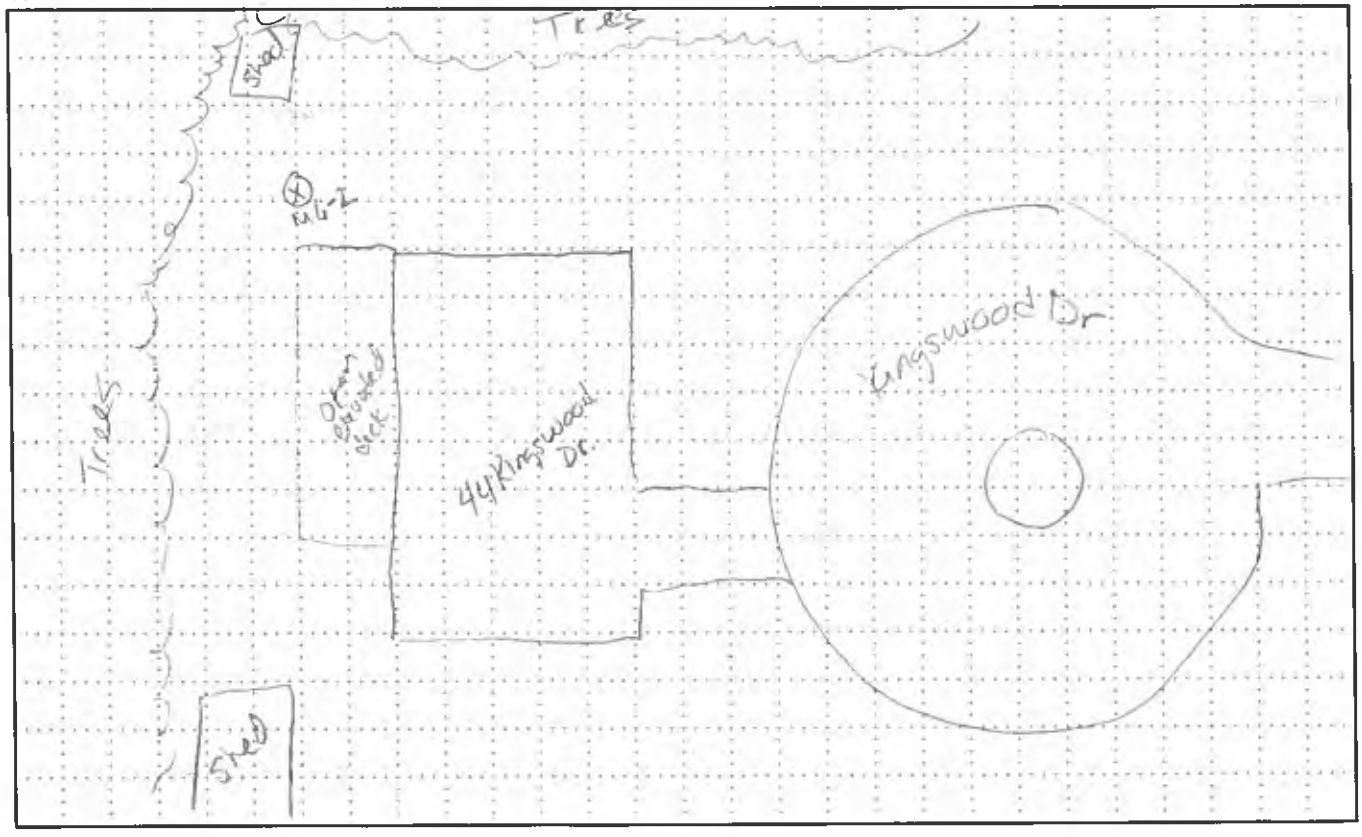
Time:	1st	start	9:17:30	stop	9:37:30	total	20 MIN			
	2nd	start		stop		total				
Data:	1st	Leq	45.9	Lmax	60.6	Lmin	44.0	SEL	76.7	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1			Roadway#2			Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto			auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: Birds and insects audible distant traffic audible especially on acceleration

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 3/27/19

PROJECT: Selinsgrove Byp.

JOB # 058758.1115

SITE ID R6-B34

Gannett Fleming, Inc.

ADDRESS: 299 Attig Rd

Selinsgrove PA

Meter Storage # _____

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

Measurement Data

Photograph #'s _____

SLM NO. 4229 SLM Calibration before 93.7 after —

GPS PT 40.83692 N
76.86111 W

Weather: temperature 52.0F wind speed 1.0 mph cloud cover NONE

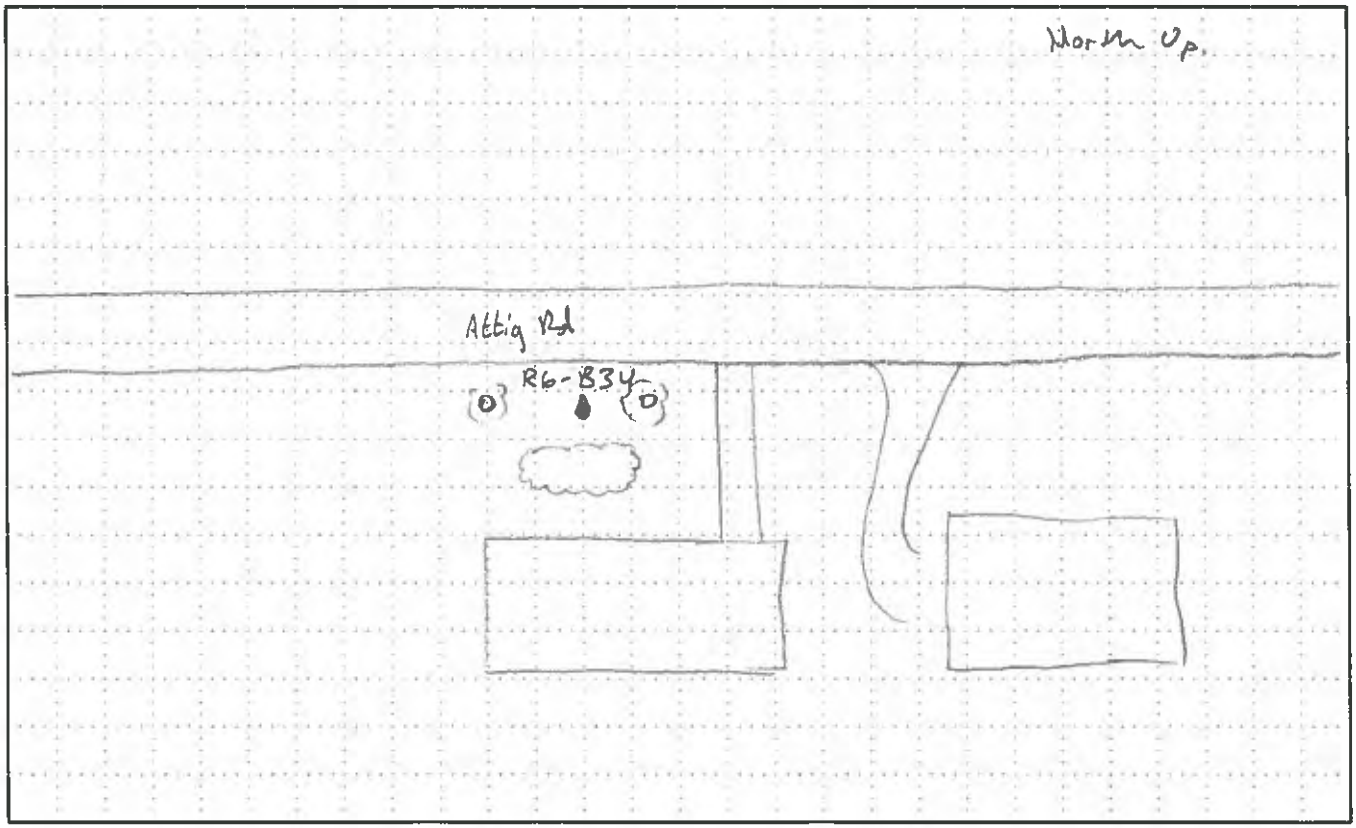
Time:	1st	start	12:42	stop	1:02	total	20m		
	2nd	start		stop		total			
Data:	1st	Leq	52.0	Lmax	71.2	Lmin	26.1	SEL	80.8
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	Attig Rd		Roadway#2			Roadway#3			Roadway#4		
Direction	BOTH		Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto			auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: 12:47-12:49 Dog barking

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-14-16

PROJECT: CSVT

JOB #

SITE ID 6-3

Gannett Fleming, Inc.

ADDRESS: 38 Kingswood Dr

BKYARD -

Meter Storage # 339

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature wind speed cloud cover

Time:	1st	start	9:16	stop	9:36	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	40.9	Lmax	37.2	Lmin	58.1	SEL	71.7	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

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

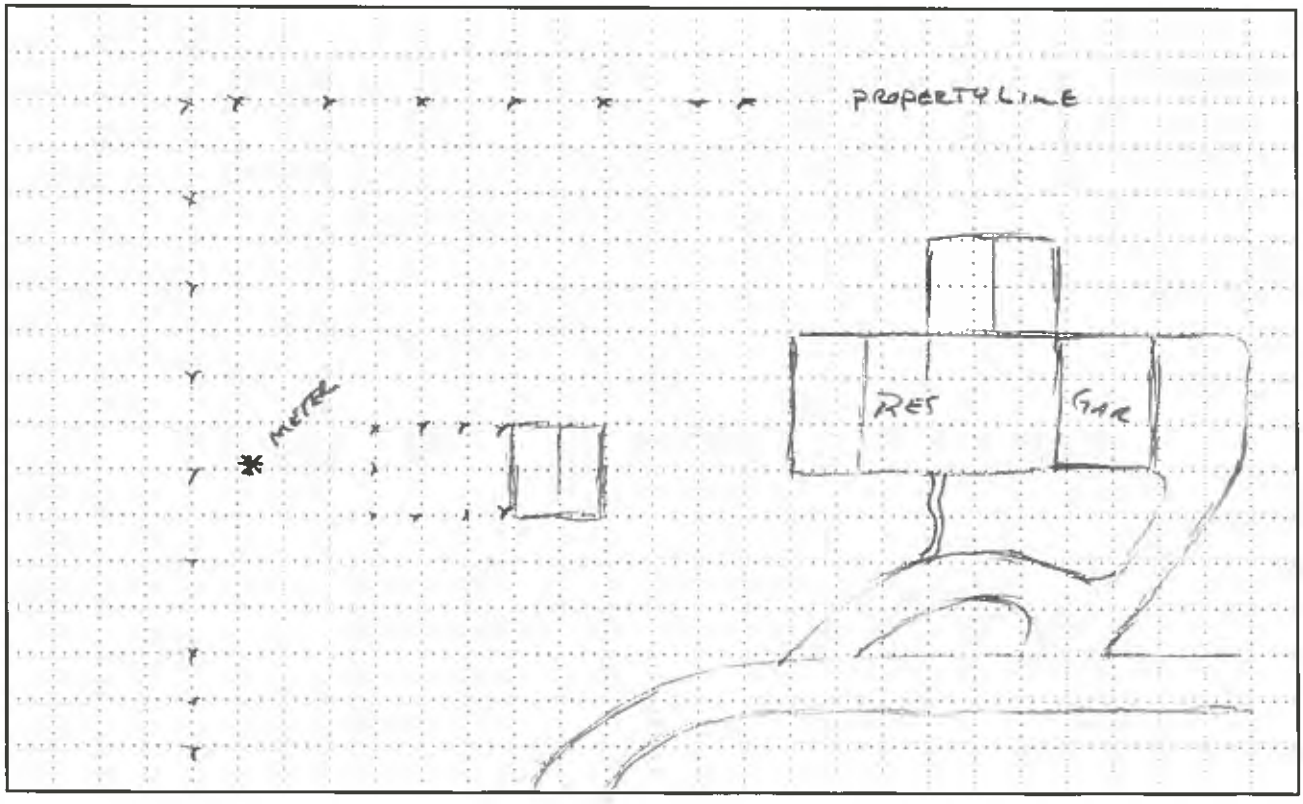
Roadway#2	1st	2nd
Direction		
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

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

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

NOTES: MOWER, BLADES CHIRPING - CAN HEAR 522 IN DISTANCE

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID MT-2

Gannett Fleming, Inc.

ADDRESS: 167 Municipal Dr. Selinsgrove Municipal Fields

Meter Storage # (#4) 0023

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

Measurement Data

Photograph #'s

GPS PT 40.841934, -76.85684

SLM Calibration before after

Weather: temperature 76°F wind speed 0.6 m/s cloud cover >5%

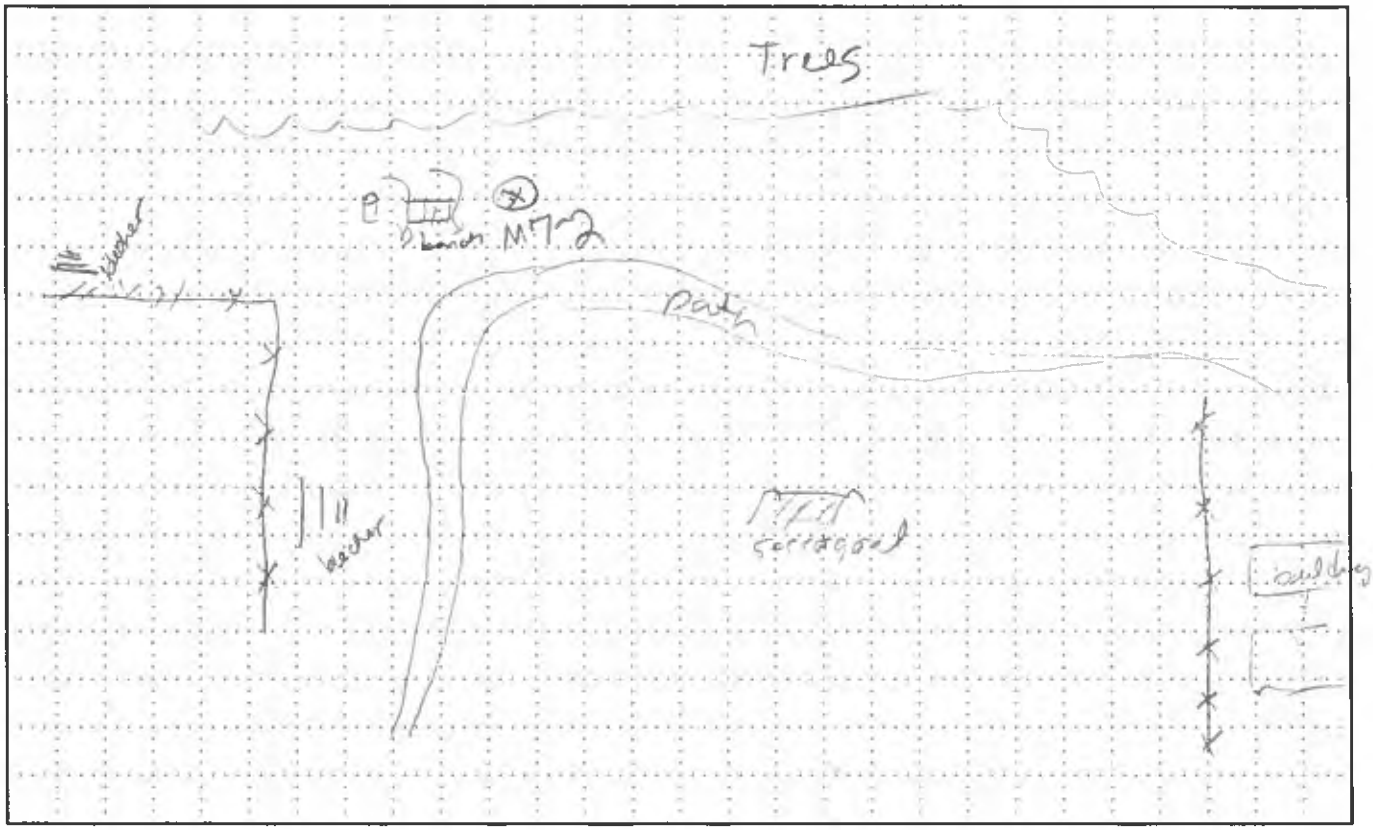
Time:	1st	start 084200	stop 090200	total 20 mins					
	2nd	start	stop	total					
Data:	1st	Leq 44.2	Lmax 50.3	Lmin 39.5	SEL 75.0				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

Roadway#1			Roadway#2			Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto			auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: birds and insect sounds audible, no traffic audible

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M7-3 (new)

Gannett Fleming, Inc.

ADDRESS: 5539 Park Rd
Monroe Township

Meter Storage # 347

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 65° wind speed 0-8mph cloud cover Mostly cloud

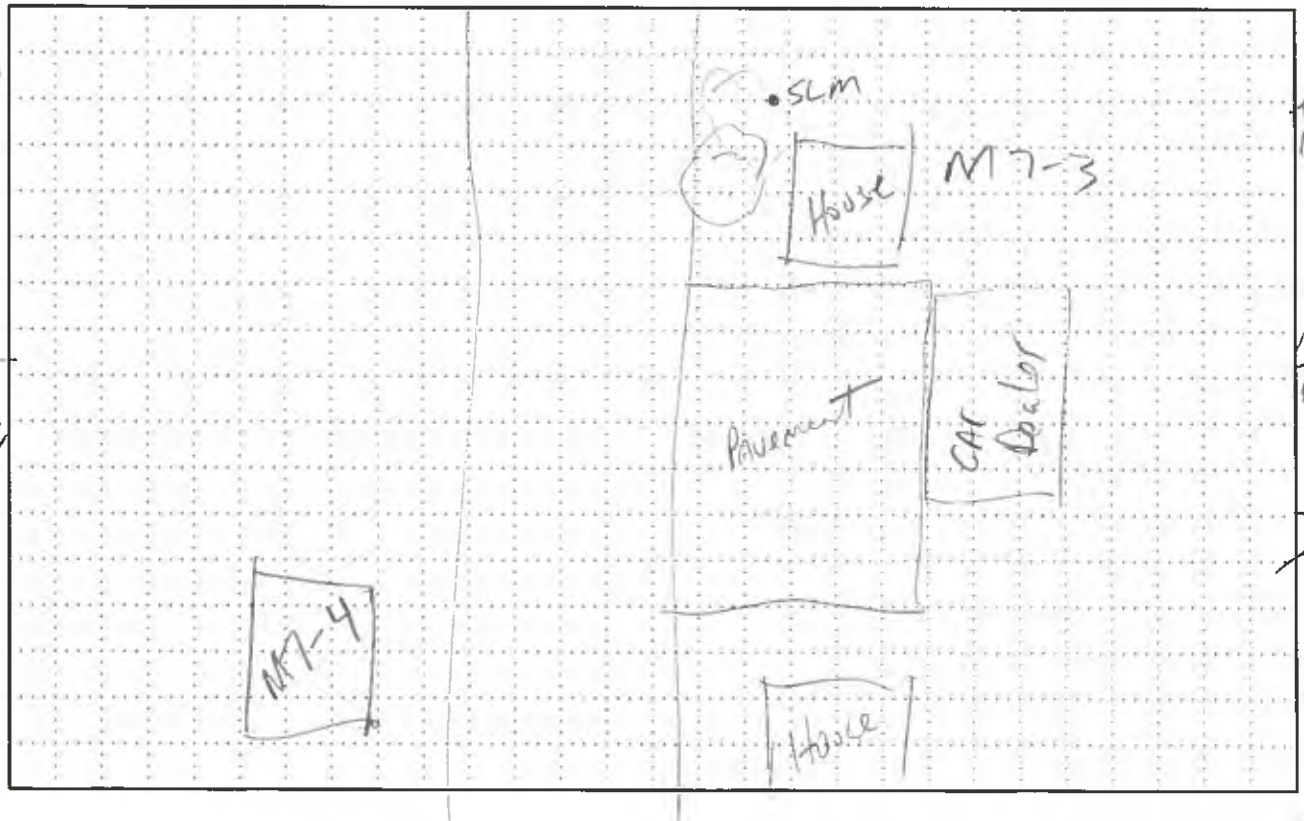
Time:	1st	start	1545	stop	1605	total			
	2nd	start		stop		total			
Data:	1st	Leq	58.0	Lmax	75.3	Lmin	39.9	SEL	88.8
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	Fisher		Roadway#2	FISHER		Roadway#3	PARK		Roadway#4	PARK	
Direction	NB		Direction	SB		Direction	NB		Direction	SB	
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	39	117 half	auto	33	99	auto	14	42	auto	7	21
med. trk.	0	0	med. trk.	0	0	med. trk.	0	0	med. trk.	1	3
hvy trk.	0	0	hvy trk.	0	0	hvy trk.	0	0	hvy trk.	0	0
bus	4	12	bus	3	9	bus	0	0	bus	3	9
motorcycle	0	0	motorcycle	0	0	motorcycle	2	6	motorcycle	1	3

NOTES:

SITE SKETCH



Fisher

Park

BUS

MC

BUS

MC

MTT

Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M7-4

Gannett Fleming, Inc.

ADDRESS: 5553 Park Rd

Meter Storage # 0032 (#4

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. _____ SLM Calibration before 94.0 after _____

GPS PT 40.844621, -76.85203

Weather: temperature 88°F wind speed 1.6 m/s gust to 5 m/s cloud cover 90%

Time:	1st	start	1551	stop	1611 00	total			
	2nd	start		stop		total			
Data:	1st	Leq	44.8	Lmax	57.7	Lmin	38.2	SEL	75.6
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 Park	1st	2nd
Direction ←		
auto	1111 1111	42
med. trk.		0
hvy trk.		0
bus		0
motorcycle	11	0

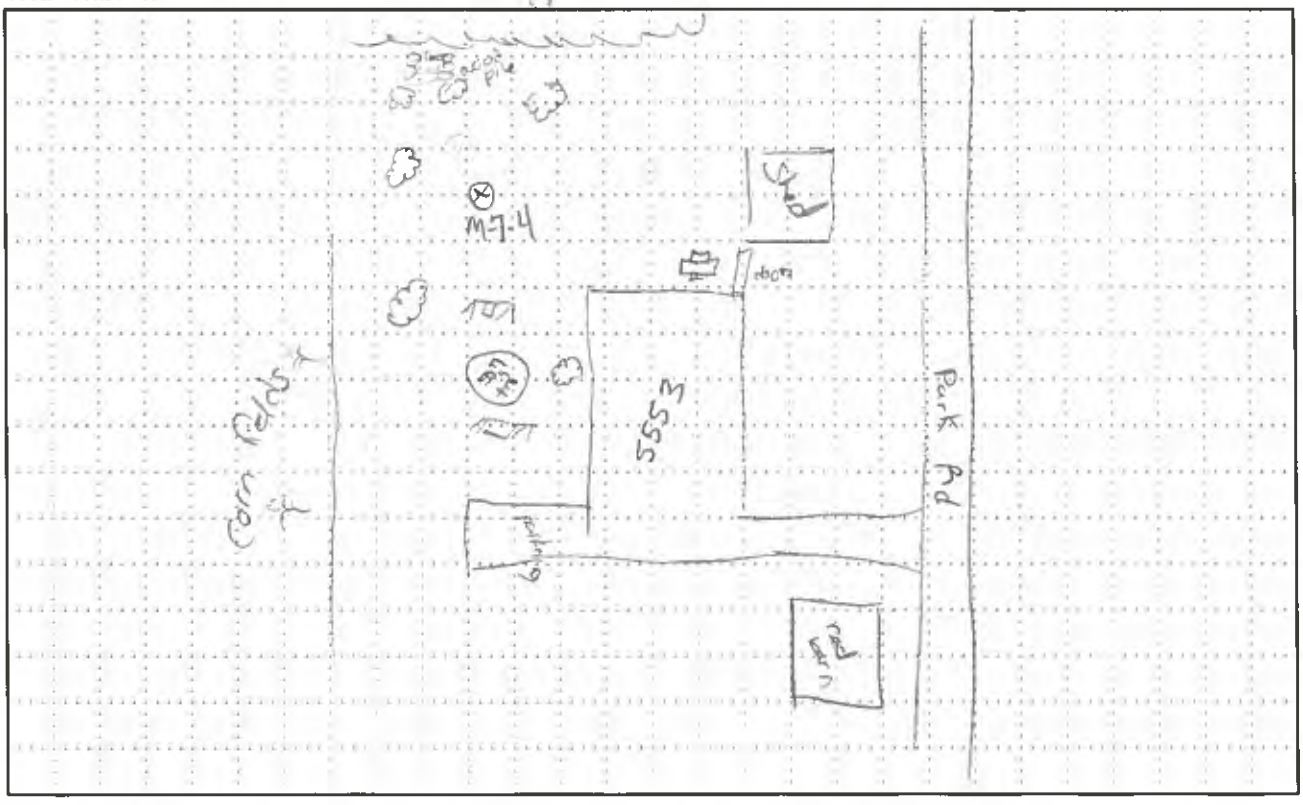
Roadway#2 Park	1st	2nd
Direction →		
auto	1111	15
med. trk.		0
hvy trk.		0
bus	111	9
motorcycle		0

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

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

NOTES: incred noise; helicopter passing. I think I paused enough lined up with middle shed and middle of swing/fire pit distant dr. truck & plane passby and some birds audible

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M7-5

Gannett Fleming, Inc.

ADDRESS: Fishers Rd
Selinsgrove, PA

Meter Storage # 346

TYPE ☒ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 2 SLM Calibration before after GPS PT

Weather: temperature 88 wind speed 0-8 cloud cover Pt. Cloudy

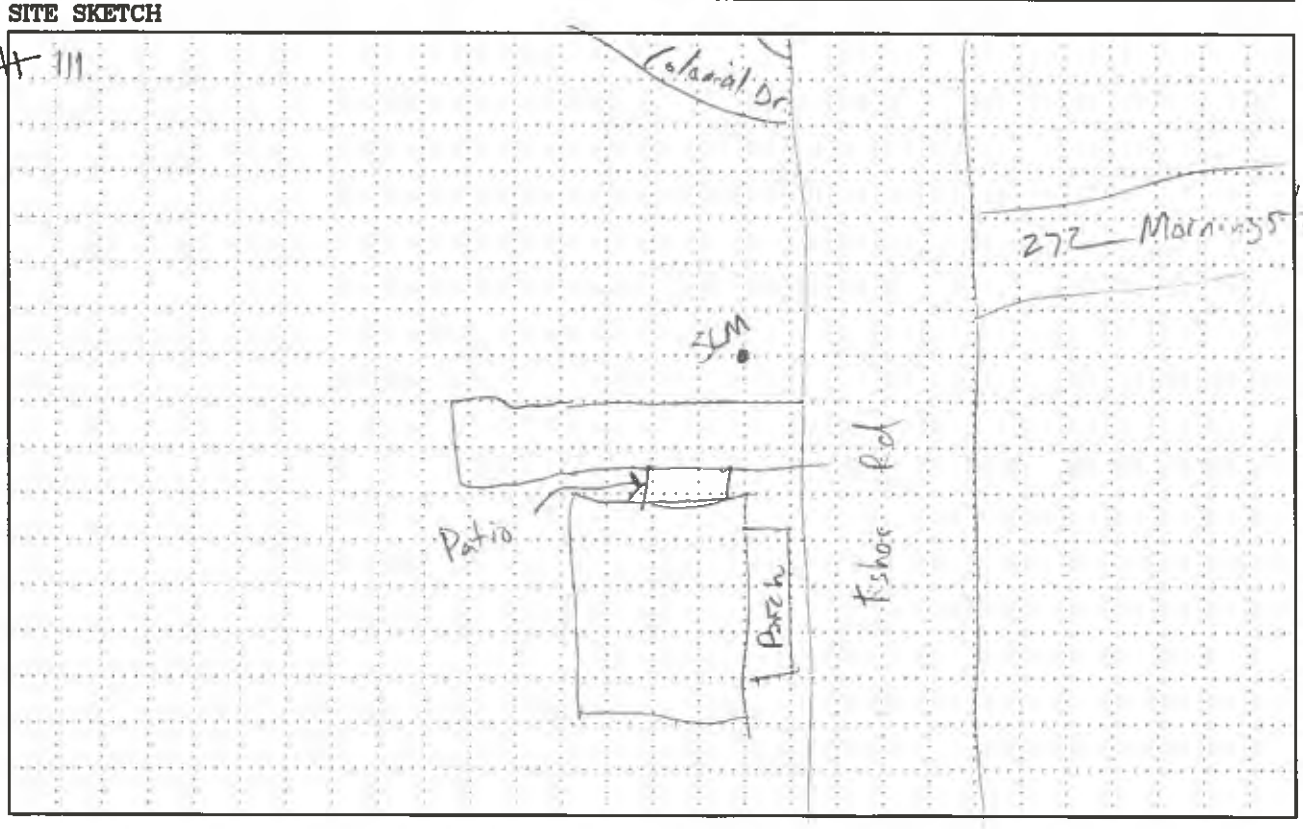
Time:	1st	start	1514	stop	1534	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	58.8	Lmax	74.7	Lmin	35.8	SEL	89.6	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	Fisher Rd		Roadway#2	Fisher Rd		Roadway#3			Roadway#4		
Direction	NB		Direction	SB		Direction			Direction		
	1st	2nd half		1st	2nd half		1st	2nd		1st	2nd
auto	38	114	auto	29	87	auto			auto		
med. trk.	0	0	med. trk.	2	6	med. trk.			med. trk.		
hvy trk.	0	0	hvy trk.	0	0	hvy trk.			hvy trk.		
bus	1	3	bus	2	6	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES: Paused 2x for helicopter

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M7-6

Gannett Fleming, Inc.

ADDRESS: 272 Morning Star Dr.

Meter Storage # #4 (0031)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. #4 SLM Calibration before 94.0 after

GPS PT 40.845769, -76.848324

Weather: temperature 93.3°F wind speed 0.7 m/s cloud cover 80%

Time:	1st	start	161000	stop	153000	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	45.4	Lmax	68.9	Lmin	37.5	SEL	76.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 Fisher	1st	2nd
Direction ←		
auto	29	87
med. trk.	1	3
hvy trk.	1	3
bus	1	3
motorcycle		

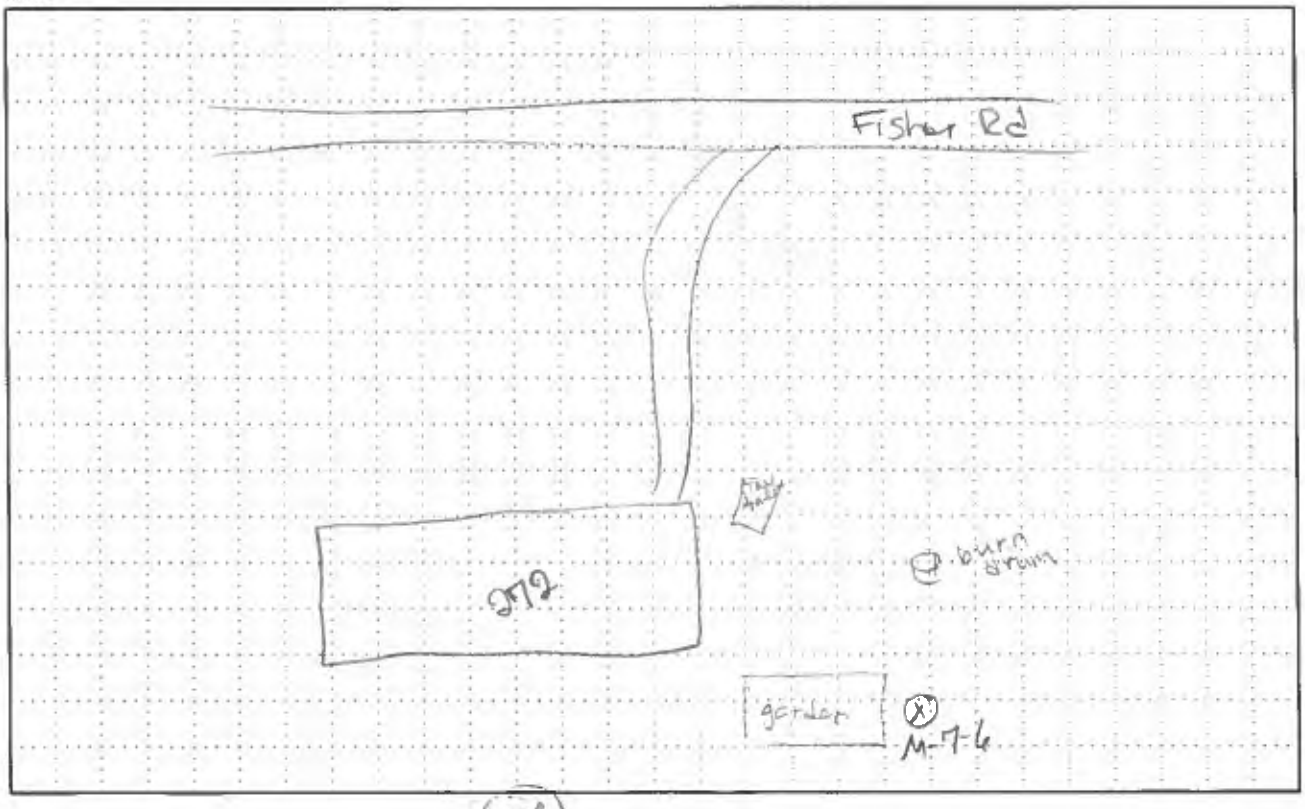
Roadway#2 Fisher	1st	2nd
Direction →		
auto	27	81
med. trk.	0	0
hvy trk.	0	0
bus	1	3
motorcycle	1	3

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

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

NOTES: helicopter passby, tried to pause meter each time
Bird noises

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M8-L

Gannett Fleming, Inc.

ADDRESS: 446 Fisher Rd

Meter Storage # (#4) 0030

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. #4 SLM Calibration before 94.0 after

GPS PT 40.848213, -76.84892

Weather: temperature 94°F wind speed 1.1 m/s cloud cover 60%

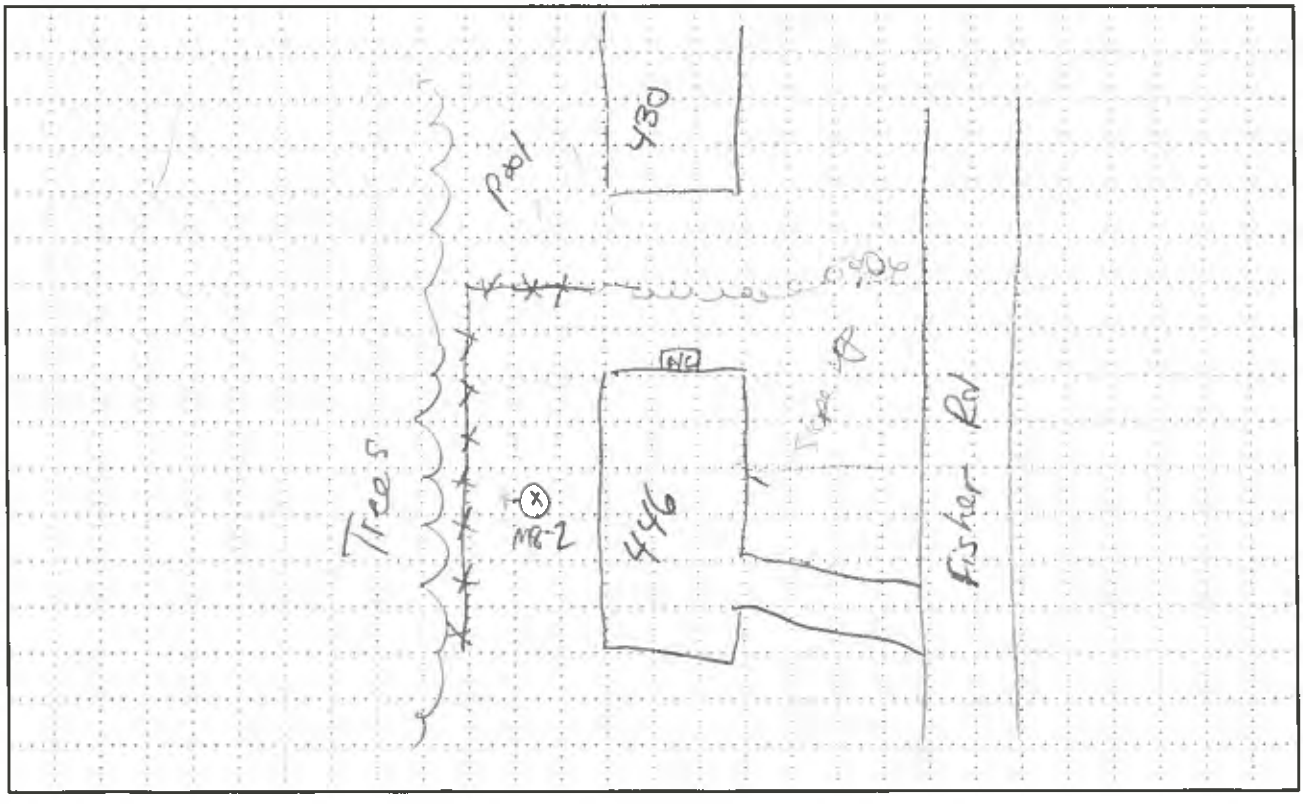
Time:	1st	start	143700	stop	145700	total	20 min			
	2nd	start		stop		total				
Data:	1st	Leq	49.0	Lmax	65.3	Lmin	37.9	SEL	79.8	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 Fisher Rd		Roadway#2 Fisher Rd		Roadway#3		Roadway#4	
Direction ←		Direction →		Direction		Direction	
	1st / 2nd		1st / 2nd		1st / 2nd		1st / 2nd
auto	29 / 87	auto	21 / 63	auto		auto	
med. trk.	1 / 2	med. trk.	1 / 3	med. trk.		med. trk.	
hvy trk.		hvy trk.	0 / 0	hvy trk.		hvy trk.	
bus		bus	0 / 0	bus		bus	
motorcycle		motorcycle	2 / 6	motorcycle		motorcycle	

NOTES: A/C on side of house running

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID MB-3

Gannett Fleming, Inc.

ADDRESS: Undeveloped Lot South of Southernmost house on Colonial Dr. (2(?) colonial Dr.)

Meter Storage # 345

TYPE ☒ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 88° wind speed 0-8 mph cloud cover partly cloudy

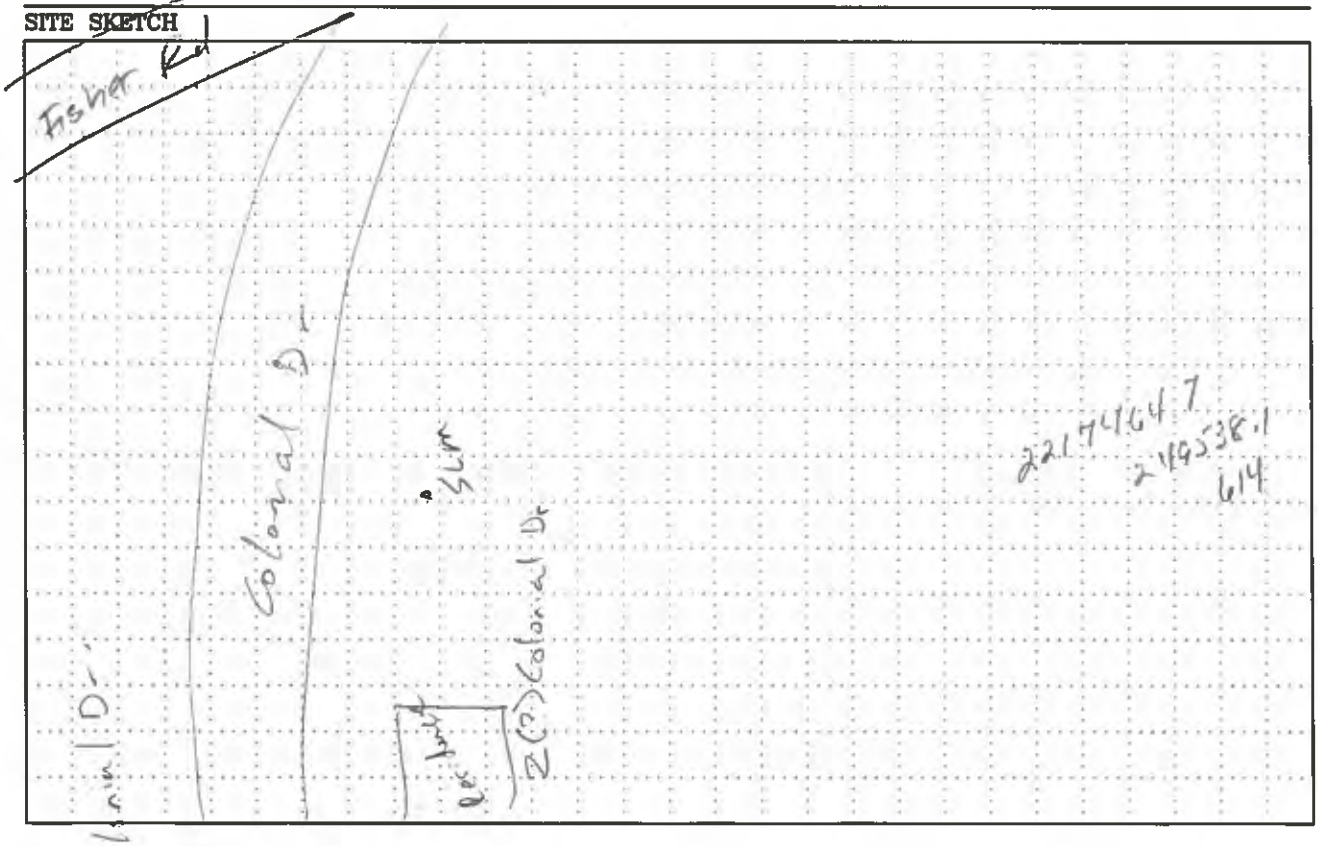
Time:	1st	start	14:39	stop	14:59	total			
	2nd	start		stop		total			
Data:	1st	Leq	44	Lmax	60.4	Lmin	32.9	SEL	74.8
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1			Roadway#2			Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto			auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: Could not see Fisher Rd. from site, but it is the dominant transportation noise source when very loud vehicles are present

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14

PROJECT: CSVT

JOB #

SITE ID M9-1

Gannett Fleming, Inc.

ADDRESS: 1104 Stahler Rd

Meter Storage # 341

TYPE ☒ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 83° wind speed 0-5mph cloud cover sparse

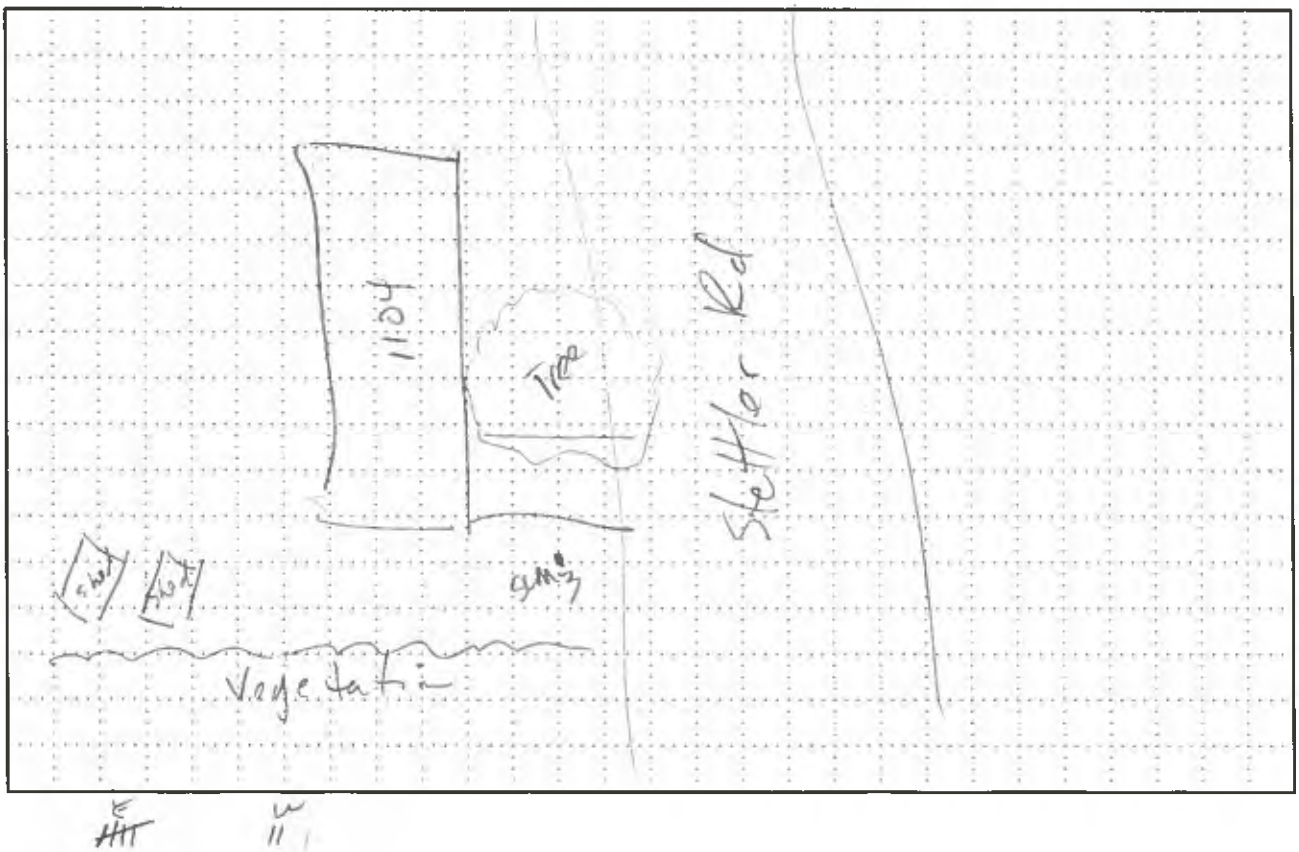
Time:	1st	start	12:10	stop	12:30	total	20m.			
	2nd	start		stop		total				
Data:	1st	Leq	45.8	Lmax	63.2	Lmin	33.9	SEL	71.6	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	Stahler Rd		Roadway#2	Stahler Rd		Roadway#3			Roadway#4		
Direction	EB		Direction	WB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	5	15	auto	2	6	auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14

PROJECT: CSVT

JOB #

SITE ID 9-2

Gannett Fleming, Inc.

ADDRESS: 759 11th Ave

NSA 9

Meter Storage # 340

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data 9-2

Photograph #'s

SLM NO. 3 SLM Calibration before after GPS PT

Weather: temperature 78° wind speed 0-8 cloud cover clear

Time:	1st	start	11:24	stop	11:44	total			
	2nd	start		stop		total			
Data:	1st	Leq	58.8	Lmax	76.1	Lmin	40.6	SEL	89.6
	2nd	Leq		Lmax		Lmin		SEL	

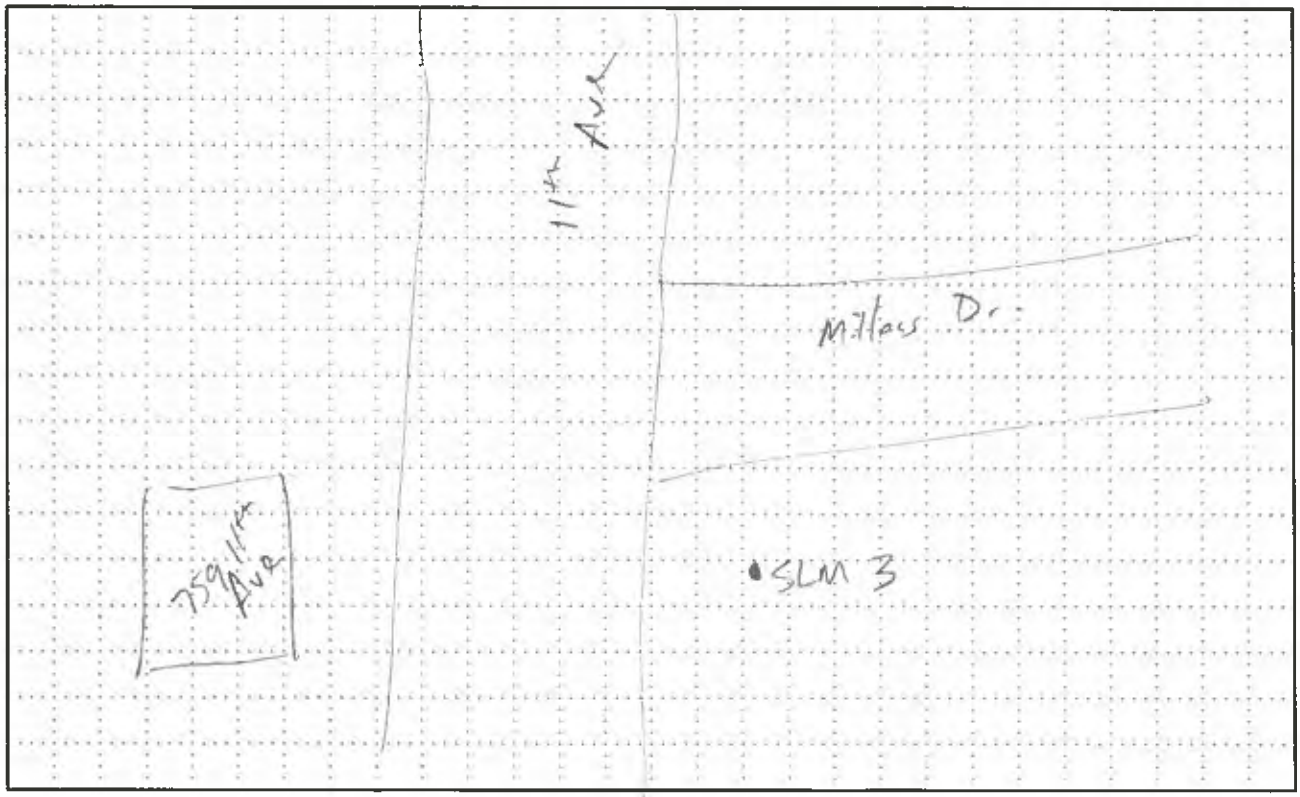
Traffic Data

Roadway#1	11th Ave	Roadway#2	11th Av	Roadway#3		Roadway#4	
Direction	NB	Direction	SB	Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	6	18	11	39				
med. trk.								
hvy trk.								
bus								
motorcycle								

NOTES: Does looking is restricted
Mail Running Traffic -

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M9-3

Gannett Fleming, Inc.

ADDRESS: 23 Millers Dr. the varnor's

Meter Storage # (#4) 0025

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.857525, -76.8354

SLM Calibration before 94.0 after

Weather: temperature 83.7°F wind speed 1.5 m/s gusts 3-4 m/s cloud cover 0% none/clear

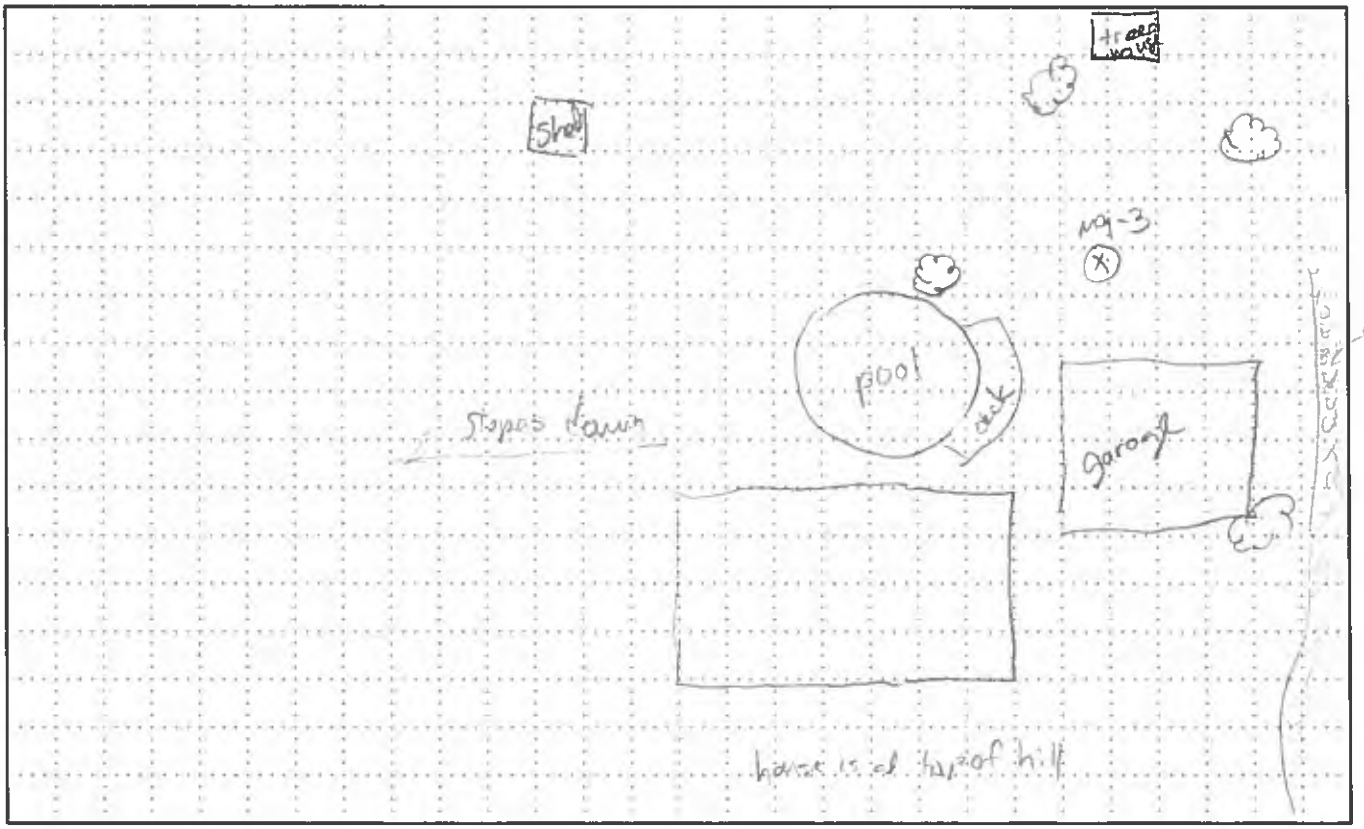
Time:	1st	start	112606	stop	114600	total	20 min			
	2nd	start		stop		total				
Data:	1st	Leq	40.4	Lmax	49.7	Lmin	34.7	SEL	71.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1			Roadway#2			Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto			auto			auto			auto		
med. trk.			med. trk.			med. trk.			med. trk.		
hvy trk.			hvy trk.			hvy trk.			hvy trk.		
bus			bus			bus			bus		
motorcycle			motorcycle			motorcycle			motorcycle		

NOTES: Bird sounds and wind in the trees traff. audible

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/14/16

PROJECT: CSVT

JOB #

SITE ID M10-1

Gannett Fleming, Inc.

ADDRESS: 955 11th Ave

Meter Storage # (#4) on26

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.858767, -76.83779

SLM Calibration before 94.0 after

Weather: temperature 80°F wind speed 1.3m/s some gusts 4-5 cloud cover 15-20% sheet like clouds

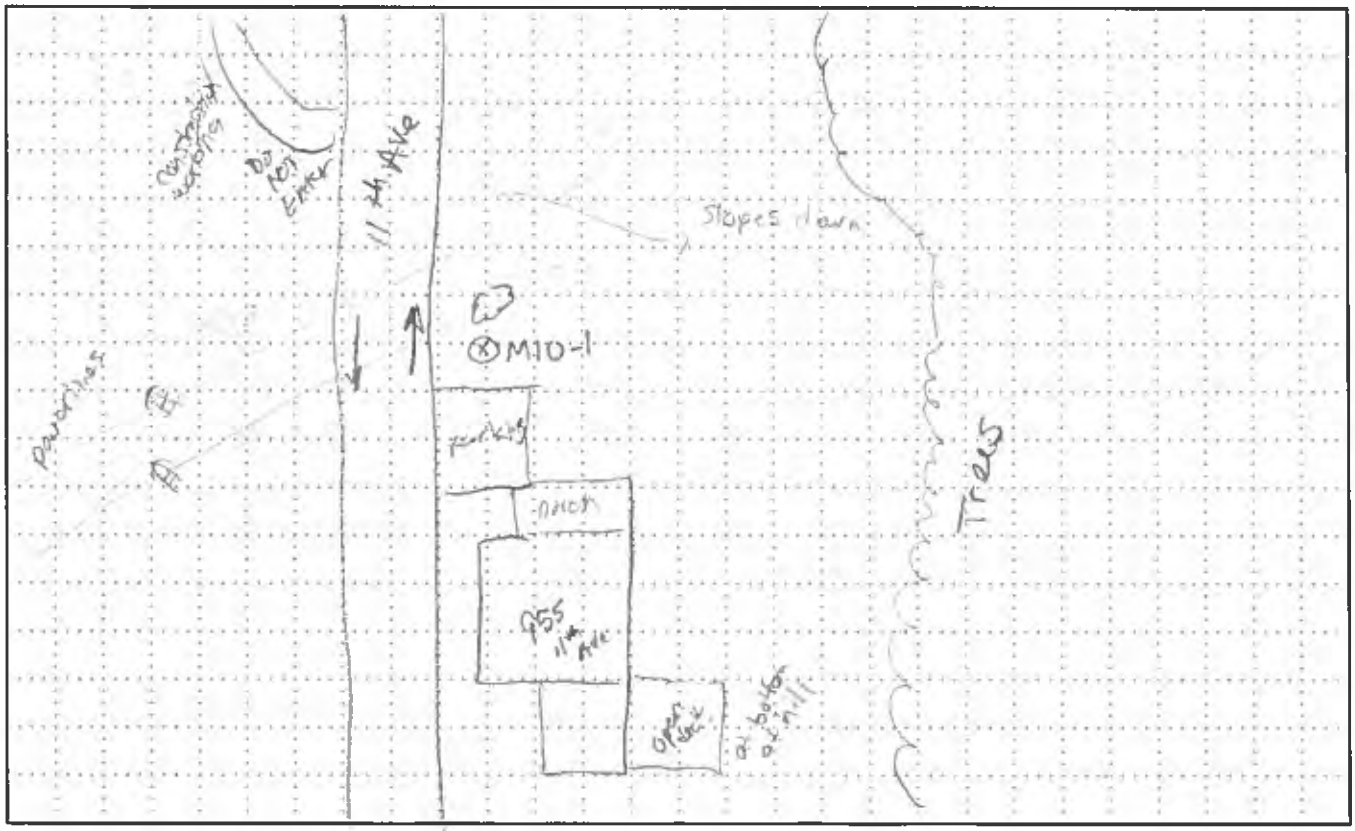
Time:	1st	start	120130	stop	120130	total	20mins			
	2nd	start		stop		total				
Data:	1st	Leq	59.9	Lmax	81.3	Lmin	36.2	SEL	90.7	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	11th Ave		Roadway#2	11th		Roadway#3			Roadway#4		
Direction	Northbound		Direction	Southbound		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	18	54	auto	14	43	auto			auto		
med. trk.	1	3	med. trk.		0	med. trk.			med. trk.		
hvy trk.	2	6	hvy trk.		0	hvy trk.			hvy trk.		
bus		0	bus		0	bus			bus		
motorcycle	2	6	motorcycle		0	motorcycle			motorcycle		

NOTES: dog inside home barking so moved meter & restarted
walk going on across the street at No trespassing house but was able to police for most of the had dump truck beeping etc.

SITE SKETCH



#0033 Calibrated Rle

Highway Noise Monitoring Sheet

DATE: 9/15/16

PROJECT: CCVT

JOB #

SITE ID M 11-1

Gannett Fleming, Inc.

ADDRESS: 1823 Sunbury Rd

Meter Storage # 0034 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. #4 SLM Calibration before 94.0 after GPS PT 40.871527, -76.835881

Weather: temperature 58.1°F wind speed 0.9 m/s cloud cover 0% none/clear

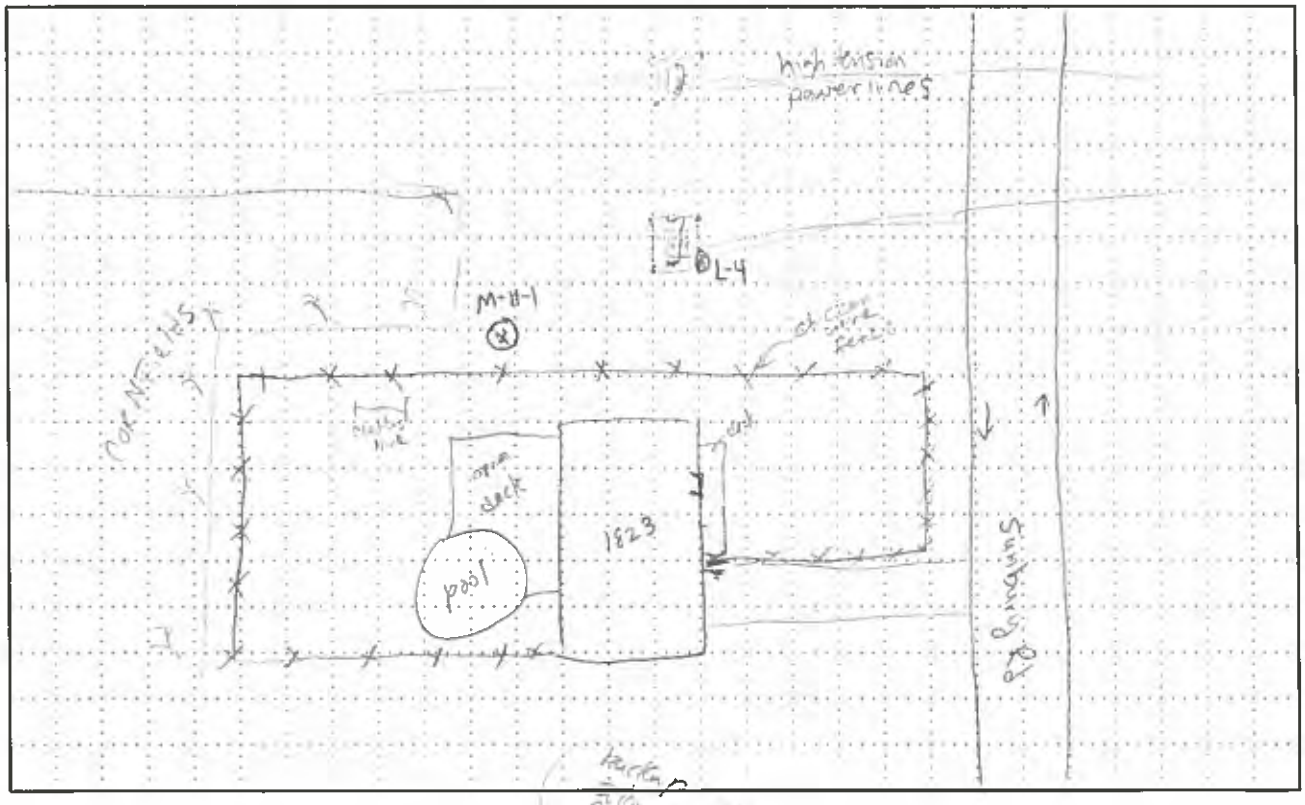
Time:	1st	start	075800	stop	081800	total	20mins			
	2nd	start		stop		total				
Data:	1st	Leq	44.6	Lmax	60.4	Lmin	36.5	SEL	75.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1 Sunbury Rd		Roadway#2 Sunbury Rd		Roadway#3		Roadway#4	
Direction	→		←					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	1	3	HH 1	18				
med. trk.								
hvy trk.	11	6	1	3				
bus								
motorcycle								

NOTES: aircraft flyover caused for part of it. back up alarms audible in distance
Us 15 count car available on MII-2's data sheet (they are not during the measurement but shortly after for a representative time period.

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/15/16

PROJECT: CSVT

JOB #

SITE ID M11-2

Gannett Fleming, Inc.

ADDRESS: 1862 Sunbury Rd

Meter Storage # 348

TYPE ☒ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. 3 SLM Calibration before 93.9 after 93.9 GPS PT

Weather: temperature 54° wind speed — cloud cover clear

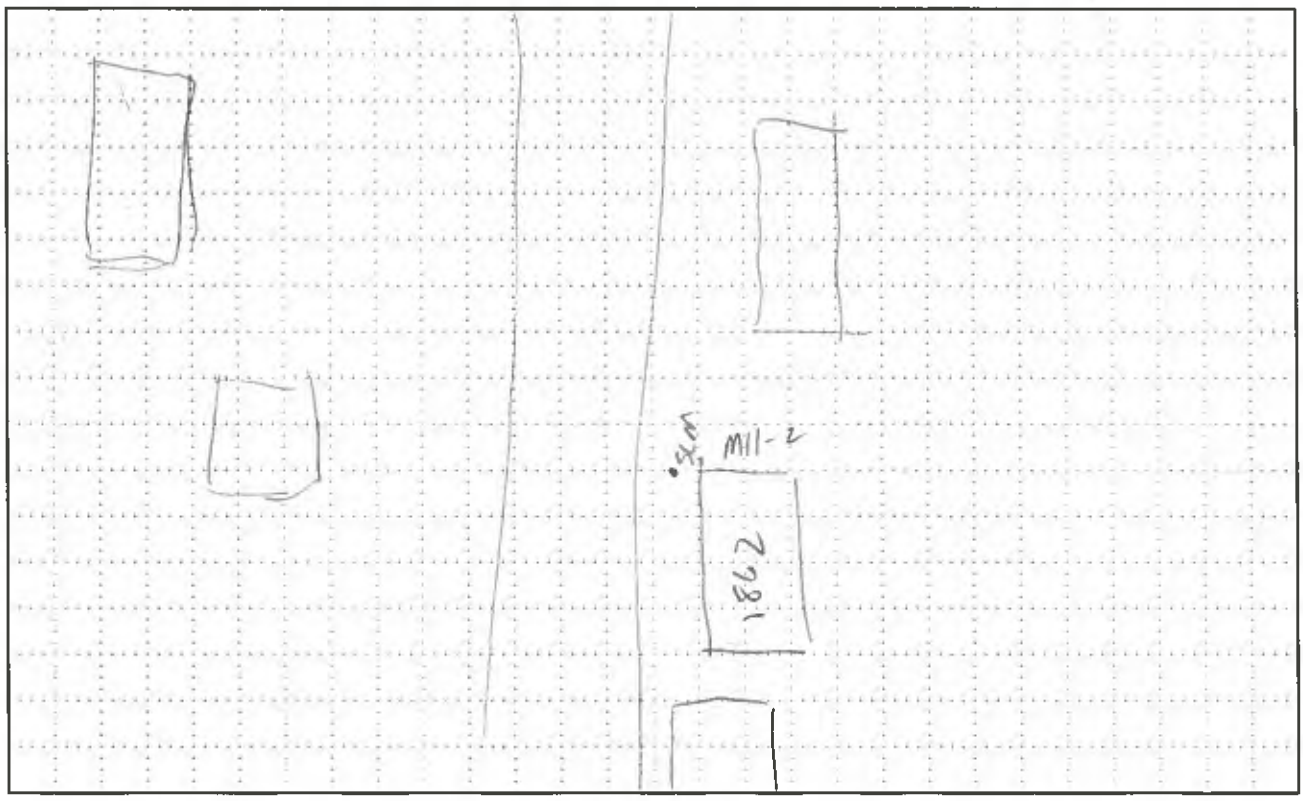
Time:	1st	start	8:02	stop	822	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	55	Lmax	73.9	Lmin	43.5	SEL	85.8	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	Sunbury Rd		Roadway#2	US 15		Roadway#3	US 15		Roadway#4		
Direction	Both		Direction	NB		Direction	SB		Direction		
	1st	2nd hdy		1st	2nd hdy		1st	2nd		1st	2nd
auto	7	21	auto	149	447	auto	154	477	auto		
med. trk.	0	0	med. trk.	2	6	med. trk.	6	18	med. trk.		
hvy trk.	3	9	hvy trk.	14	57	hvy trk.	17	57	hvy trk.		
bus	0	0	bus	2	6	bus	4	12	bus		
motorcycle	0	0	motorcycle	3	9	motorcycle	1	3	motorcycle		

NOTES: construction site east of measurement location w/ backup alarms. Can hear US 15 but not visible

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/15/16

PROJECT: CSVT

JOB #

SITE ID M 11-3

Gannett Fleming, Inc.

ADDRESS: 1713 Sunbury Rd

Meter Storage # (#3) 0349

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. #3 SLM Calibration before 93.9 after

GPS PT 40.871031, -76.831028

Weather: temperature 74.0°F wind speed 0.8 m/s cloud cover 50% long sheets

Time:	1st	start	181430	stop	183430	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	40.7	Lmax	54.1	Lmin	35.3	SEL	71.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

(hard loses from top of hill w/ trees)

Roadway#1	Sunbury	Roadway#2	Sunbury	Roadway#3		Roadway#4	
Direction	→	Direction	←	Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	11	6	11	9				
med. trk.								
hvy trk.								
bus								
motorcycle								

NOTES: bird sounds audible & occasional aircraft flying + distant dog barks

SITE SKETCH

Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSVT

JOB #

SITE ID M 12-1

Gannett Fleming, Inc.

ADDRESS: 6577 US-15

Meter Storage # (#3) 0331

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 93.9 after

rare gusts up to 6 m/s

GPS PT 40.82628 -76.84182

Weather: temperature 83.1°F wind speed 0-2 m/s cloud cover none / clear

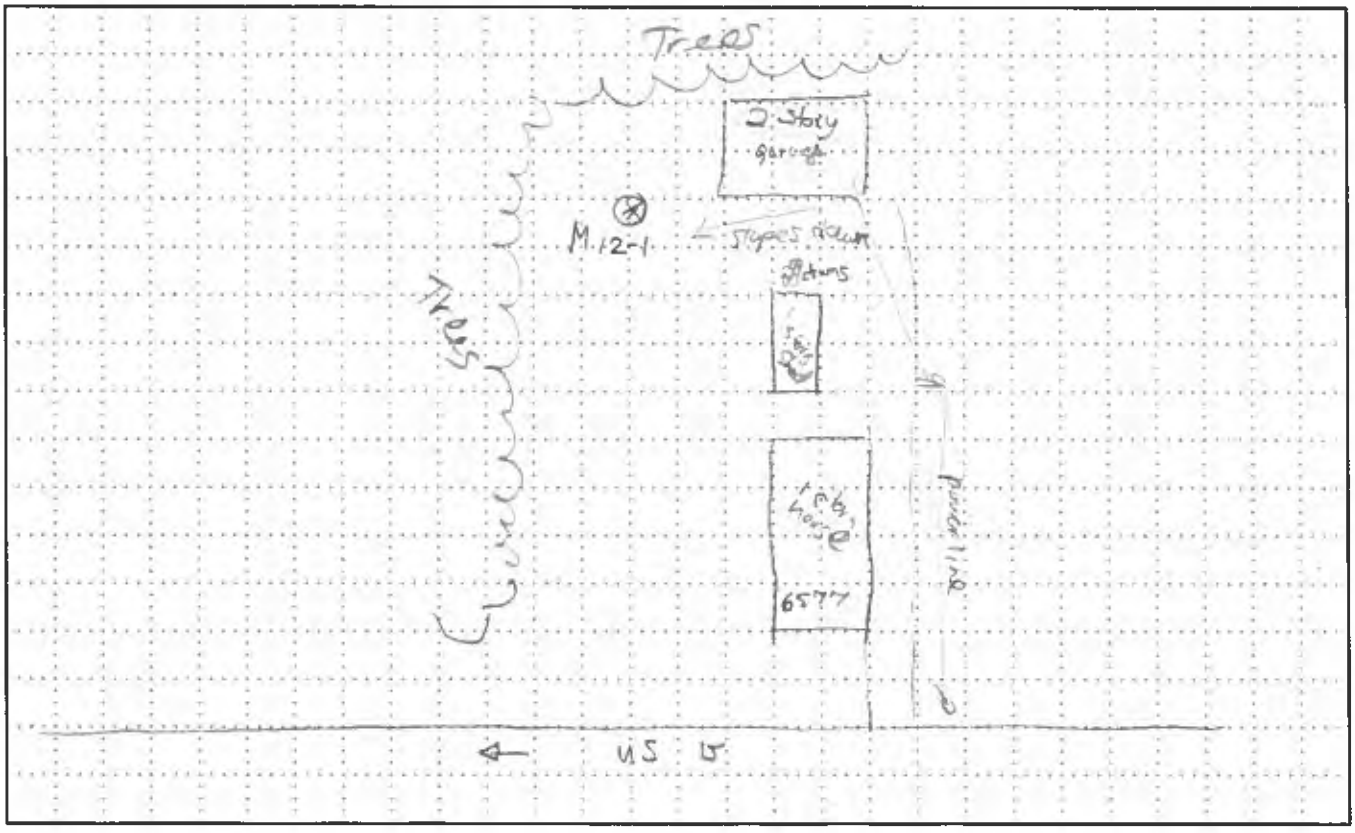
Time:	1st	start	1307	stop	1327	total	20 min		
	2nd	start		stop		total			
Data:	1st	Leq	54.3	Lmax	68.9	Lmin	43.8	SEL	85.1
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	15 N		Roadway#2	15 S		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	474		auto	429		auto			auto		
med. trk.	36		med. trk.	9		med. trk.			med. trk.		
hvy trk.	15		hvy trk.	5		hvy trk.			hvy trk.		
bus	15		bus	0		bus			bus		
motorcycle	3		motorcycle	3		motorcycle			motorcycle		

NOTES: Traffic from US-15, wind in trees & insects & birds

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CSVT

JOB #

SITE ID 12-2

Gannett Fleming, Inc.

ADDRESS:

15 RTE

Meter Storage # 18

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature wind speed cloud cover

Time:	1st	start	1:07	stop	1:27	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	62.6	Lmax	76.9	Lmin	45.4	SEL	93.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 15N	1st	2nd
Direction		
auto	474	
med. trk.	36	
hvy trk.	45	
bus	15	
motorcycle	3	

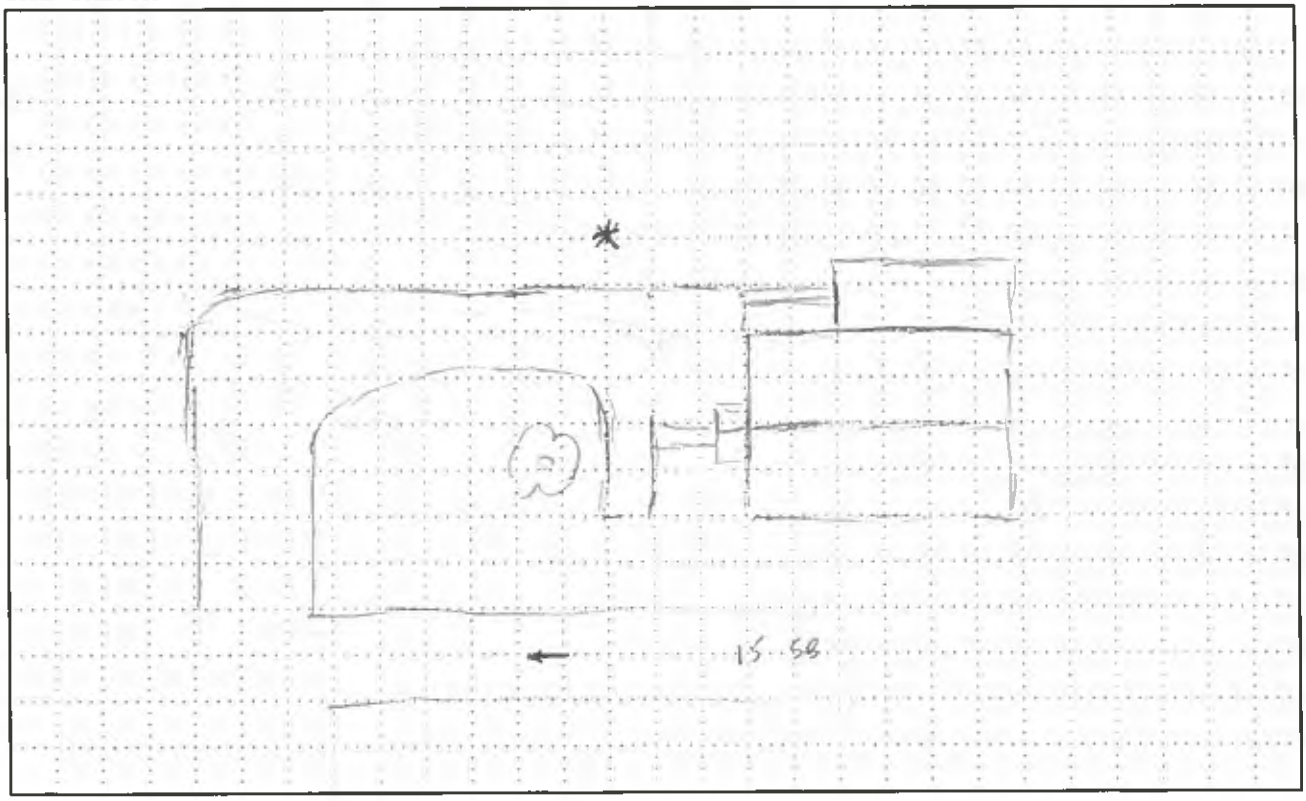
Roadway#2 15S	1st	2nd
Direction		
auto	429	
med. trk.	9	
hvy trk.	54	
bus	0	
motorcycle	3	

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

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

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/14

PROJECT: CSVT

JOB #

SITE ID M13-1

Gannett Fleming, Inc.

ADDRESS: 110 Granger Rd

Meter Storage # 0021 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.876696, -76.8415

SLM Calibration before 94.0 after

Weather: temperature 84.8 wind speed 1.4 m/s gusts 4m/s cloud cover 40%

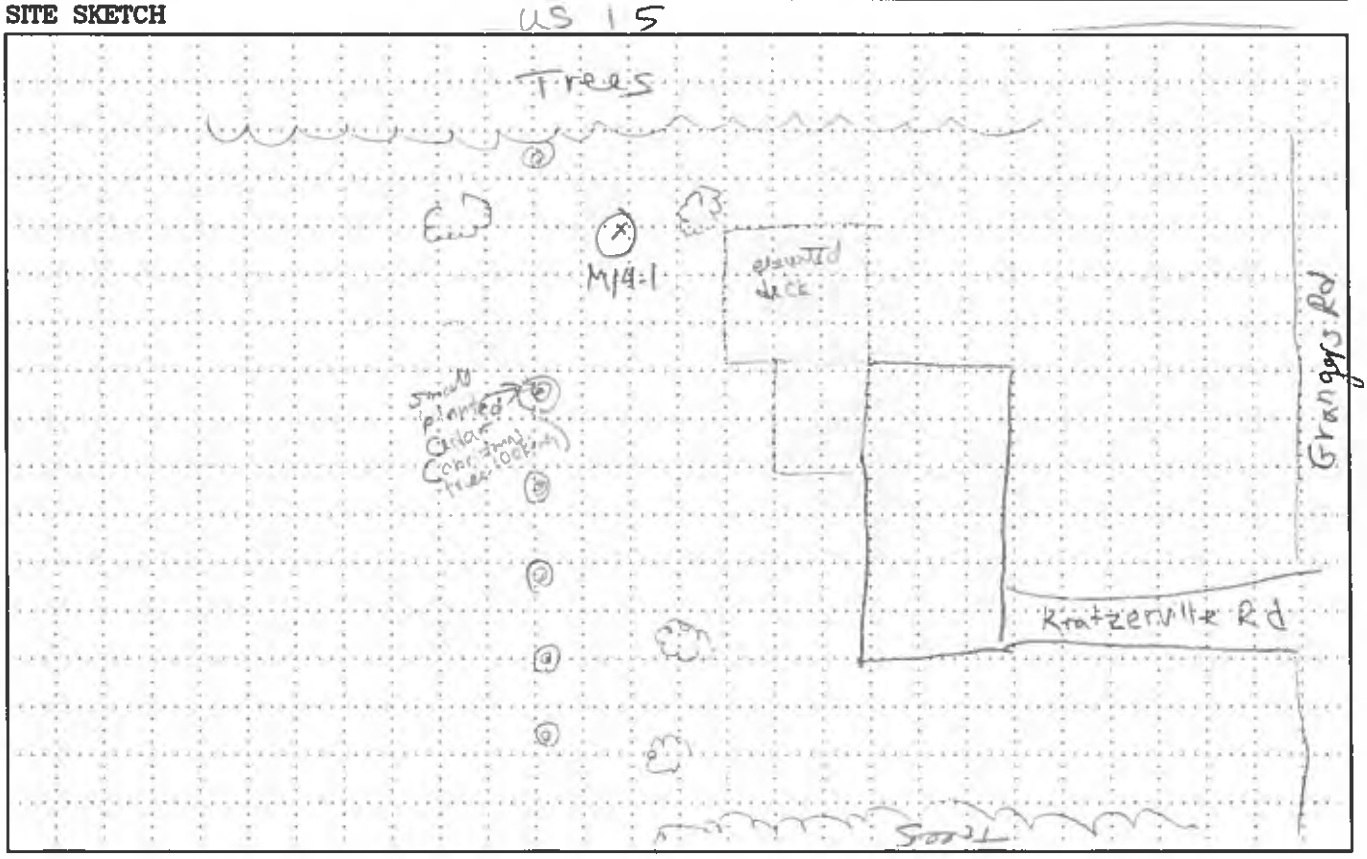
Time:	1st	start	164015	stop	170015	total	20 mins			
	2nd	start	4:40	stop	5:00	total				
Data:	1st	Leq	45.8	Lmax	55.5	Lmin	38.4	SEL	76.6	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1		Roadway#2		Roadway#3		Roadway#4	
Direction								
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	618		624					
med. trk.	18		21					
hvy trk.	60		24					
bus	3		2					
motorcycle	9		0					

NOTES: Wind in trees; traffic audible. Children playing & people talk at neighbors house audible

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CSVT

JOB #

SITE ID 13-2

Gannett Fleming, Inc.

ADDRESS: 1164 Glamorx Rd

Meter Storage # 337

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature 86 wind speed 0-9 cloud cover 10%

Time:	1st	start	4.40	stop	5:00	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	46.1	Lmax	72.2	Lmin	42.2	SEL	76.9	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	1st	2nd
Direction		
auto	618	
med. trk.	18	
hvy trk.	60	
bus	3	
motorcycle	9	

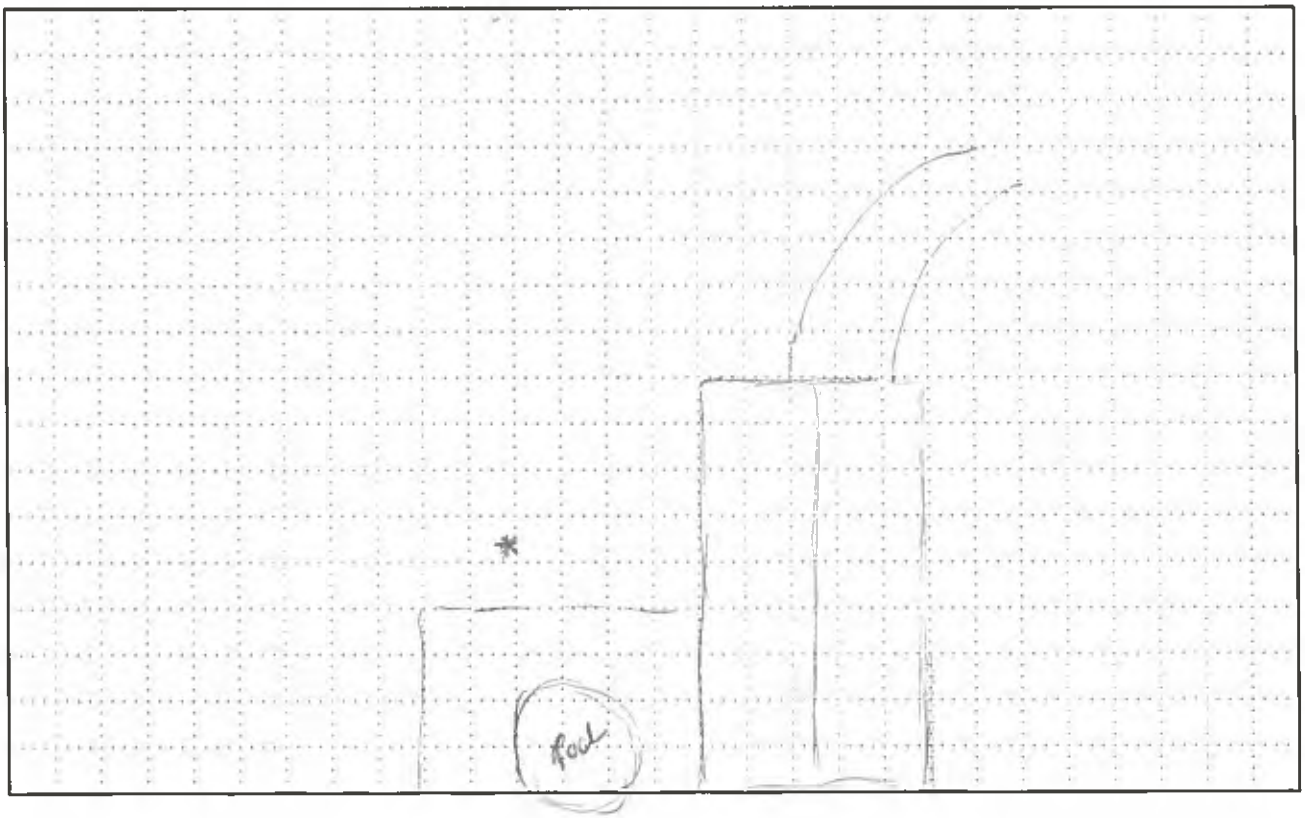
Roadway#2	1st	2nd
Direction		
auto	624	
med. trk.	21	
hvy trk.	24	
bus	2	
motorcycle	0	

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

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

NOTES: Hear Jake Brakes

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSUT

JOB #

SITE ID M13-3

Gannett Fleming, Inc.

ADDRESS: 20 Mark Dr

Yellow house at end of cart

Meter Storage # (#3) 0332

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.878895, -76.843

SLM Calibration before 93.9 after

Weather: temperature 82.9°F wind speed 1.2 M/s gusts to 3 M/s cloud cover 5%

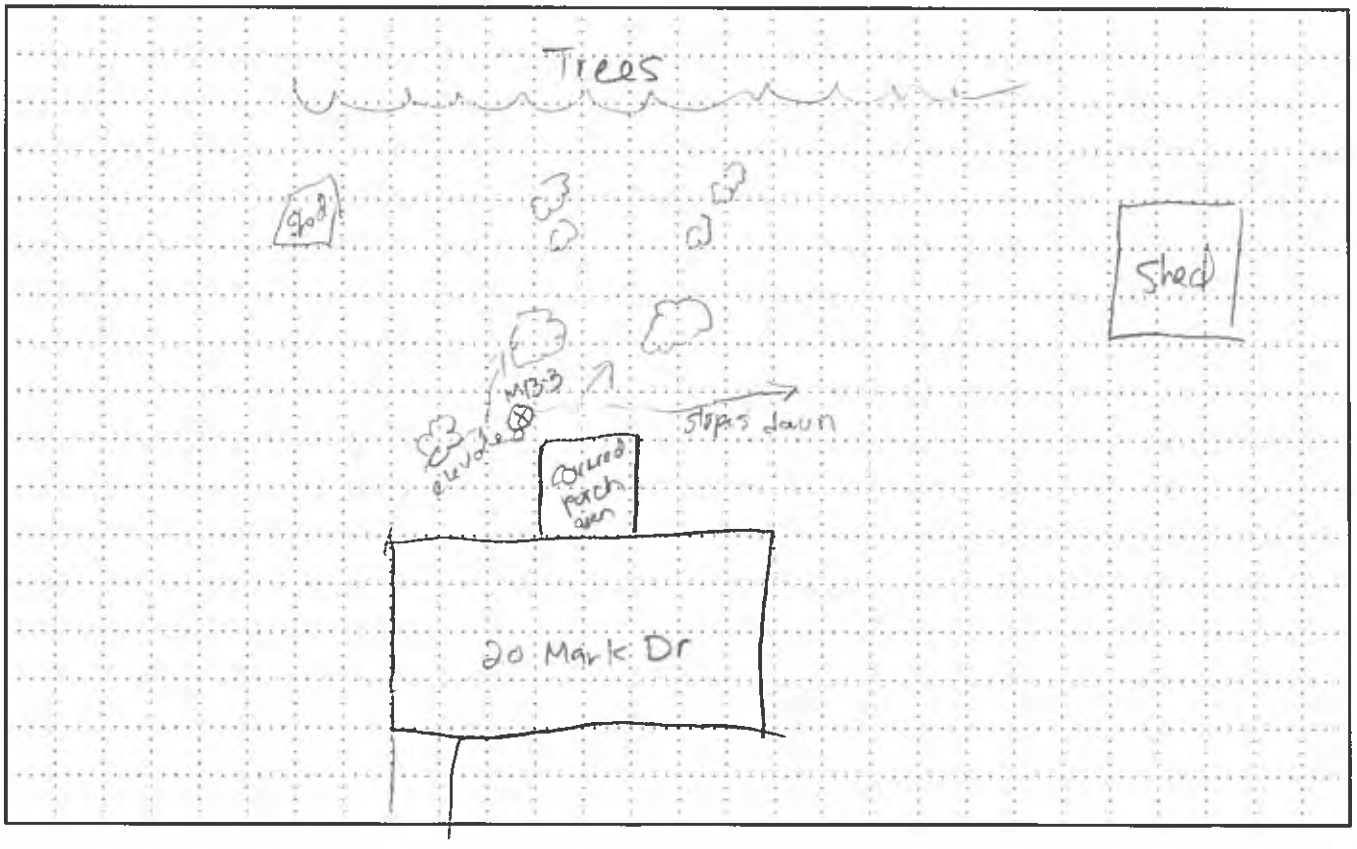
Time:	1st	start	1405	stop	1425	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	44.0	Lmax	50.4	Lmin	38.2	SEL	74.8	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	15 NB		Roadway#2	15 SB		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	537		auto	489		auto			auto		
med. trk.	27		med. trk.	24		med. trk.			med. trk.		
hvy trk.	27		hvy trk.	24		hvy trk.			hvy trk.		
bus	3		bus	1		bus			bus		
motorcycle	3		motorcycle	0		motorcycle			motorcycle		

NOTES: Traffic audible, wind in trees & birds

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CVST

JOB #

SITE ID 13-4

Gannett Fleming, Inc.

ADDRESS:

16 MARK DR

Meter Storage # 18

TYPE [4] Residential [ ] Commercial [ ] Religion [ ] Educational [ ] Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature wind speed cloud cover

Time:	1st	start 2:01	stop 2:21	total 20					
	2nd	start	stop	total					
Data:	1st	Leq 52.7	Lmax 81.9	Lmin 37.4	SEL 83.5				
	2nd	Leq	Lmax	Lmin	SEL				

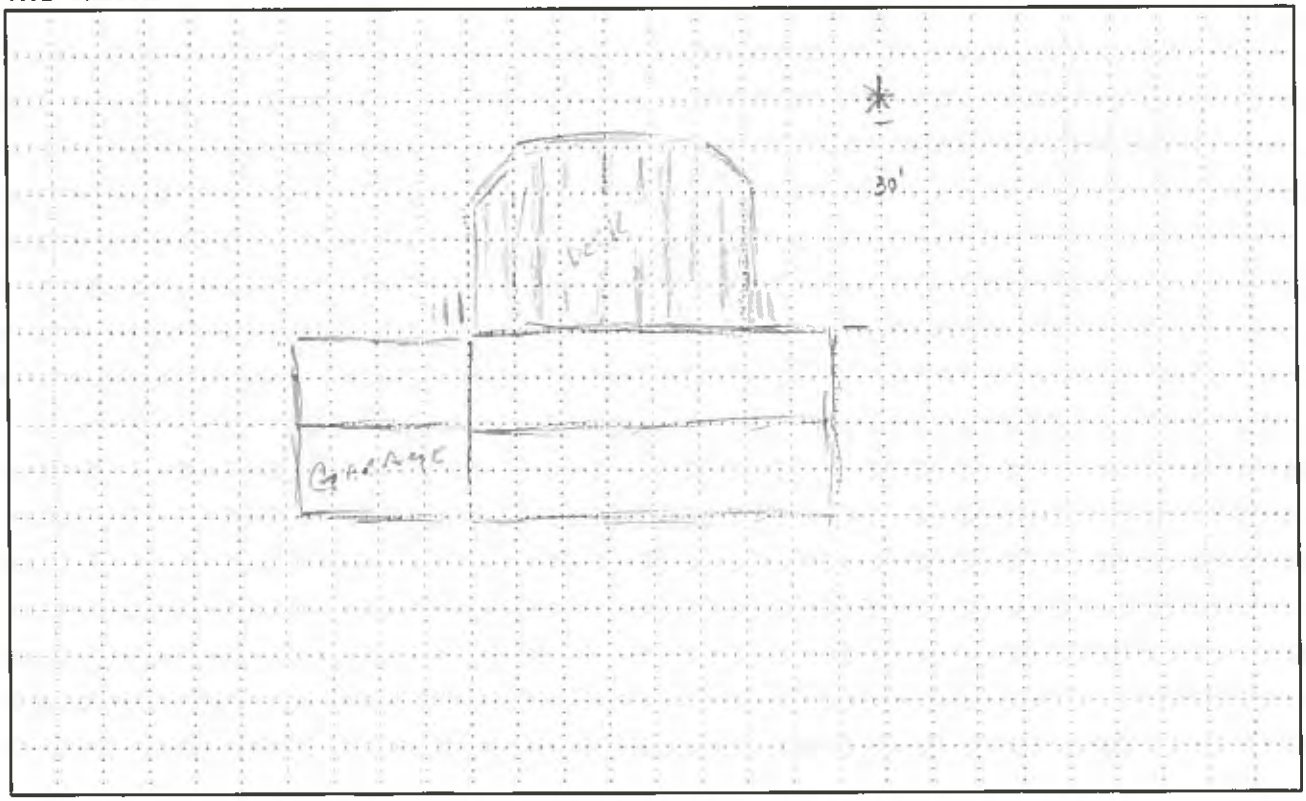
Traffic Data

Roadway#1	15NB		Roadway#2	15SB		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	537		auto	489		auto			auto		
med. trk.	27		med. trk.	24		med. trk.			med. trk.		
hvy trk.	27		hvy trk.	24		hvy trk.			hvy trk.		
bus	3		bus	1		bus			bus		
motorcycle	3		motorcycle	0		motorcycle			motorcycle		

NOTES: AC UNIT KICKING ON 2 OS Helicopter Rover, Dog BARKING, INSIDE

LEAF BLOWERS ON HIGHWAY - BIRDS SINGING, LEAVES RUSTLING

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/10

PROJECT: CSVT

JOB #

SITE ID M13-5

Gannett Fleming, Inc.

ADDRESS: 15 Mark Dr. (1 town 14 & 15 closer to 15)

Meter Storage # (#4) 0019

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after

GPS PT 40.880096, -76.84469

Weather: temperature 83.6°F wind speed 22 m/s (gusts up to 8 m/s) cloud cover 10%

Time:	1st	start	1446	stop	1506	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	45.5	Lmax	70.8	Lmin	39.5	SEL	76.3	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

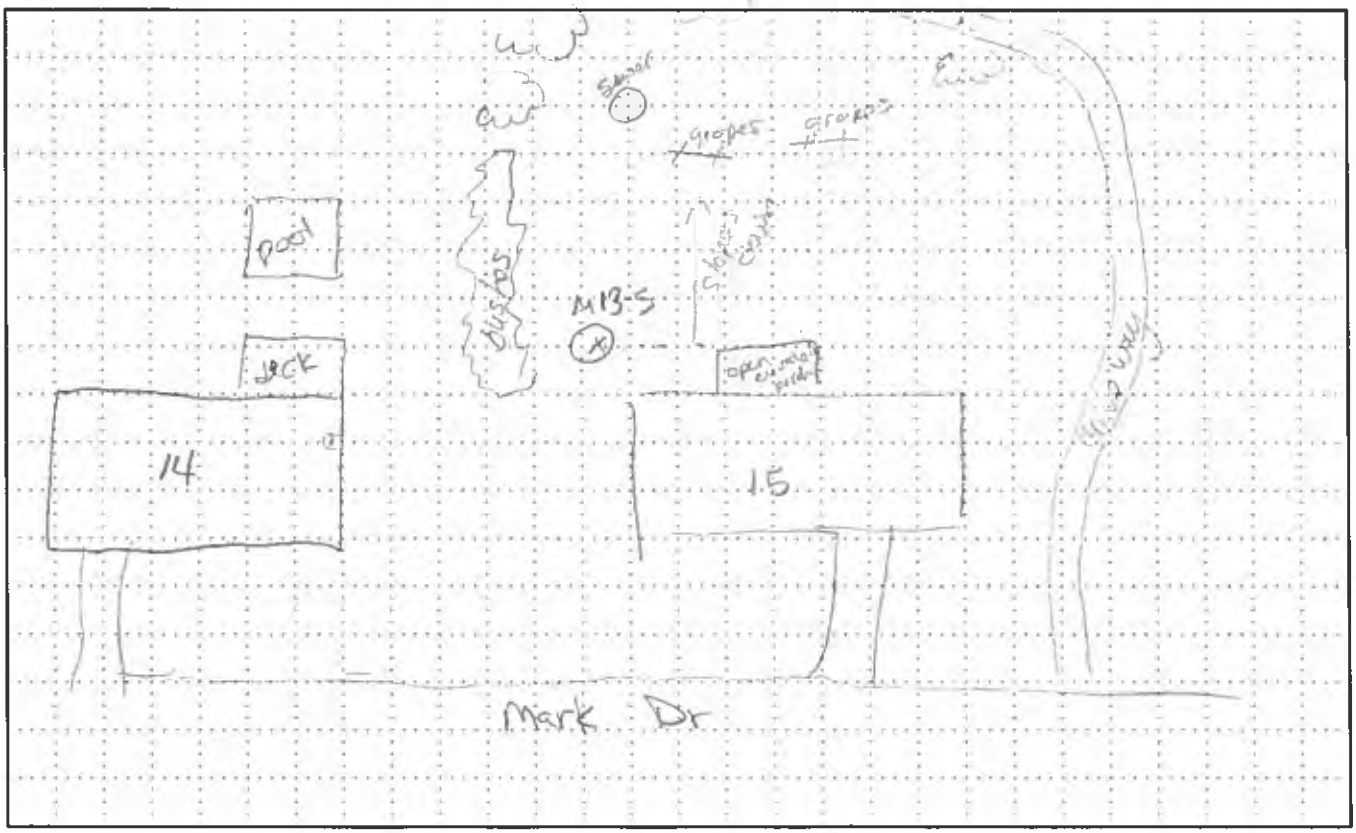
	Roadway#1 Mark Dr		Roadway#2 driveway		Roadway#3 15 NB		Roadway#4 15 SB	
Direction			U					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	III		I		450		516	
med. trk.					27		12	
hvy trk.					51		57	
bus					0		12	
motorcycle					6		12	

NOTES: Guy cutting grass on tractor across the street about 2 houses down (hit mic at beginning of measurement)

Wind chimes not usually audible over cars during gusts → located under porch

birds & wind in trees

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSUT

JOB #

SITE ID M13-6

Gannett Fleming, Inc.

ADDRESS: 11 Mark Btwn 9 & 11 Mark

Meter Storage # (#4) 0020

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.881596, -76.84432

SLM Calibration before 94.0 after

Weather: temperature 84.5°F wind speed 1.3 m/s gusts up to 5 m/s cloud cover 50%

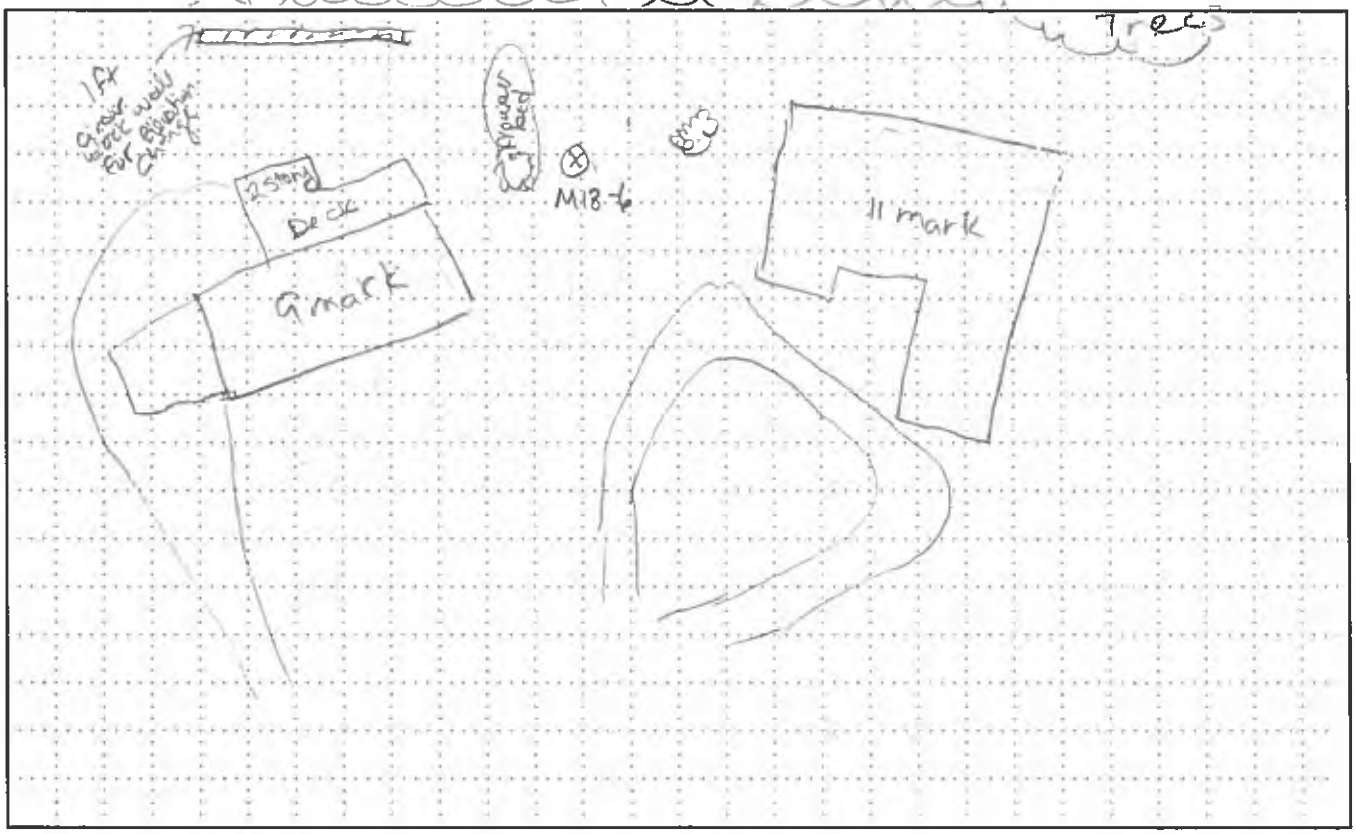
Time:	1st	start	1519:12	stop	1539:07	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	45.2	Lmax	60.8	Lmin	38.8	SEL	76.0	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	15NB		Roadway#2	15SB		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	432		auto	465		auto			auto		
med. trk.	9		med. trk.	9		med. trk.			med. trk.		
hvy trk.	39		hvy trk.	36		hvy trk.			hvy trk.		
bus	3		bus	6		bus			bus		
motorcycle	0		motorcycle	3		motorcycle			motorcycle		

NOTES: Wind in the trees. Truck traffic curtailed

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CSVT

JOB #

SITE ID M13-7

Gannett Fleming, Inc.

ADDRESS: 13 MARK DR

Meter Storage # 333

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature 81 wind speed 0-9 cloud cover 0

Time:	1st	start	3:05	stop	3:25	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	44.4	Lmax	58.1	Lmin	36.9	SEL	75.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	1st	2nd
Direction		
auto	432	
med. trk.	9	
hvy trk.	39	
bus	3	
motorcycle	0	

Roadway#2	1st	2nd
Direction		
auto	465	
med. trk.	9	
hvy trk.	36	
bus	6	
motorcycle	3	

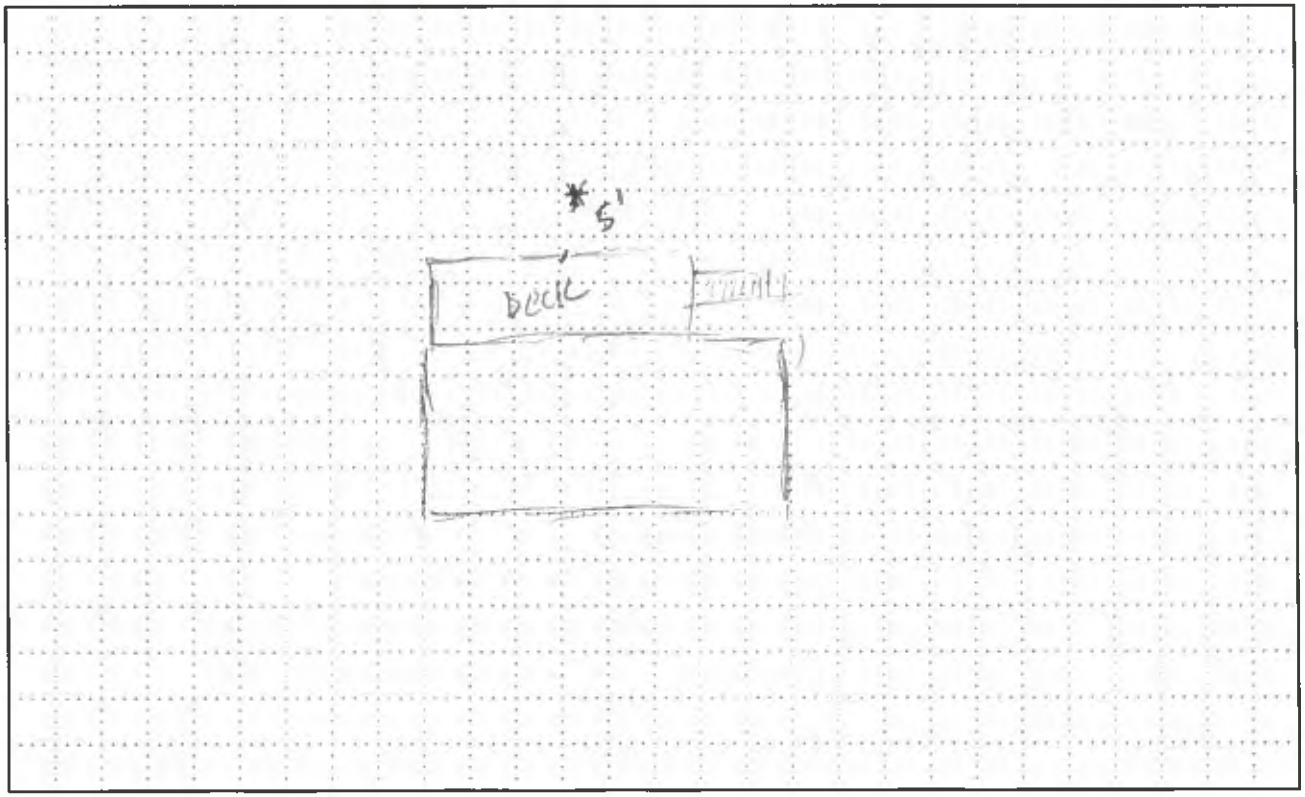
Roadway#3	1st	2nd
Direction		
auto		
med. trk.		
hvy trk.		
bus		
motorcycle		

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

NOTES: HEAVY LEAVES RUSTLING - MOVING LEAVES

TT UPS PASSBY AIRPLANE OVERHEAD

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-13-16

PROJECT: CSVT

JOB #

SITE ID M13-8

Gannett Fleming, Inc.

ADDRESS: 9 MARK DR

Meter Storage # 336

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM NO. SLM Calibration before after GPS PT

Weather: temperature 85 wind speed cloud cover

Time:	1st	start	3 36	stop	3:56	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	45.0	Lmax	52.0	Lmin	37.6	SEL	75.8	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	1st	2nd
Direction		
auto	510	
med. trk.	21	
hvy trk.	31	
bus	0	
motorcycle	9	

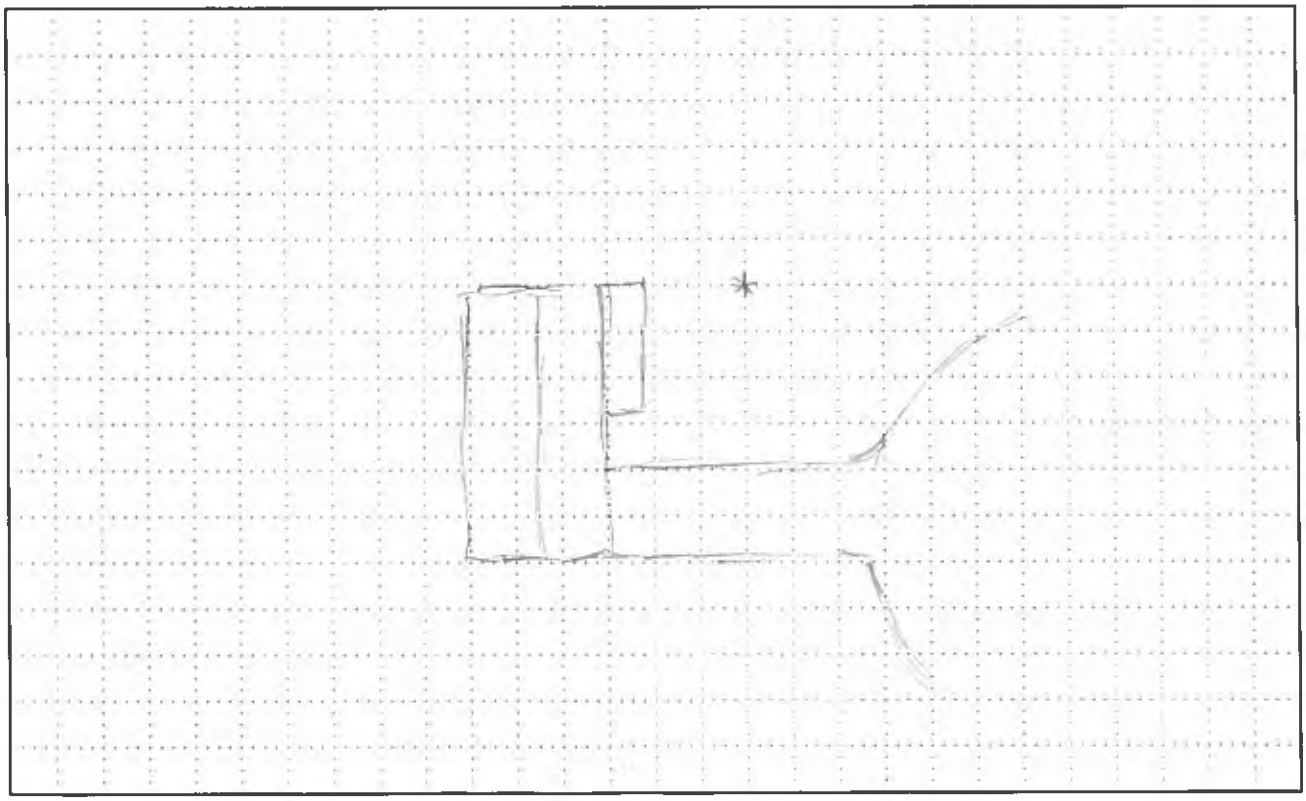
Roadway#2	1st	2nd
Direction		
auto	630	
med. trk.	56	
hvy trk.	18	
bus	9	
motorcycle	9	

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

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

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSVT

JOB #

SITE ID M14-1

Gannett Fleming, Inc.

ADDRESS: 18 Weatherfield Dr

Meter Storage # (#3) 0330

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.854741, -76.8268

SLM Calibration before 73.9 after

Weather: temperature 78.6 wind speed 2 m/s w/ gusts cloud cover none/clear

Time:	1st	start	11:46:15	stop	12:06:15	total	20 min			
	2nd	start		stop		total				
Data:	1st	Leq	46.6	Lmax	54.1	Lmin	41.4	SEL	77.4	
	2nd	Leq		Lmax		Lmin		SEL		

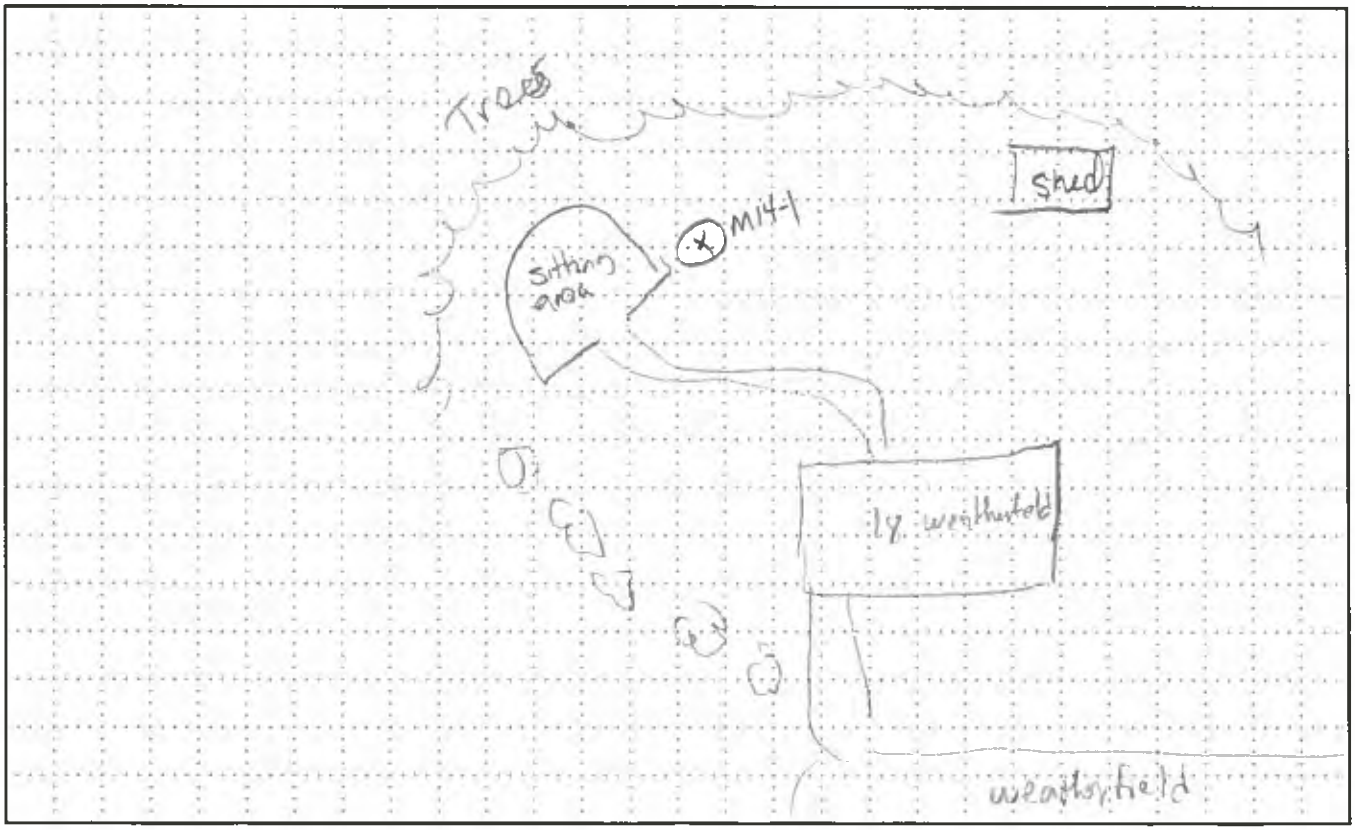
Traffic Data

Roadway#1	11/15 NB	Roadway#2	11/15 SB	Roadway#3 (60')	WB OFF	Roadway#4 (60')	EB ON
Direction		Direction		Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	1119		765		558		123	
med. trk.	33		27		27		3	
hvy trk.	144		135		9		9	
bus	15		12		0		0	
motorcycle	3		9		10		3	

NOTES: Wind in trees and insects, leaves rustling

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: SVT

JOB #

SITE ID M14-2

Gannett Fleming, Inc.

ADDRESS: Btwn 19 & 15 Weatherfield Dr

Meter Storage # (#4) 0016

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.854741, -76.82674

SLM Calibration before 94.0 after

Weather: temperature 78.2°F wind speed 2-3 m/s gusts 5-7 cloud cover >50%

Time:	1st	start	11 46 55	stop	12 06 55	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	45.7	Lmax	65.2	Lmin	40.7	SEL	76.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

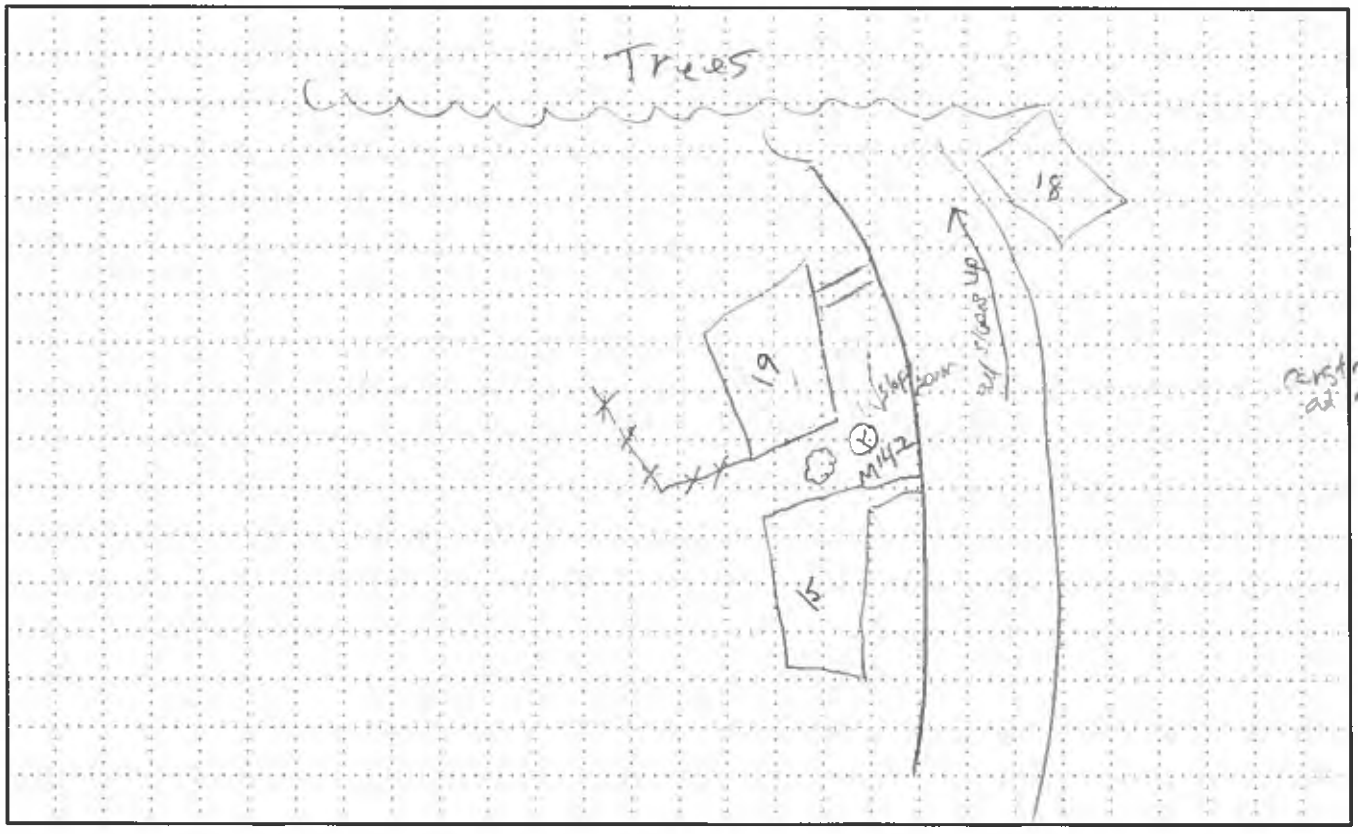
Roadway#1	11/15 NB	Roadway#2	11/15 SB	Roadway#3	61 WB OFF	Roadway#4	61 EBON
Direction		Direction		Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	1119		765		558		123	
med. trk.	33		27		27		3	
hvy trk.	144		135		9		9	
bus	15		12		0		0	
motorcycle	3		9		6		3	

NOTES: construction at municipal building audible; birds & wind in trees

This site did not windscreen

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: RSVP

JOB #

SITE ID M14-3

Gannett Fleming, Inc.

ADDRESS: 40W 8th Ave

Meter Storage # (#3) 0329

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.85356, -76.82672

SLM Calibration before 93.9 after

Weather: temperature 78.4°F wind speed 1.4 m/s cloud cover >10%

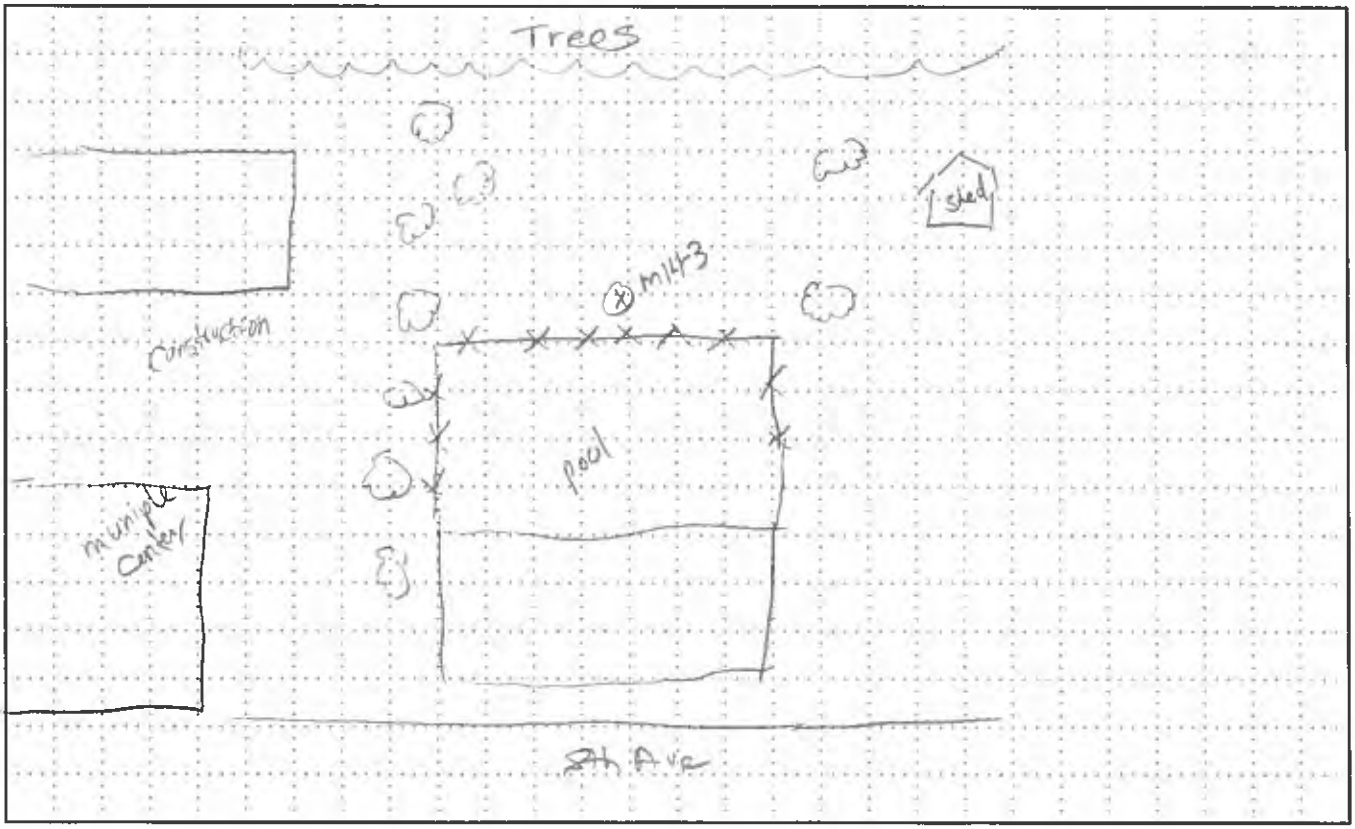
Time:	1st	start	11:00	stop	11:20	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	45.9	Lmax	57.0	Lmin	42.5	SEL	76.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	NB		Roadway#2	SB		Roadway#3	OFF NB		Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd half		1st	2nd		1st	2nd		1st	2nd
auto	356	1068	auto	308	924	auto	154	462	auto	60	180
med. trk.	14	42	med. trk.	20	60	med. trk.	5	15	med. trk.	3	9
hvy trk.	48	144	hvy trk.	40	120	hvy trk.	7	21	hvy trk.	7	21
bus	5	15	bus	3	9	bus	0	0	bus	0	0
motorcycle	1	3	motorcycle	3	9	motorcycle	8	24	motorcycle	2	6

NOTES: The home owner had dogs and was not home so the meter was placed as close to the backyard area as possible - a shed & boat are still further back. Construction at municipal center & wind in trees

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSVT

JOB #

SITE ID M14-4

Gannett Fleming, Inc.

ADDRESS: Btwn 24 & 26 W 8th Ave in backyard

Meter Storage # (#4) 0015

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.852605, -76.8826

SLM Calibration before 94.0 after

Weather: temperature 73.4 °F wind speed 2.1 m/s cloud cover >10%

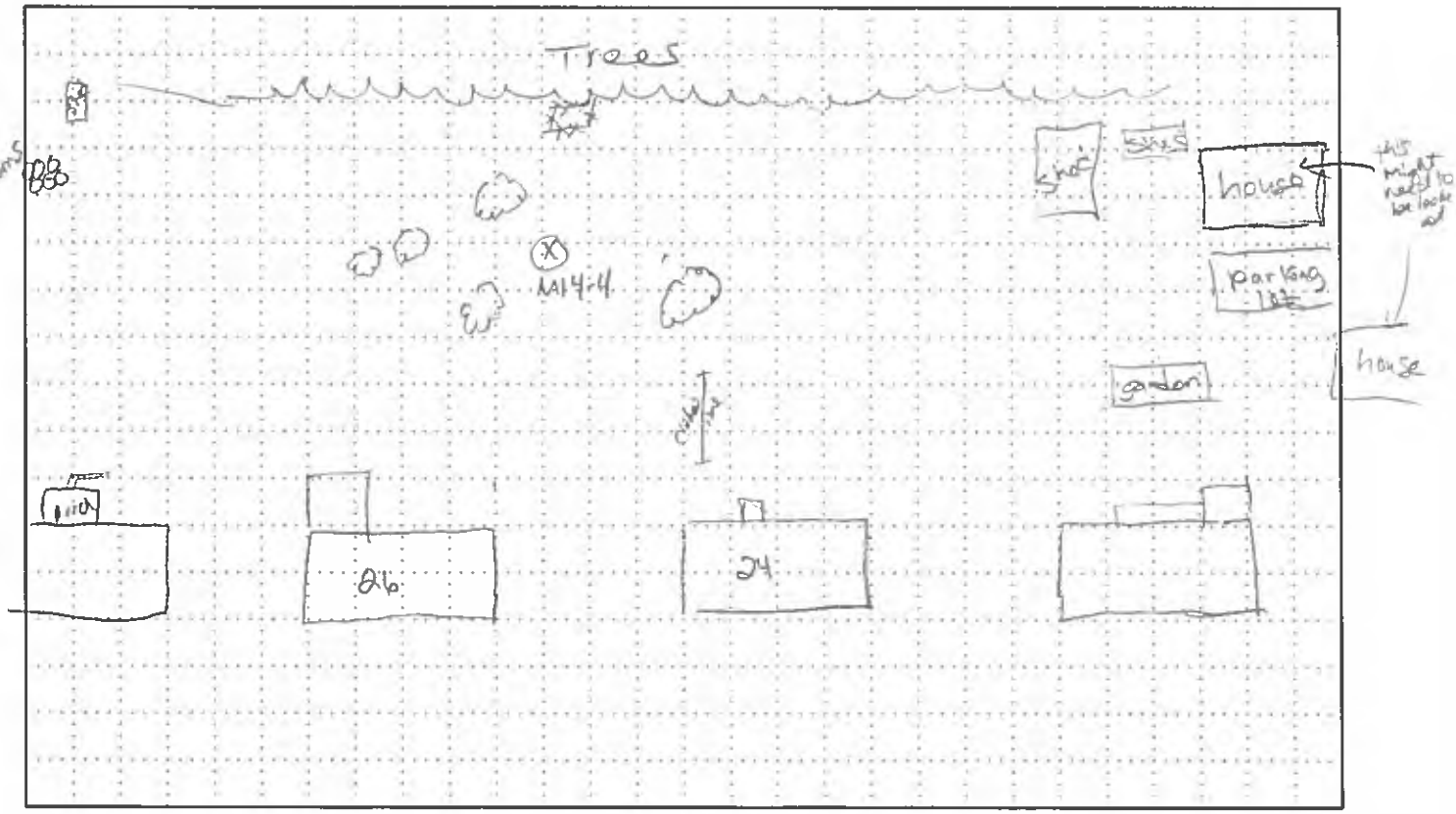
Time:	1st	start	101900	stop	1039	total	20mins		
	2nd	start		stop		total			
Data:	1st	Leq	44.2	Lmax	58.6	Lmin	41.4	SEL	75.0
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

	Roadway#1		Roadway#2		Roadway#3 61'		Roadway#4 61'	
Direction	NB 11/15		SB 11/15		WB OFF		ONEB	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	1053		762		465		117	
med. trk.	63		18		12		15	
hvy trk.	150		99		21		6	
bus	18		6					
motorcycle	3		0					

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSVT

JOB #

SITE ID M14-5

Gannett Fleming, Inc.

ADDRESS: 16 8th Ave

Meter Storage # (#3) 0328

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.85176, -76.82276

SLM Calibration before 93.9 after

Weather: temperature 73.3°F wind speed 2.5 m/s cloud cover 10-15%

Time:	1st	start	94000	stop	100000	total	20 min		
	2nd	start		stop		total			
Data:	1st	Leq	46.6	Lmax	53.0	Lmin	41.9	SEL	77.4
	2nd	Leq		Lmax		Lmin		SEL	

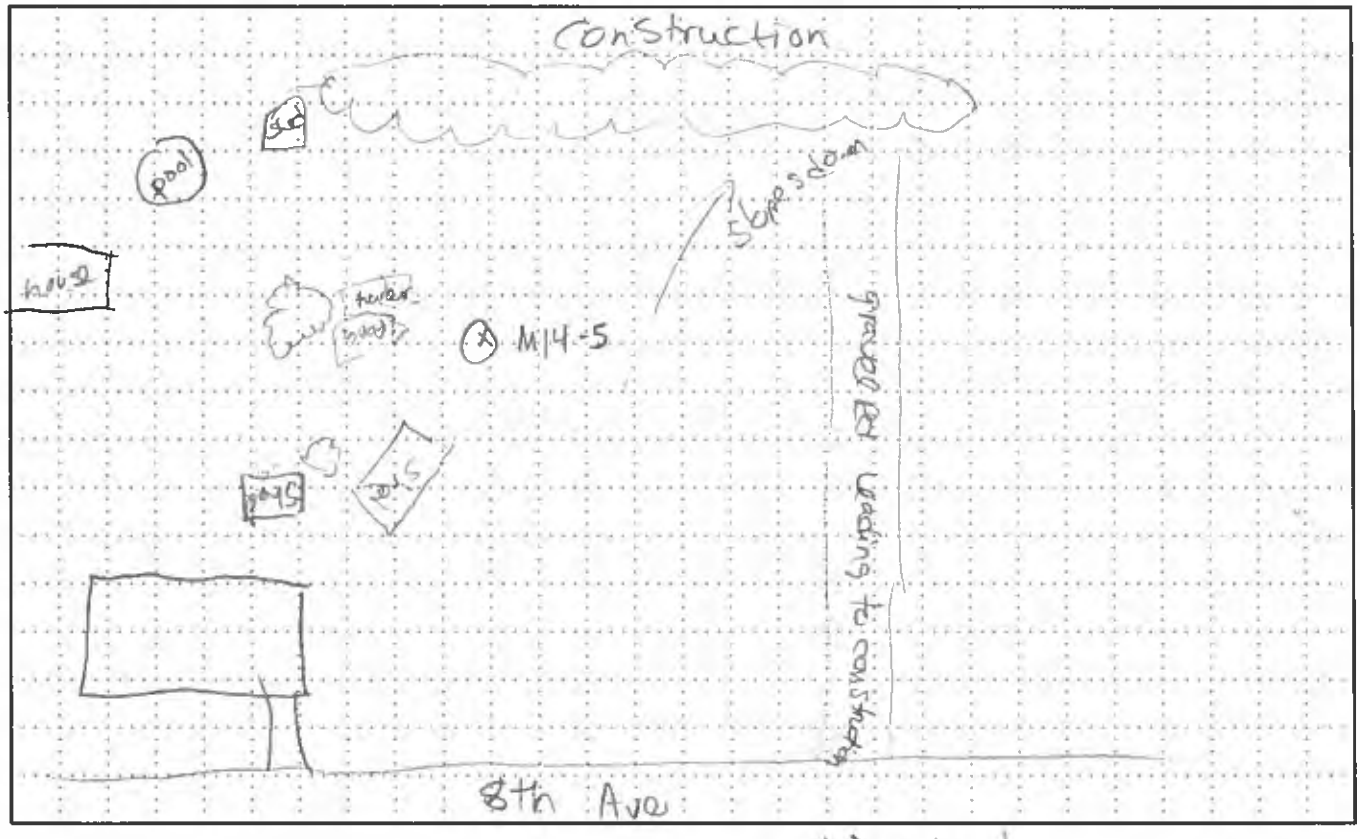
Traffic Data

Roadway#1	NB 11/15	Roadway#2	SB 11/15	Roadway#3	81 OFF WB	Roadway#4	81 ON EB
Direction		Direction		Direction		Direction	

	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	957		660		552		138	
med. trk.	48		33		15		3	
hvy trk.	126		114		9		9	
bus	15		3		0		0	
motorcycle	9		0		3		4	

NOTES: wind chimes; some construction behind house

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: CSUT

JOB #

SITE ID M14-10

Gannett Fleming, Inc.

ADDRESS: 12 8th Ave

Meter Storage # (#4) 0014

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.850600, -76.801564

SLM Calibration before 94.0 after

Weather: temperature 76.1 °F wind speed 1.3 m/s cloud cover 10-15%

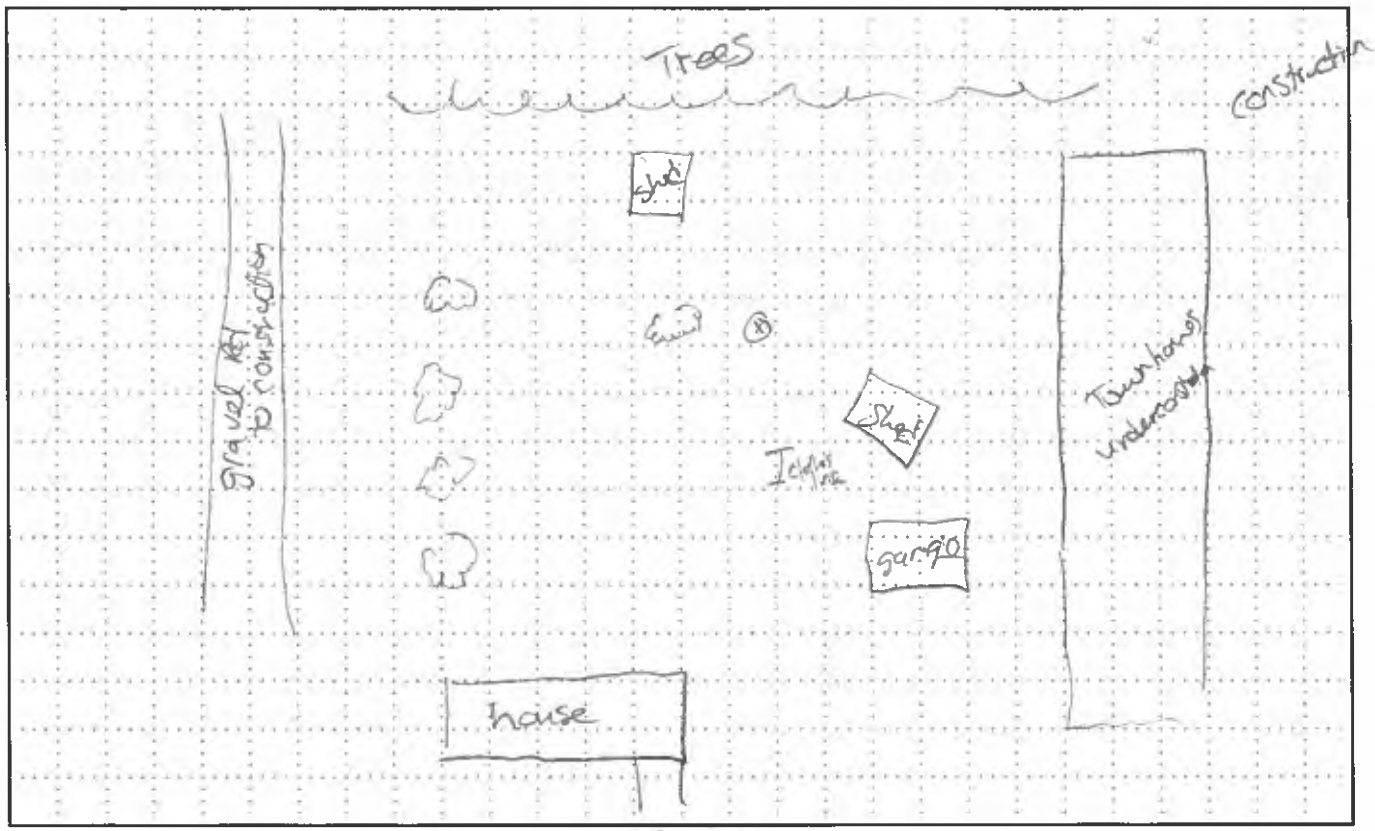
Time:	1st	start	933830	stop		total	20 min			
	2nd	start		stop		total				
Data:	1st	Leq	50.1	Lmax	61.4	Lmin	42.5	SEL	80.9	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1 NB 11/15		Roadway#2 NB 11/15		Roadway#3 OFFWB 61		Roadway#4 ONEB 61	
Direction								
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	957		660		552		138	
med. trk.	48		93		15		3	
hvy trk.	126		114		9		9	
bus	15		3		1		0	
motorcycle	9		0		3		6	

NOTES: Construction near townhouses accounts for most of the noise

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/13/16

PROJECT: PSU IT

JOB #

SITE ID M14-7

Gannett Fleming, Inc.

ADDRESS: Erono Lodge
3249 N. Susquehanna Trail
Harrisburg, Pa 17776

Meter Storage # 0012 (#4) & 6326 (#3)

TYPE ☐ Residential ☑ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.850092, -76.819968

SLM Calibration before 94.0 after

Weather: temperature 58.6°F wind speed 0.5 m/s cloud cover scattered/patchy ~30%-40%

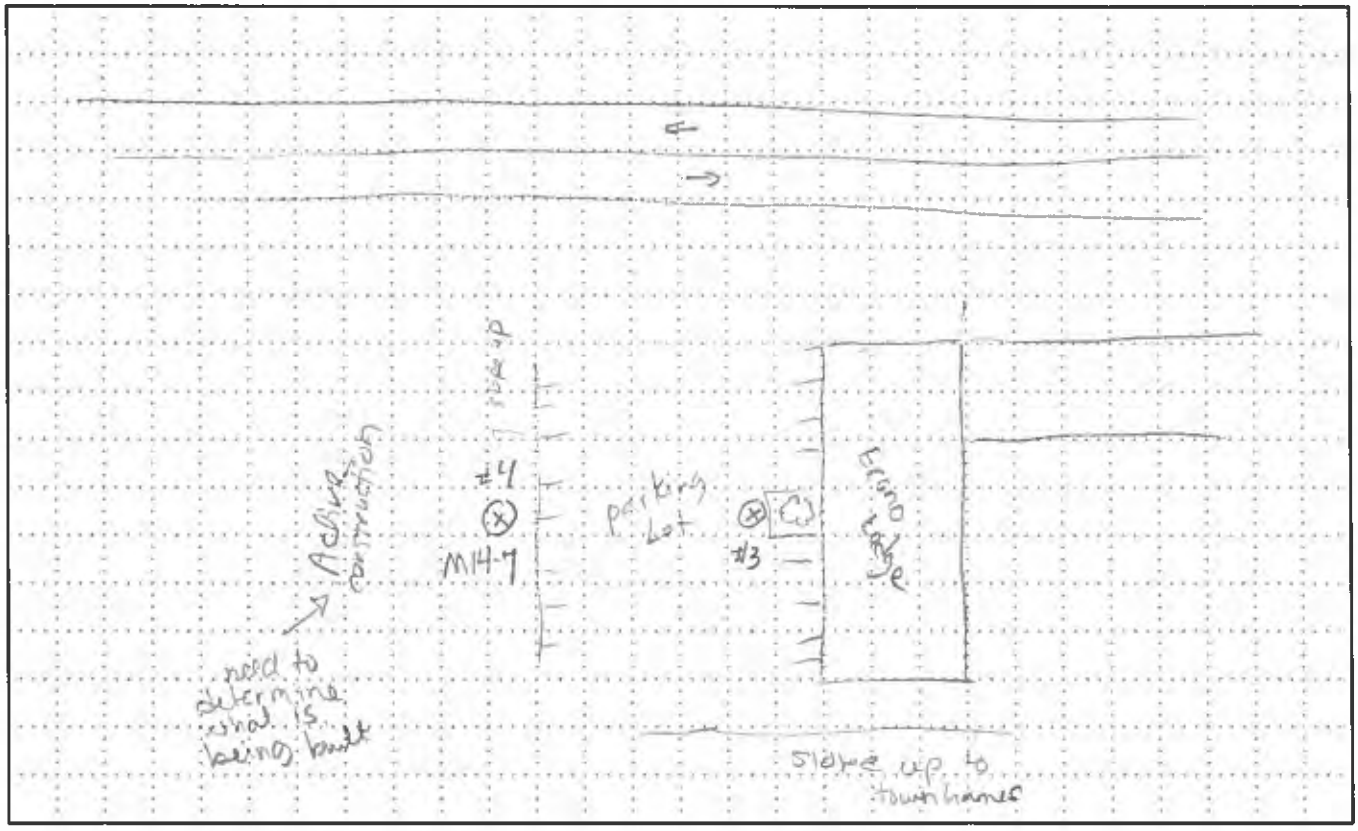
Time:	1st	start	708	stop	728	total	20 mins			
	2nd	start		stop		total				
Data:	1st #4	Leq	55.3	Lmax	67.1	Lmin	49.9	SEL	86.1 (0012)	closer to construction
	2nd #3	Leq	56.1	Lmax	68.8	Lmin	50.4	SEL	86.9 (CB06)	closer to hotel

Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 SB		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	1113		auto	996		auto			auto		
med. trk.	33		med. trk.	36		med. trk.			med. trk.		
hvy trk.	126		hvy trk.	138		hvy trk.			hvy trk.		
bus	9		bus	12		bus			bus		
motorcycle	9		motorcycle	3		motorcycle			motorcycle		

NOTES: some intermitant hammering from framing at construction site. backup alarm & banging but tried to use pause feature on #4 closest to construction and birds audible toward the end

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M15-1

Gannett Fleming, Inc.

ADDRESS: 41 Jonathan Rd

Meter Storage # 010 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.854767, -76.820191

SLM Calibration before 94.0 after

Weather: temperature 79.6 wind speed 0.6 m/s cloud cover none/clear

Time:	1st	start	1543	stop	1603	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	44.8	Lmax	61.2	Lmin	39.2	SEL	75.6
	2nd	Leq		Lmax		Lmin		SEL	

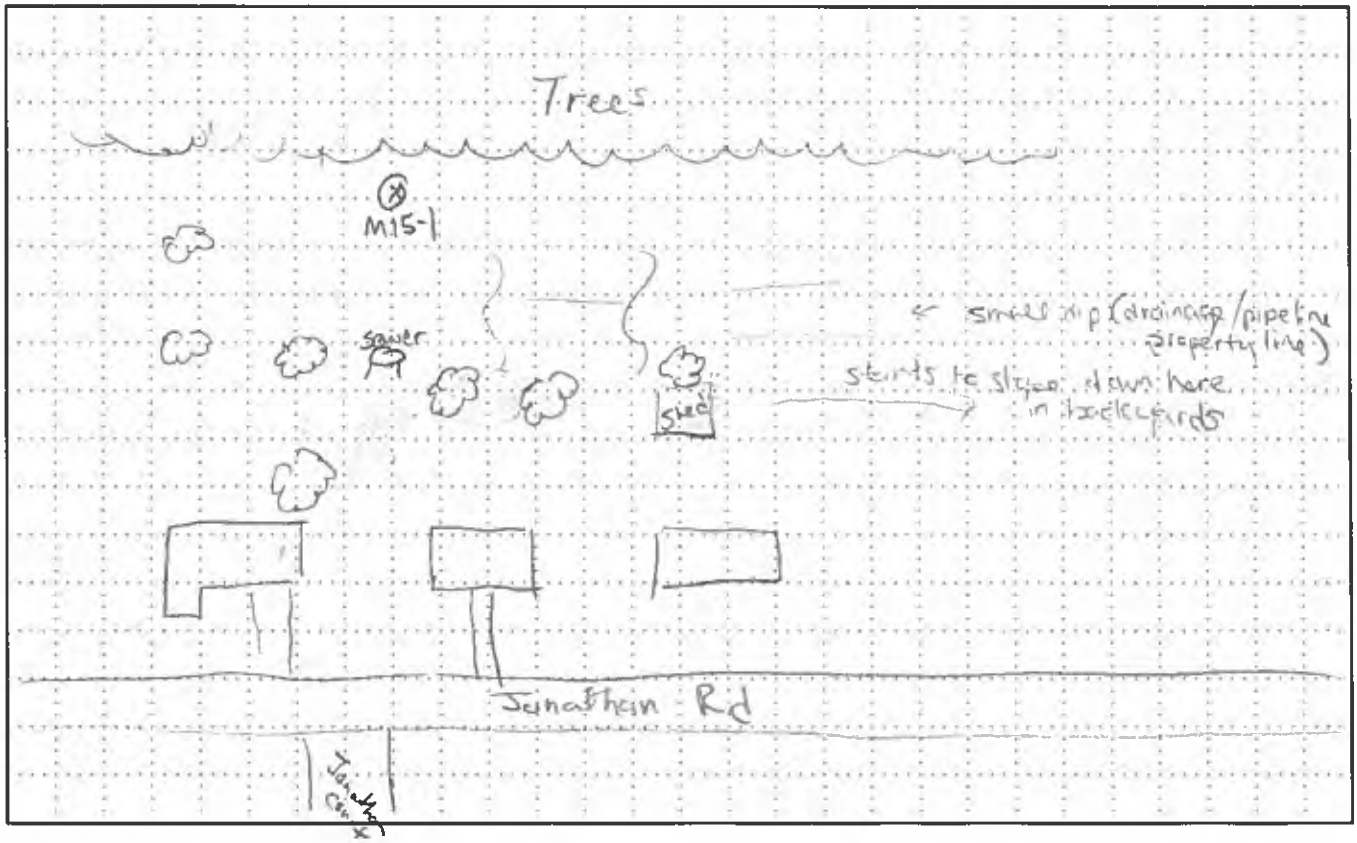
Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 - SB		Roadway#3	61 WB		Roadway#4	61 EB	
Direction			Direction			Direction	OFF		Direction	ON	
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	786		auto	1281		auto	504		auto	234	
med. trk.	33		med. trk.	75		med. trk.	6		med. trk.	12	
hvy trk.	84		hvy trk.	117		hvy trk.	12		hvy trk.	6	
bus	12		bus	9		bus			bus		
motorcycle	12		motorcycle	3		motorcycle			motorcycle		

NOTES: bird noises audible & some insect noise

lady calling her dog 2 house over, briefly not very loud

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M15-2

Gannett Fleming, Inc.

ADDRESS: 27 Jonathan Rd

Meter Storage # 009 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.853909, -76.81906

SLM Calibration before 94.0 after

Weather: temperature 79.8°F wind speed 1.6m/s cloud cover > 5%

Time:	1st	start	1509	stop	1529	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	51.9	Lmax	64.9	Lmin	46.6	SEL	82.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	11/15 NB	Roadway#2	11/15 SB	Roadway#3	61 WB OFF	Roadway#4	61 EB ON
Direction		Direction		Direction		Direction	

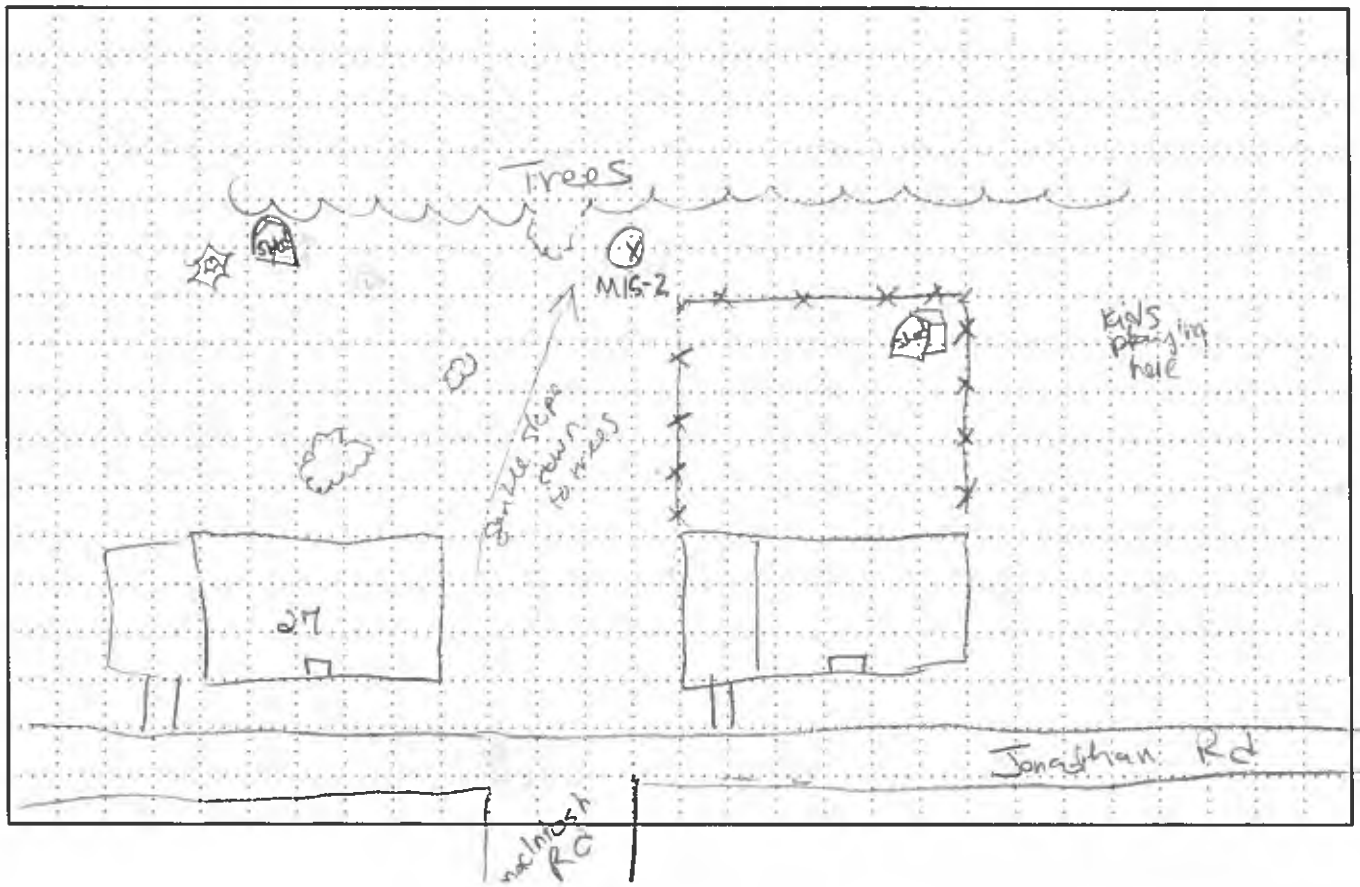
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	675		909		567		222	
med. trk.	36		36		24		12	
hvy trk.	117		123		12		15	
bus	0		6		0		9	
motorcycle	3		9		6		3	

NOTES: 15:25O – 15:33O aircraft flyover

1521 distant kids playing & 1522 insect/bird noise; insect noise audible entire time

15:26:48 kids walking & noise down

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID MP-3

Gannett Fleming, Inc.

ADDRESS: 102 5th Ave

Meter Storage # 008 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after

GPS PT 40.853402, -76.8184

Weather: temperature 81.4°F wind speed 1.5 m/s cloud cover none/clear

Time:	1st	start	1440	stop	1500	total	20 min		
	2nd	start		stop		total			
Data:	1st	Leq	58.7	Lmax	76.5	Lmin	44.9	SEL	89.5
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

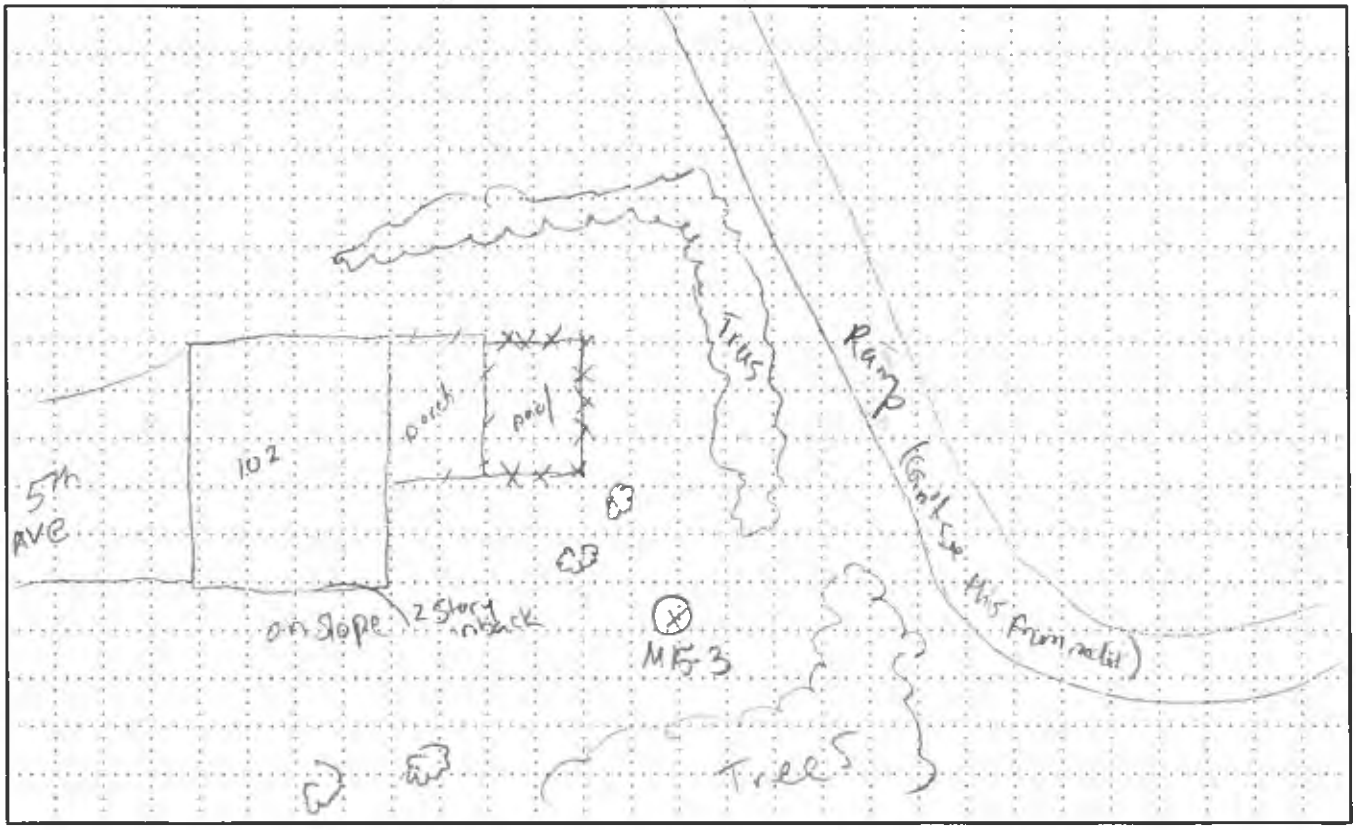
Roadway#1	NB 11/15		Roadway#2	SB 11/15		Roadway#3	I-81 NB		Roadway#4	I-81 EB	
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	756		auto	1056		auto	501		auto	216	
med. trk.	33		med. trk.	60		med. trk.	15		med. trk.	21	
hvy trk.	117		hvy trk.	108		hvy trk.	18		hvy trk.	12	
bus	12		bus	9		bus	0		bus	3	
motorcycle	18		motorcycle	6		motorcycle	6		motorcycle	0	

NOTES: 1450 helicopter +/- 1 minute either side overhead slow passby

1453 - 1454 dog barking loudly from house (was inside previously, inside; now unconditioned porch)

1455 - 1457 dog barking/howling continues into 1457 intermittent & a lot less after this

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9-12-16

PROJECT: CSVT

JOB # 58758-C01

SITE ID 15-4

Gannett Fleming, Inc.

ADDRESS: 120 MAIN ST

Meter Storage # 323

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

Measurement Data

Photograph #'s _____

GPS PT _____

SLM Calibration before _____ after _____

Weather: temperature 81 wind speed _____ cloud cover _____

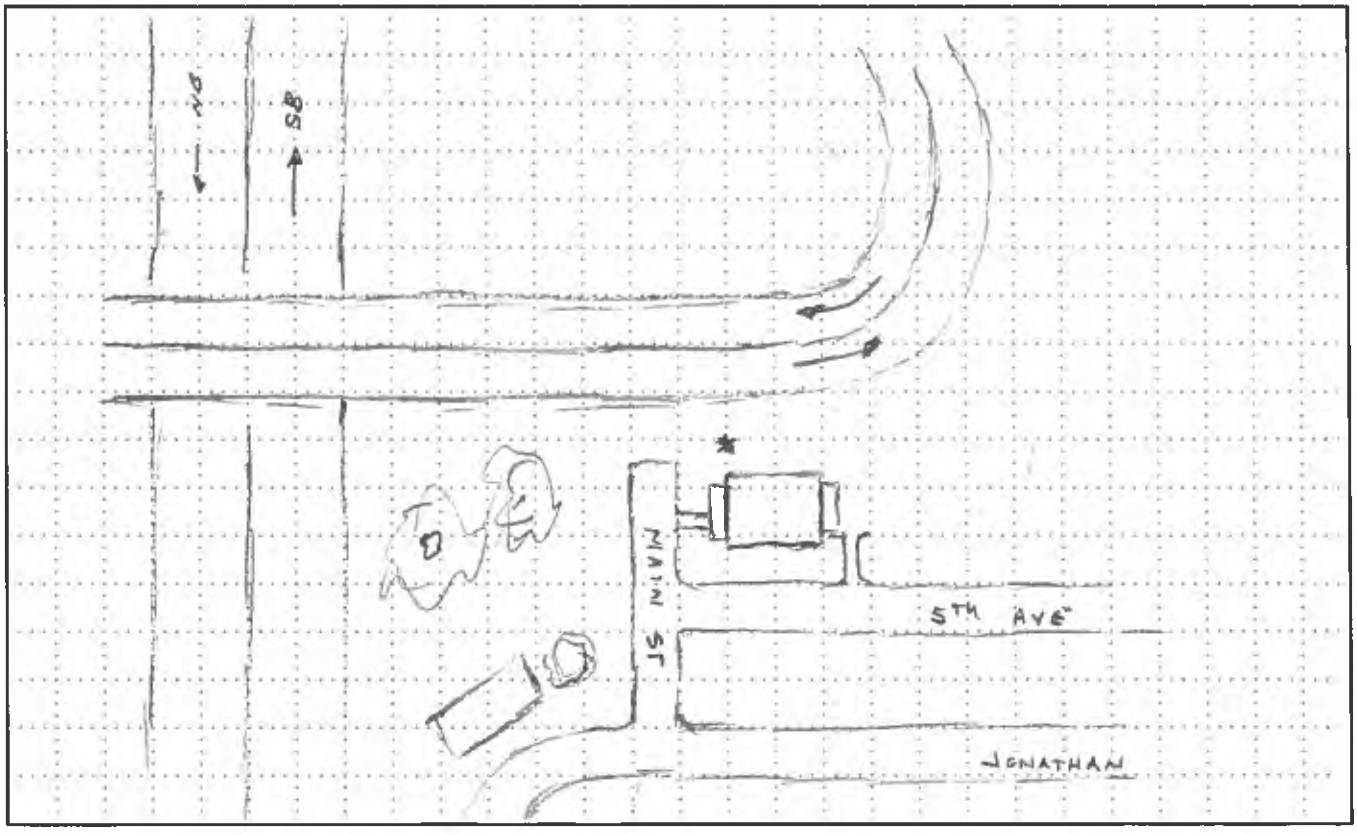
Time:	1st	start	2:40	stop	3:00	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.4	Lmax	79.3	Lmin	50	SEL	91.2
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	61 - WB		Roadway#2	61 EB		Roadway#3	NB 11/15		Roadway#4	SB 11/15	
Direction	→		Direction	←		Direction			Direction		
	1st	2nd hrly		1st	2nd hrly		1st	2nd		1st	2nd
auto	167	501	auto	72	216	auto	756		auto	1056	
med. trk.	5	15	med. trk.	7	21	med. trk.	33		med. trk.	60	
hvy trk.	6	18	hvy trk.	4	12	hvy trk.	117		hvy trk.	80	
bus	0	0	bus	1	3	bus	12		bus	9	
motorcycle	2	6	motorcycle	0	0	motorcycle	18		motorcycle	6	

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M16-1

Gannett Fleming, Inc.

ADDRESS: 22 Rome Court

Meter Storage # 011 (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 40.853418, -76824580

SLM Calibration before 94.0 after

Weather: temperature 78.9°F wind speed 1 m/s cloud cover sunny/clear

Time:	1st	start	1623	stop	1643	total	20mins		
	2nd	start		stop		total			
Data:	1st	Leq	47.6	Lmax	62.4	Lmin	44.2	SEL	78.4
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

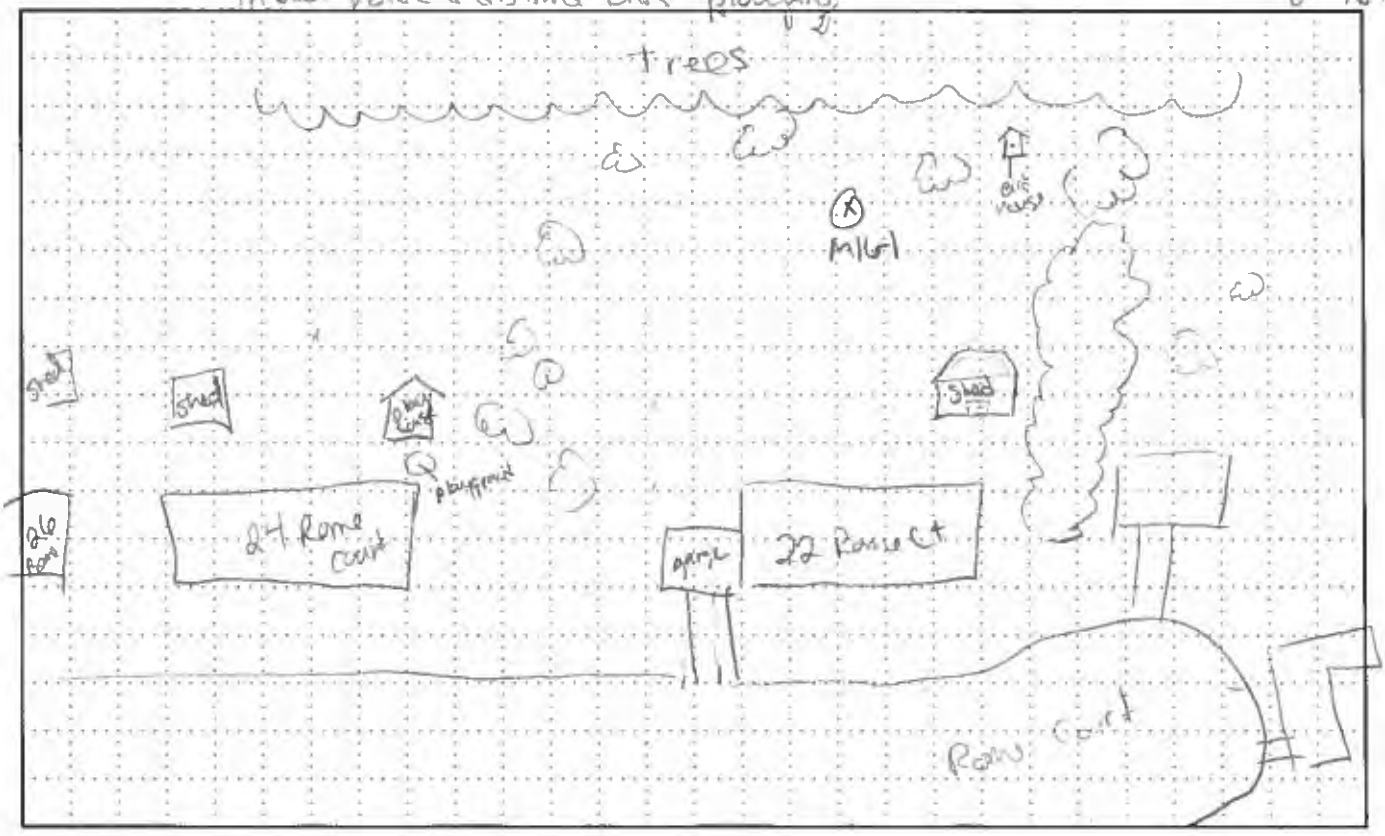
	Roadway#1 11/15 NB		Roadway#2 11/15 SB		Roadway#3		Roadway#4	
Direction								
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	783		1023					
med. trk.	9		36					
hvy trk.	114		54					
bus	3		3					
motorcycle			4					

NOTES: 1625 guy walking dog & talking on cell phone (less than 1 min) takes path through woods

163740 – 163752 kid on dirt bike passes by thru water & woods / same or other kid and dog

16 3841 163901 kid on dirt bike past by; 163947 – 164005 kid on dirt bike past by. 164051 – 164112 kid on dirt bike past by

SITE SKETCH insect noise & distant kids playing



Highway Noise Monitoring Sheet

DATE: 9-12-16

PROJECT: CSVT

JOB #

SITE ID 16-2

Gannett Fleming, Inc.

ADDRESS: 30 Rome CT

Meter Storage # 324

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT

SLM Calibration before after

Weather: temperature 81 wind speed 0-5 cloud cover 0

Time:	1st	start	4:23	stop	4:43	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	45.1	Lmax	55.0	Lmin	42.4	SEL	75.9	
	2nd	Leq		Lmax		Lmin		SEL		

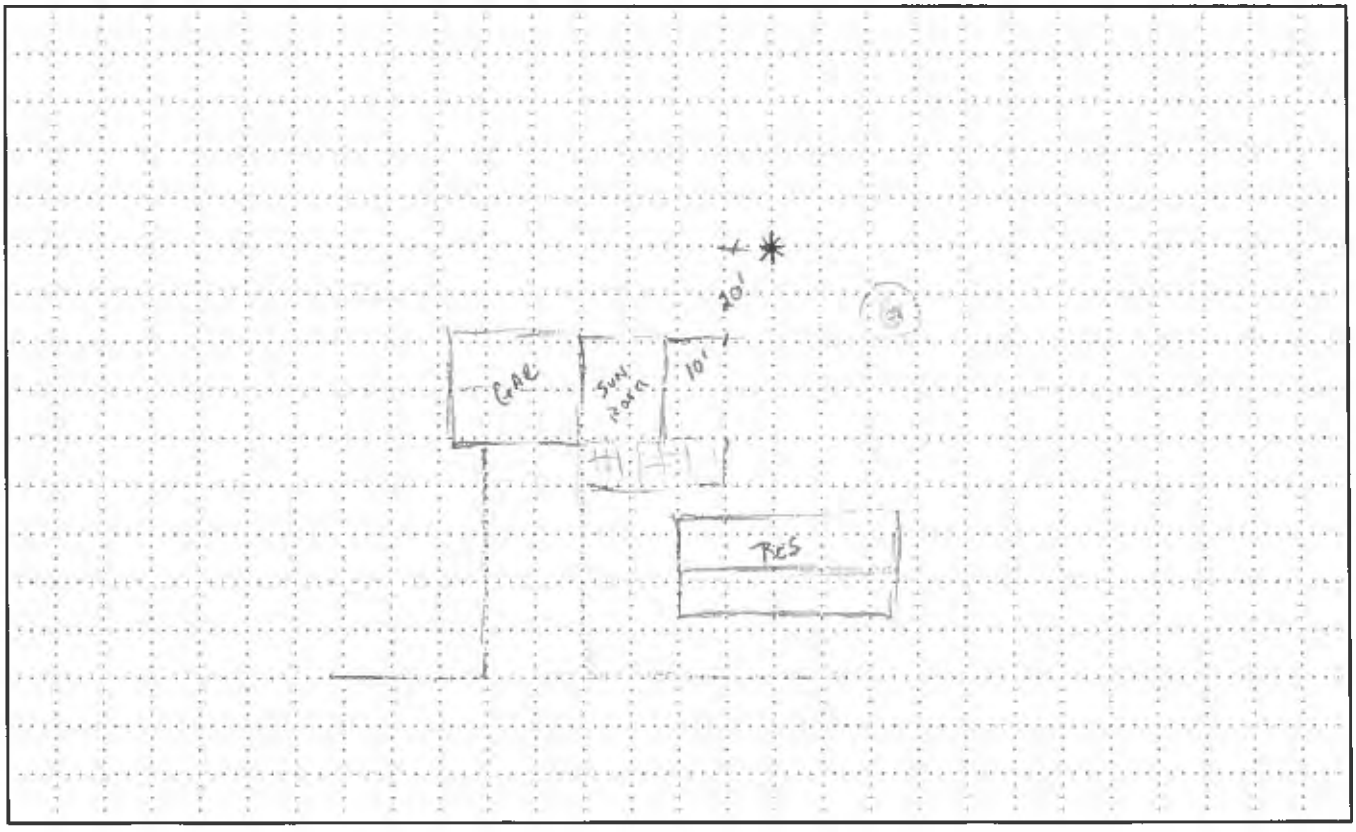
Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 SB		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	783		auto	1023		auto			auto		
med. trk.	9		med. trk.	36		med. trk.			med. trk.		
hvy trk.	114		hvy trk.	34		hvy trk.			hvy trk.		
bus	3		bus	3		bus			bus		
motorcycle			motorcycle	6		motorcycle			motorcycle		

NOTES: Can Barely hear 11/15 traffic

Dog barking in backyard Kid on small MC passby

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: PSVT

JOB #

SITE ID M16-3

Gannett Fleming, Inc.

ADDRESS: 36 Rome Ct
A1 Roofing & Sporting

Meter Storage # 0325 (#3)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after

GPS PT 40.854227, -76.822

Weather: temperature 78.8 wind speed 1.6 m/s cloud cover none / clear

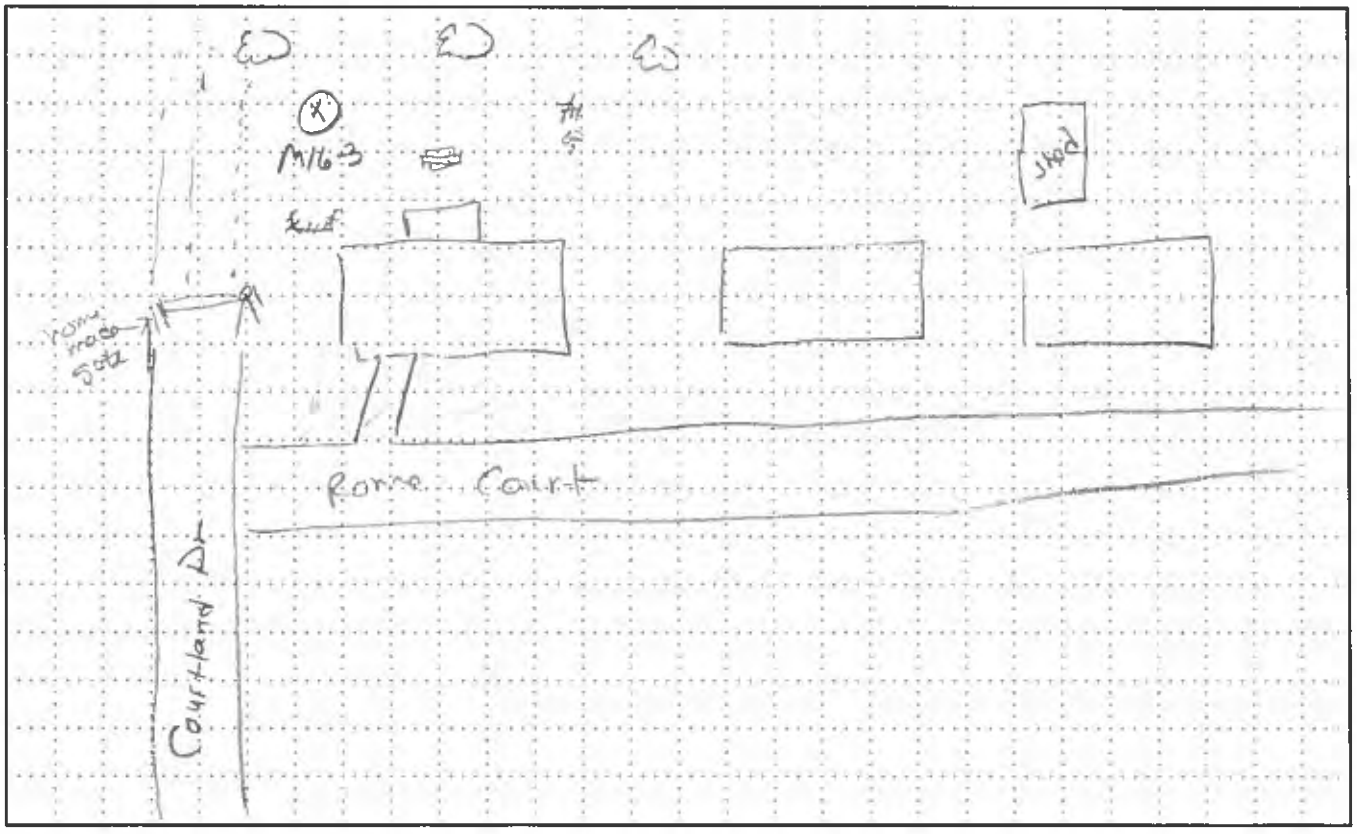
Time:	1st	start	1655	stop	1715	total	20mins			
	2nd	start		stop		total				
Data:	1st	Leq	42.8	Lmax	53.5	Lmin	40.8	SEL	73.6	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1 11/15 NB		Roadway#2 11/15 SB		Roadway#3		Roadway#4	
Direction								
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	816		1386					
med. trk.	48		48					
hvy trk.	96		186					
bus	0		0					
motorcycle	9		21					

NOTES: bird & insect noises

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M17-1

Gannett Fleming, Inc.

ADDRESS: 2 Helen St

M17-1 (btwn 2 & 4 Helen St)

Meter Storage # 006 (# 4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after 94.0

GPS PT 40.848595, -76.81888

Weather: temperature 30.2°F wind speed 2.3 m/s cloud cover >10% clouds

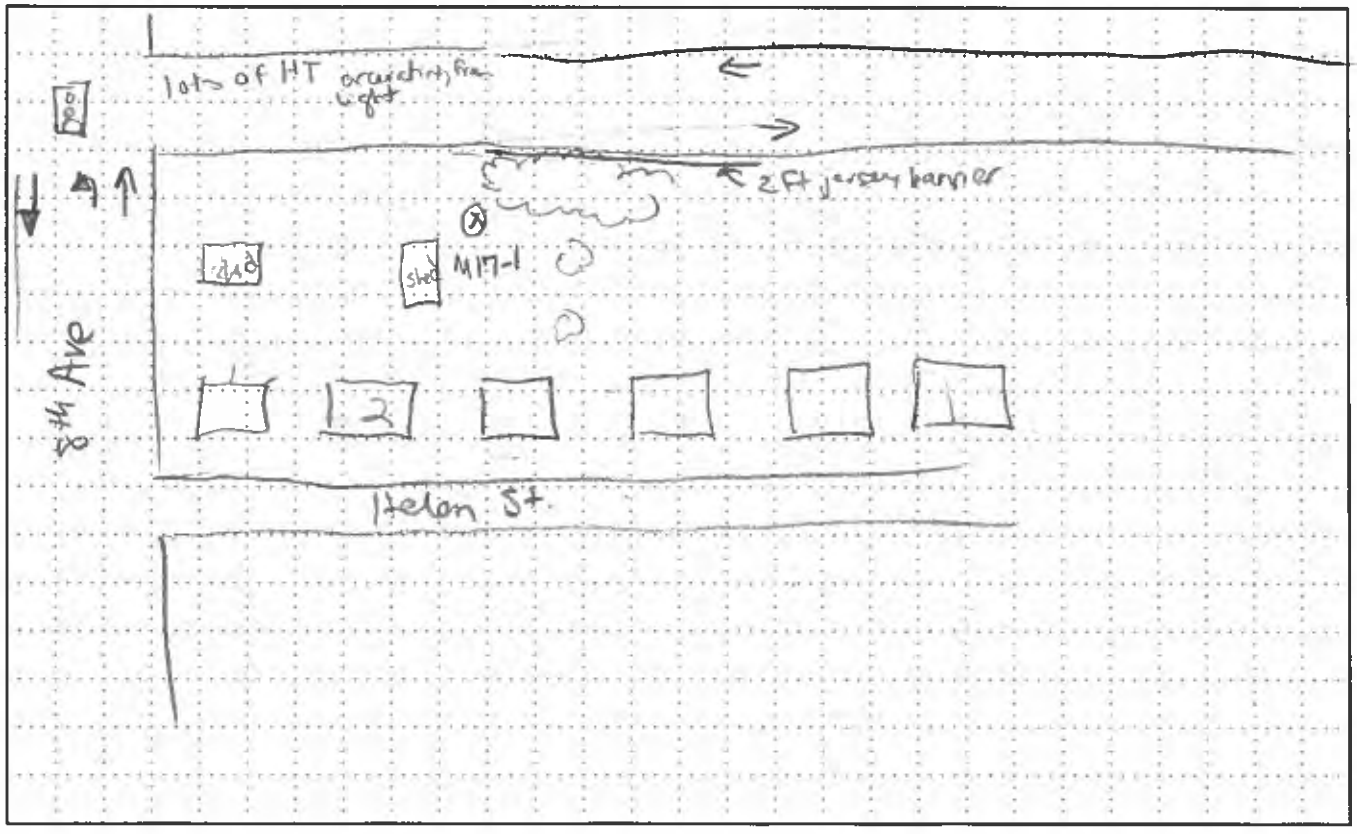
Time:	1st	start	1231	stop	1251	total	20 mins			
	2nd	start		stop		total				
Data:	1st	Leq	60.5	Lmax	72.7	Lmin	49.1	SEL	91.3	006
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

	Roadway#1		Roadway#2		Roadway#3		Roadway#4	
	8th Ave		8th Ave		N3/11/15		S2 11/15	
Direction	↓		↑					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	42		65		738		1086	
med. trk.	1				24		60	
hvy trk.	1				144		129	
bus					12		0	
motorcycle			2		6		1	

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M17-2

Gannett Fleming, Inc.

ADDRESS: 28 Helen St

Meter Storage # 00M (#4)

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 94.0 after 94.0

GPS PT 40.849738, -76.81791

Weather: temperature 85.1°F wind speed 0.9 m/s cloud cover none

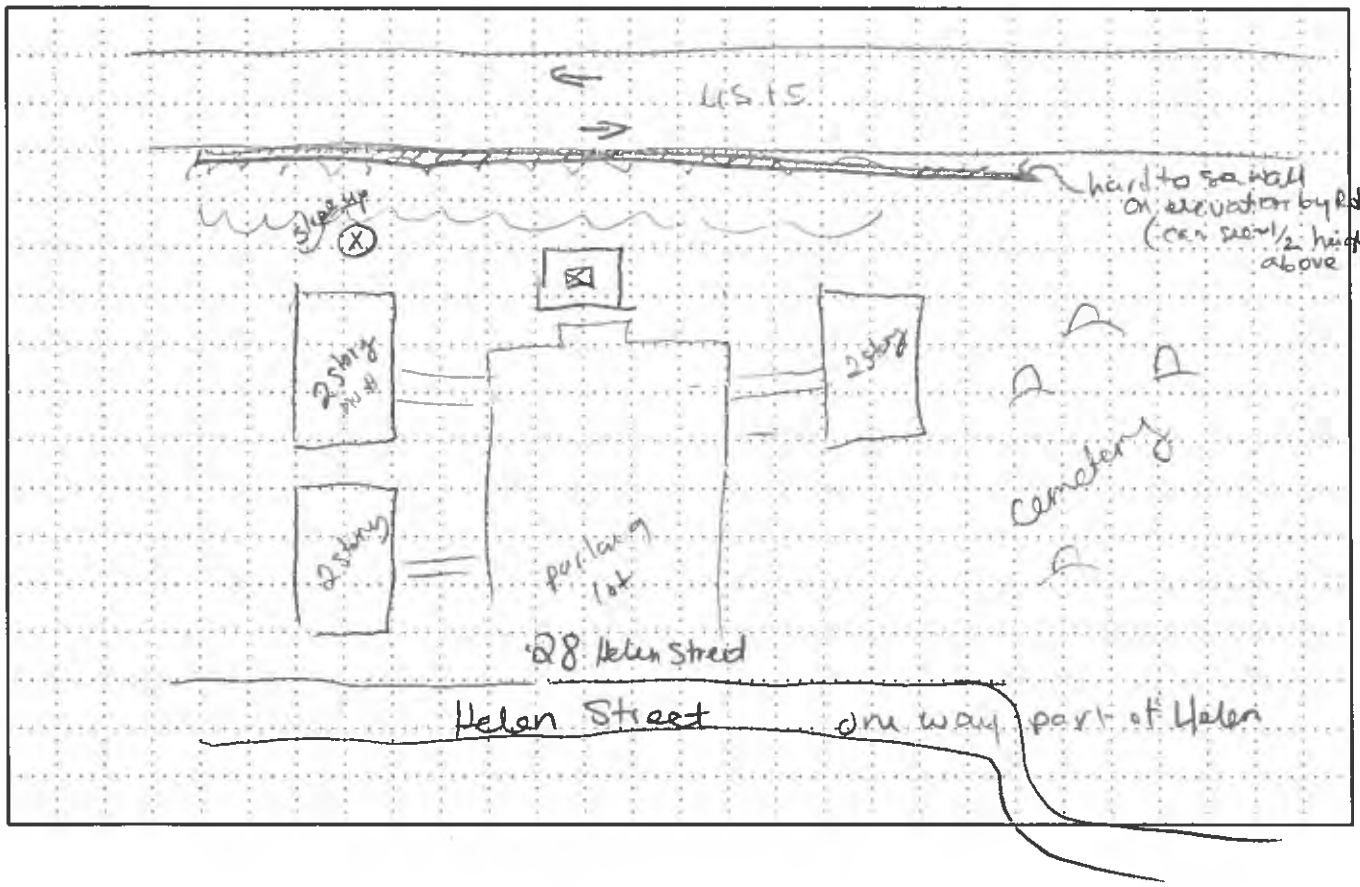
Time:	1st	start	1258	stop	1318	total	20 mins		
	2nd	start		stop		total			
Data:	1st	Leq	56.2	Lmax	74.2	Lmin	46.7	SEL	87.0
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 SB		Roadway#3	61	61	Roadway#4	61 WB OFF	61 WB THRU
Direction			Direction			Direction	EBON	EB	Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	819		auto	939		auto	573	225	auto	111	444
med. trk.	54		med. trk.	36		med. trk.	33	0	med. trk.	0	15
hvy trk.	105		hvy trk.	150		hvy trk.	15	5	hvy trk.	6	1
bus	0		bus	3		bus	0	1	bus	6	
motorcycle	6		motorcycle	15		motorcycle	15		motorcycle		

NOTES: distant emergency sirens

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M17-3 + M17-6

Gannett Fleming, Inc.

ADDRESS: Cemetery on Helen St
44 Helen Street

Meter Storage # 005 + 0322

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 940 after

GPS PT #3 40.849724, -76.816482
#4 40.850607, -76.817036

Weather: temperature 82°F wind speed 1.9 m/s cloud cover none/clear

Time: #3 1st start 1154 stop 1214 total 20 mins grave yard residential

#4 2nd start 1156 stop 1216 total 20 mins

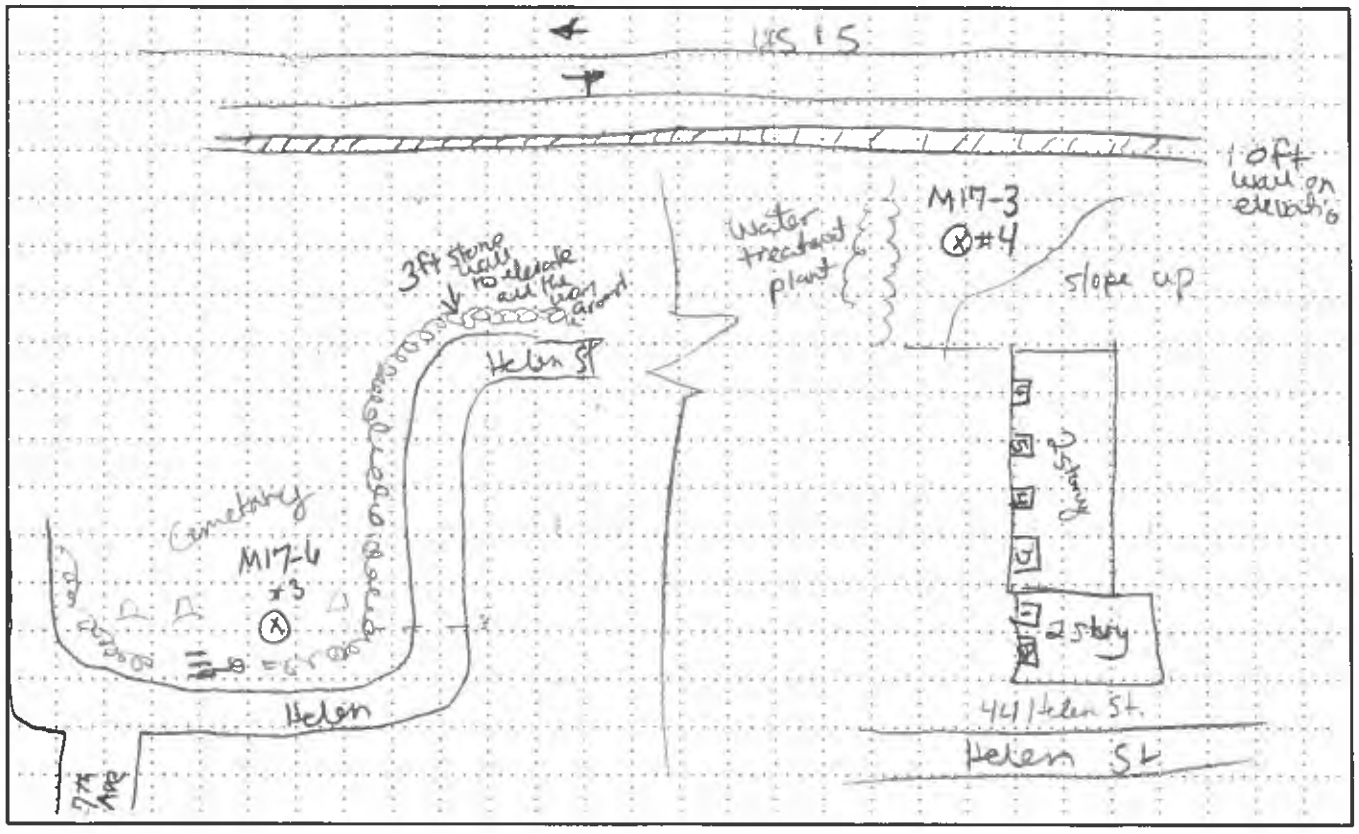
Data: #3 1st	Leq	48.2	Lmax	64.0	Lmin	41.7	SEL	79.0	#322
M173 #4 2nd	Leq	55.1	Lmax	75.7	Lmin	46.6	SEL	85.9	#605

Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 SB		Roadway#3	GI EB ramp ON	GI EB	Roadway#4	GI WB OFF	GI WB ramp	PA 4 LOT
Direction			Direction			Direction			Direction			
	1st	2nd		1st	2nd		1st	2nd		1st	2nd	
auto	840		auto	930		auto	444	201	auto	141	558	1
med. trk.	30		med. trk.	33		med. trk.	0	15	med. trk.	0	30	
hvy trk.	144		hvy trk.	147		hvy trk.	12	15	hvy trk.	9	15	
bus	0		bus			bus	0		bus			
motorcycle	0		motorcycle			motorcycle	3		motorcycle			

NOTES: raking gravel at shed next door

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 9/12/16

PROJECT: CSVT

JOB #

SITE ID M17-4 & M17-5

Gannett Fleming, Inc.

ADDRESS: 47 Helen St (#3) & Park (#4) Jack H. Treas Park

Meter Storage # 004 & 032/

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

Measurement Data

Photograph #'s

GPS PT (#3) 40.851049, -76.81589 (#4) 40.851142, -76.81447

SLM Calibration before 94.0 after

Weather: temperature 78.7°F wind speed 3.6 m/s cloud cover none

residential ← park

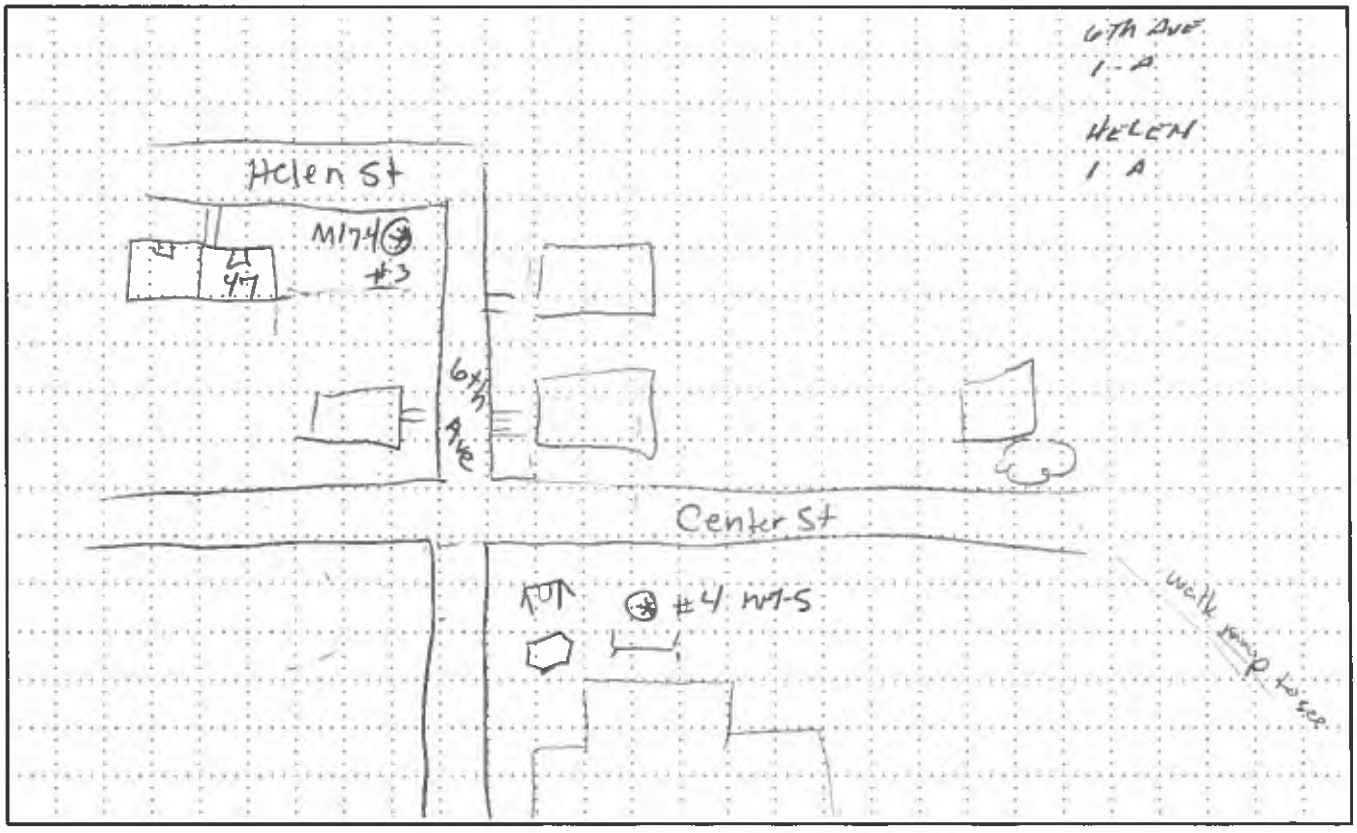
Time: M17-4	1st	#3	start 1125	stop 1145	total 20 mins						
M17-5	2nd	#4	start 1126	stop 1146	total 20 mins						
Data: M17-4	1st	#3	Leq 56.2	Lmax 76.7	Lmin 44.2	SEL 87.0	# 321 (#3)				
M17-5	2nd	#4	Leq 49.4	Lmax 58.8	Lmin 42.5	SEL 80.2	# 004 (#4)				

Traffic Data

Roadway#1	11/15 NB		Roadway#2	11/15 SB		Roadway#3	LB ON	EB THRU	Roadway#4	WB OFF	WB THRU
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	750	330	auto	822		auto	420	195	auto	120	447
med. trk.	30		med. trk.	54		med. trk.	0	15	med. trk.	0	15
hvy trk.	78 - 48		hvy trk.	168		hvy trk.	30	8	hvy trk.	24	27
bus	0		bus			bus	0	3	bus	0	0
motorcycle	6		motorcycle			motorcycle	9	3	motorcycle	3	1

NOTES: 1 tractor on 6th Ave that turned on Helen St. (Loud might count as HT?) (industrial type)

SITE SKETCH



Appendix B

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.37418

Instrument:	**Acoustical Calibrator**
Model:	**Cal150**
Manufacturer:	**Larson Davis**
Serial number:	**3047**
Class (IEC 60942):	**2**
Barometer type:	
Barometer s/n:	

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

Customer:	**Environmental Acoustics**
Tel/Fax:	**717-730-4680 / -4685**
Address:	**1400 Hummel Avenue**
	Lemoyne, PA 17403-1749

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

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

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
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
140-Norsonic	Real Time Analyzer	1403978	Mar 17, 2016	Scantek, Inc. / NVLAP	Mar 17, 2017
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4192-Brüel&Kjær	Microphone	2854675	Nov 11, 2016	Scantek, Inc. / NVLAP	Nov 11, 2017
1203-Norsonic	Preamplifier	92268	Oct 17, 2016	Scantek, Inc./ NVLAP	Oct 17, 2017

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

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

Document stored as: Z:\Calibration Lab\Cal 2016\LDCAL150_3047_M1.doc

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

Calibration Certificate

Certificate Number 2016007135

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	831	***Procedure Number***	D0001.8378		
Serial Number	0004228	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	9 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis Model 831	***Temperature***	23.35	°C	± 0.01 °C
		Humidity	49.6	%RH	± 0.5 %RH
		Static Pressure	85.86	kPa	± 0.03 kPa

Evaluation Method Tested electrically using PRM831 S/N 046380 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	06/17/2016	06/17/2017	006946
SRS DS360 Ultra Low Distortion Generator	03/17/2016	03/17/2017	007174

Calibration Certificate

Certificate Number 2016007087

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	377C20	***Procedure Number***	D0001.8387		
Serial Number	163243	***Technician***	Abraham Ortega		
Test Results	**Pass**	***Calibration Date***	8 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
Description	1/2 inch Microphone - RI - 0V	***Temperature***	23.4	°C	± 0.01 °C
		Humidity	31.6	%RH	± 0.5 %RH
		Static Pressure	101.47	kPa	± 0.03 kPa

Evaluation Method Tested electrically using an electrostatic actuator.

Compliance Standards Compliant to Manufacturer Specifications.

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Sound Level Meter / Real Time Analyzer	07/15/2016	07/15/2017	001230
Microphone Calibration System	09/03/2015	09/03/2016	001233
1/2" Preamplifier	12/15/2015	12/15/2016	001274
Agilent 34401A DMM	12/04/2015	12/04/2016	001329
Larson Davis CAL250 Acoustic Calibrator	01/05/2016	01/05/2017	003030
1/2" Preamplifier	12/15/2015	12/15/2016	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	09/11/2015	09/11/2016	006507
1/2 inch Microphone - RI - 200V	08/17/2015	08/17/2016	006511
1/2 inch Microphone - RI - 200V	08/08/2016	08/08/2017	006519
Larson Davis 1/2" Preamplifier 7-pin LEMO	09/11/2015	09/11/2016	006530
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/14/2015	08/14/2016	006531

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

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Calibration Certificate

Certificate Number 2016005752

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	046380	***Technician***	Whitney Anderson		
Test Results	**Pass**	***Calibration Date***	28 Jun 2016		
Initial Condition	As Manufactured	***Calibration Due***			
		Temperature	23.16	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Humidity***	50.6	%RH	± 0.5 %RH
		Static Pressure	86.47	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Sound Level Meter / Real Time Analyzer	11/05/2015	11/05/2016	001150
Hart Scientific 2626-H Temperature Probe	06/17/2015	07/22/2016	006798
Agilent 34401A DMM	06/07/2016	06/07/2017	007165
SRS DS360 Ultra Low Distortion Generator	11/10/2015	11/10/2016	007167

Calibration Certificate

Certificate Number 2016007140

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	831	***Procedure Number***	D0001.8384		
Serial Number	0004228	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	9 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis Model 831	***Temperature***	23.31	°C	± 0.01 °C
		Humidity	50	%RH	± 0.5 %RH
		Static Pressure	85.83	kPa	± 0.03 kPa

Evaluation Method ***Tested with:***
PRM831. S/N 046380
377C20. S/N 163243

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	06/21/2016	06/21/2017	006311
Hart Scientific 2626-S Humidity/Temperature Sensor	06/17/2016	06/17/2017	006946
Larson Davis CAL200 Acoustic Calibrator	07/26/2016	07/26/2017	007027
Larson Davis Model 831	03/01/2016	03/01/2017	007182
1/2 inch Microphone - P - 0V	03/07/2016	03/07/2017	007185
Larson Davis CAL291 Residual Intensity Calibrator	09/24/2015	09/24/2016	007287

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Provo, UT 84601, United States
716-684-0001

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Sensitivity

Measurement	Test Result [mV/Pa]	Lower limit [mV/Pa]	Upper limit [mV/Pa]	Expanded Uncertainty [mV/Pa]	Result
Open Circuit Sensitivity	46.84	43.15	58.21	1.10	Pass

-- End of measurement results--

Capacitance

Measurement	Test Result [pF]				
Capacitance	12.00			‡	

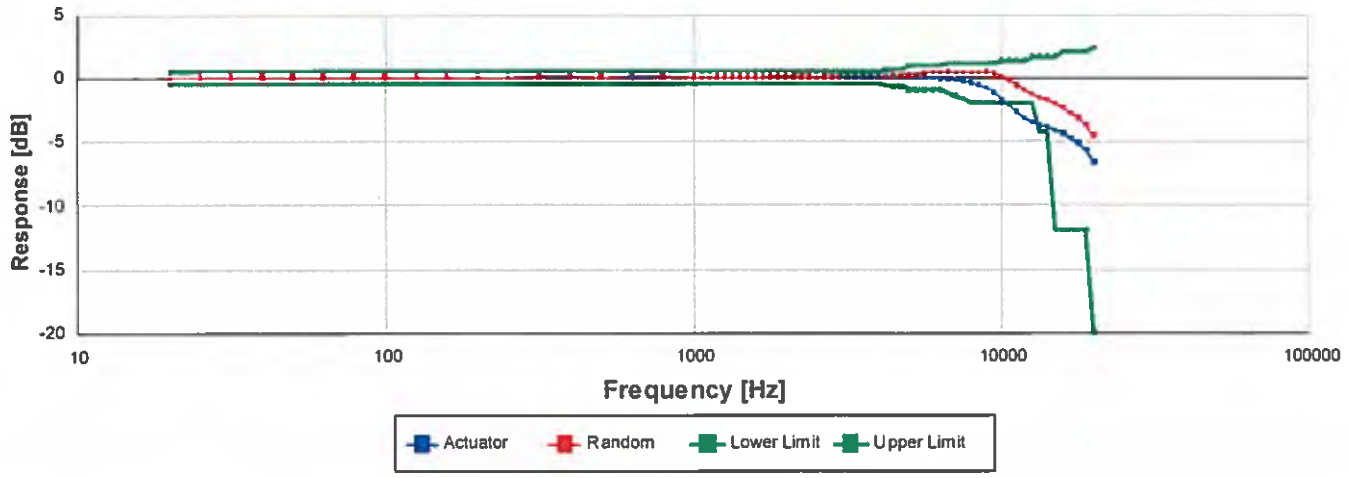
-- End of measurement results--

Lower Limiting Frequency

Measurement	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]		Result
-3 dB Frequency	1.80	1.00	2.40		Pass ‡

-- End of measurement results--

Frequency Response



Data is normalized for 0 dB @ 251.19 Hz.

Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
19.95	-0.02	-0.02	-0.50	0.50	Pass ‡
25.12	0.01	0.01	-0.50	0.50	Pass ‡
31.62	0.02	0.02	-0.50	0.50	Pass ‡
39.81	0.02	0.02	-0.50	0.50	Pass ‡
50.12	0.03	0.03	-0.50	0.50	Pass ‡
63.10	0.02	0.02	-0.50	0.50	Pass ‡
79.43	0.02	0.02	-0.50	0.50	Pass ‡
100.00	0.01	0.01	-0.50	0.50	Pass ‡
125.89	0.01	0.01	-0.50	0.50	Pass ‡
158.49	0.01	0.01	-0.50	0.50	Pass ‡
199.53	0.00	0.00	-0.50	0.50	Pass ‡

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1681 West 820 North
Provo, UT 84601. United States
716-684-0001

ACCREDITED Cert #3622.01

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Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
251.19	0.00	0.00	-0.50	0.50	Pass ‡
316.23	0.00	0.06	-0.50	0.50	Pass ‡
398.11	-0.01	0.05	-0.50	0.50	Pass ‡
501.19	-0.01	0.01	-0.50	0.50	Pass ‡
630.96	-0.01	0.13	-0.50	0.50	Pass ‡
794.33	-0.01	0.06	-0.50	0.50	Pass ‡
1,000.00	-0.01	0.01	-0.50	0.50	Pass ‡
1,059.25	-0.01	-0.01	-0.50	0.50	Pass ‡
1,122.02	-0.01	0.00	-0.50	0.50	Pass ‡
1,188.50	-0.01	0.01	-0.50	0.50	Pass ‡
1,258.93	-0.01	0.03	-0.50	0.50	Pass ‡
1,333.52	-0.01	0.04	-0.50	0.50	Pass ‡
1,412.54	-0.01	0.04	-0.50	0.50	Pass ‡
1,496.24	-0.01	0.03	-0.50	0.50	Pass ‡
1,584.89	-0.01	0.03	-0.50	0.50	Pass ‡
1,678.80	-0.01	0.04	-0.50	0.50	Pass ‡
1,778.28	-0.01	0.05	-0.50	0.50	Pass ‡
1,883.65	-0.01	0.07	-0.50	0.50	Pass ‡
1,995.26	-0.01	0.08	-0.50	0.50	Pass ‡
2,113.49	-0.01	0.07	-0.50	0.50	Pass ‡
2,238.72	-0.01	0.04	-0.50	0.50	Pass ‡
2,371.37	0.00	0.02	-0.50	0.50	Pass ‡
2,511.89	0.00	0.00	-0.50	0.50	Pass ‡
2,660.73	0.00	0.01	-0.50	0.50	Pass ‡
2,818.38	0.00	0.03	-0.50	0.50	Pass ‡
2,985.38	0.01	0.08	-0.50	0.50	Pass ‡
3,162.28	0.01	0.11	-0.50	0.50	Pass ‡
3,349.65	0.01	0.14	-0.50	0.50	Pass ‡
3,548.13	0.01	0.14	-0.50	0.50	Pass ‡
3,758.37	0.01	0.14	-0.50	0.50	Pass ‡
3,981.07	0.01	0.14	-0.50	0.50	Pass ‡
4,216.97	0.01	0.15	-0.63	0.63	Pass ‡
4,466.84	0.01	0.18	-0.70	0.70	Pass ‡
4,731.51	0.00	0.21	-0.70	0.70	Pass ‡
5,011.87	0.00	0.26	-1.00	1.00	Pass ‡
5,308.84	-0.02	0.30	-1.00	1.00	Pass ‡
5,623.41	-0.03	0.36	-1.00	1.00	Pass ‡
5,956.62	-0.05	0.42	-1.00	1.00	Pass ‡
6,309.57	-0.09	0.44	-1.00	1.00	Pass ‡
6,683.44	-0.13	0.46	-1.25	1.20	Pass ‡
7,079.46	-0.19	0.45	-1.50	1.20	Pass ‡
7,498.94	-0.28	0.43	-1.70	1.20	Pass ‡
7,943.28	-0.41	0.42	-2.00	1.20	Pass ‡
8,413.95	-0.58	0.43	-2.00	1.20	Pass ‡
8,912.51	-0.78	0.46	-2.00	1.20	Pass ‡
9,440.61	-1.15	0.36	-2.00	1.20	Pass ‡
10,000.00	-1.67	0.10	-2.00	1.38	Pass ‡
10,592.54	-2.14	-0.16	-2.00	1.38	Pass ‡
11,220.19	-2.68	-0.55	-2.00	1.38	Pass ‡
11,885.02	-3.18	-0.97	-2.00	1.38	Pass ‡
12,589.25	-3.50	-1.27	-2.00	1.68	Pass ‡
13,335.21	-3.74	-1.53	-4.20	1.68	Pass ‡
14,125.38	-3.83	-1.68	-4.20	1.68	Pass ‡

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

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Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
14,962.36	-4.06	-1.99	-11.90	1.68	Pass ‡
15,848.93	-4.31	-2.31	-11.90	2.08	Pass ‡
16,788.04	-4.69	-2.72	-11.90	2.08	Pass ‡
17,782.80	-5.08	-3.11	-11.90	2.08	Pass ‡
18,836.49	-5.61	-3.61	-11.90	2.08	Pass ‡
19,952.62	-6.56	-4.51	-100.00	2.38	Pass ‡

-- End of measurement results--

Signatory: *Abraham Ortega*

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716-684-0001

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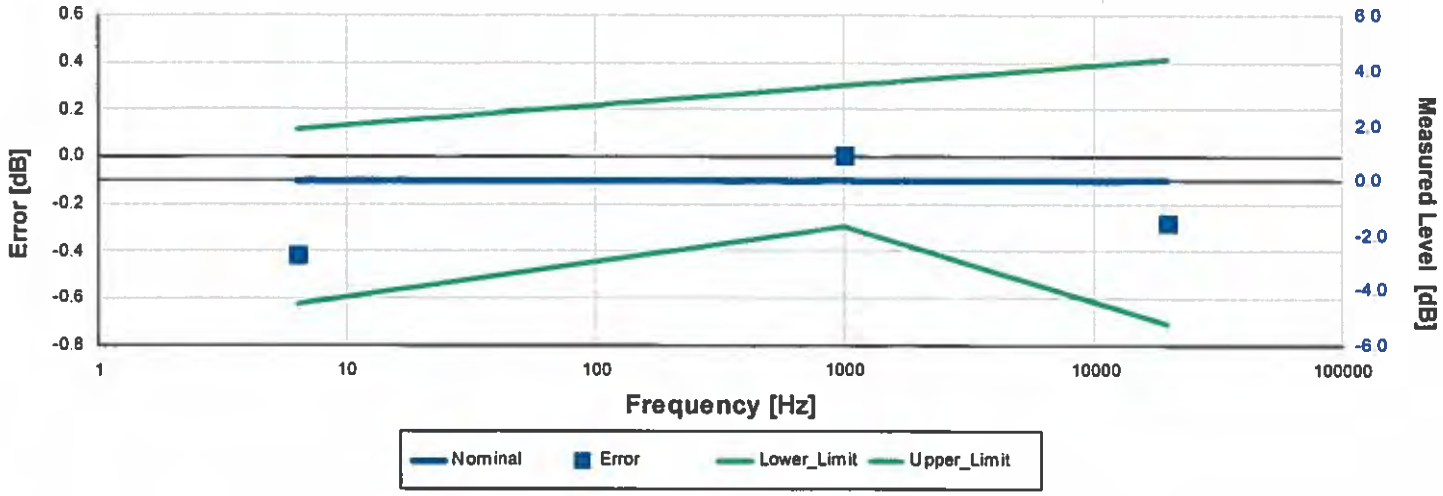
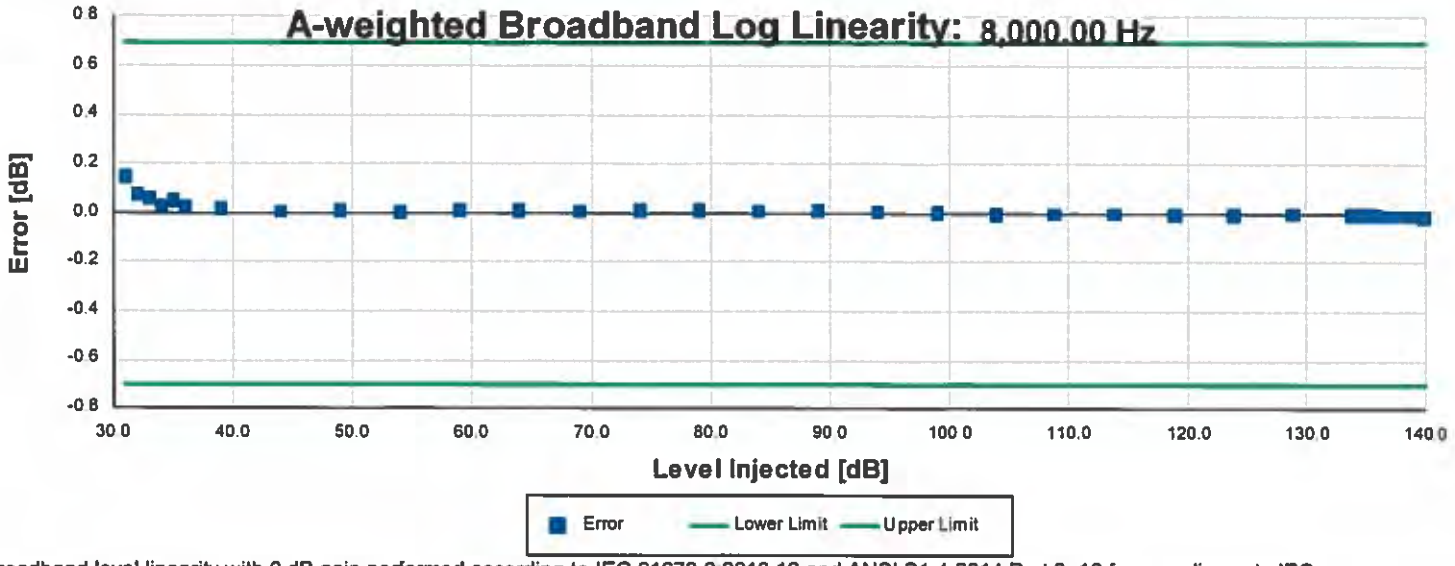
Z-weight Filter Response



Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.42	-0.42	-0.63	0.12	0.09	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.09	Pass
19,952.62	-0.28	-0.28	-0.71	0.41	0.09	Pass

-- End of measurement results--



Broadband level linearity with 0 dB gain performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
31.00	0.15	-0.70	0.70	0.09	Pass
32.00	0.07	-0.70	0.70	0.09	Pass
33.00	0.06	-0.70	0.70	0.09	Pass
34.00	0.03	-0.70	0.70	0.09	Pass
35.00	0.05	-0.70	0.70	0.09	Pass
36.00	0.03	-0.70	0.70	0.09	Pass
39.00	0.02	-0.70	0.70	0.09	Pass
44.00	0.01	-0.70	0.70	0.09	Pass
49.00	0.01	-0.70	0.70	0.09	Pass
54.00	0.00	-0.70	0.70	0.09	Pass
59.00	0.01	-0.70	0.70	0.09	Pass
64.00	0.01	-0.70	0.70	0.09	Pass
69.00	0.01	-0.70	0.70	0.09	Pass
74.00	0.01	-0.70	0.70	0.09	Pass
79.00	0.01	-0.70	0.70	0.09	Pass
84.00	0.01	-0.70	0.70	0.09	Pass
89.00	0.01	-0.70	0.70	0.09	Pass
94.00	0.01	-0.70	0.70	0.09	Pass
99.00	0.01	-0.70	0.70	0.09	Pass
104.00	-0.01	-0.70	0.70	0.09	Pass
109.00	0.00	-0.70	0.70	0.09	Pass
114.00	0.00	-0.70	0.70	0.09	Pass
119.00	0.00	-0.70	0.70	0.09	Pass
124.00	0.00	-0.70	0.70	0.09	Pass
129.00	0.00	-0.70	0.70	0.09	Pass
134.00	-0.01	-0.70	0.70	0.09	Pass
135.00	-0.01	-0.70	0.70	0.09	Pass
136.00	-0.01	-0.70	0.70	0.09	Pass
137.00	-0.01	-0.70	0.70	0.09	Pass
138.00	-0.01	-0.70	0.70	0.09	Pass
139.00	-0.01	-0.70	0.70	0.09	Pass
140.00	-0.01	-0.70	0.70	0.09	Pass

-- End of measurement results--

Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [µs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
137.00	40	Negative Pulse	135.95	134.46	136.46	0.09	Pass
		Positive Pulse	135.96	134.47	136.47	0.09	Pass
	30	Negative Pulse	135.03	134.46	136.46	0.09	Pass
		Positive Pulse	135.03	134.47	136.47	0.09	Pass

-- End of measurement results--

Positive Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.09	Pass
	5	OVLD	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
128.00	3	-0.14	± 0.50	0.10	Pass
	5	-0.14	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
118.00	3	-0.15	± 0.50	0.10	Pass
	5	-0.14	± 1.00	0.09	Pass
	10	-0.01	± 1.50	0.09	Pass
108.00	3	-0.12	± 0.50	0.13	Pass
	5	-0.14	± 1.00	0.09	Pass
	10	-0.17	± 1.50	0.09	Pass

-- End of measurement results--

Negative Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.09	Pass
	5	OVLD	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
128.00	3	-0.14	± 0.50	0.09	Pass
	5	-0.13	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
118.00	3	-0.15	± 0.50	0.09	Pass
	5	-0.14	± 1.00	0.09	Pass
	10	-0.02	± 1.50	0.09	Pass
108.00	3	-0.12	± 0.50	0.09	Pass
	5	-0.14	± 1.00	0.09	Pass
	10	-0.18	± 1.50	0.09	Pass

-- End of measurement results--

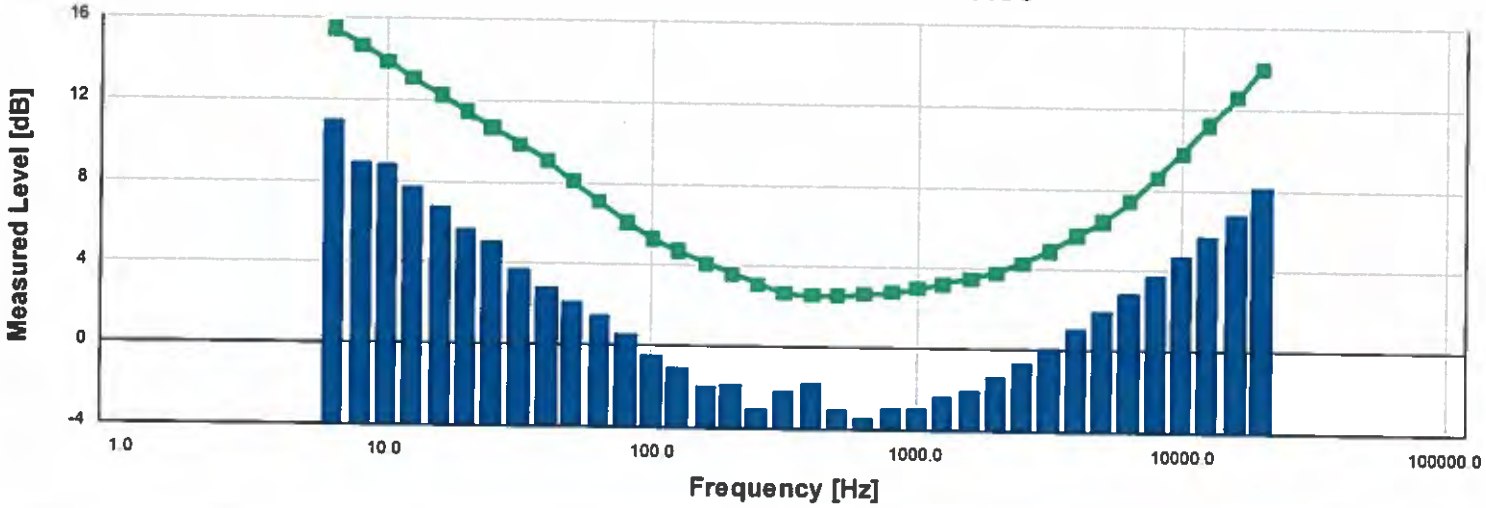
Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
Normal Range	93.55	93.20	94.80	0.09	Pass
Low Range	93.55	93.45	93.65	0.09	Pass
20 dB Gain	93.55	93.45	93.65	0.09	Pass
20 dB Gain, Linearity	24.20	23.85	25.25	0.12	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



The SLM is set to low range and 0 dB gain. 1/3-Octave self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	11.04	15.50	Pass
8.00	8.97	14.70	Pass
10.00	8.80	13.90	Pass
12.50	7.79	13.10	Pass
16.00	6.81	12.30	Pass
20.00	5.67	11.50	Pass
25.00	5.16	10.70	Pass
31.50	3.73	9.90	Pass
40.00	2.88	9.10	Pass
50.00	2.17	8.10	Pass
63.00	1.47	7.10	Pass
80.00	0.56	6.10	Pass
100.00	-0.44	5.30	Pass
125.00	-1.09	4.70	Pass
160.00	-1.92	4.10	Pass
200.00	-1.82	3.60	Pass
250.00	-3.02	3.10	Pass
315.00	-2.11	2.70	Pass
400.00	-1.79	2.60	Pass
500.00	-3.06	2.60	Pass
630.00	-3.44	2.70	Pass
800.00	-2.92	2.80	Pass
1,000.00	-2.96	3.00	Pass
1,250.00	-2.36	3.20	Pass
1,600.00	-2.01	3.50	Pass
2,000.00	-1.41	3.80	Pass
2,500.00	-0.69	4.30	Pass
3,150.00	0.13	4.90	Pass
4,000.00	1.06	5.70	Pass
5,000.00	1.96	6.40	Pass
6,300.00	2.87	7.40	Pass
8,000.00	3.71	8.60	Pass
10,000.00	4.74	9.80	Pass
12,500.00	5.74	11.20	Pass
16,000.00	6.77	12.60	Pass

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
20,000.00	8.11	14.00	Pass

-- End of measurement results--

Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	12.84	15.00	Pass
C-weight Noise Floor	14.53	17.30	Pass
Z-weight Noise Floor	22.34	24.50	Pass

-- End of measurement results--

Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	137.50	137.20	138.80	0.09	Pass
THD	-74.93		-60.00	0.01	Pass
THD+N	-66.55		-60.00	0.01	Pass

-- End of measurement results--

-- End of Report--

Signatory: Ron Harris

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Provo, UT 84601, United States
716-684-0001

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Larson Davis
Configuration and Final Inspection

Sound Level Meter Serial Number 4228

Preamplifier Serial Number 046382

Microphone Serial Number 163243

Calibrated By aw

Inspected By aw

Although this sound level meter has been factory calibrated, **Larson Davis recommends an acoustic calibration be performed prior to making measurements** with your new sound level meter.

Several factors such as changes in atmospheric air pressure can influence microphone sensitivity and therefore we recommend regular, routine acoustic calibration for best results.

Thank you for purchasing Larson Davis.

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QA FINAL INSPECTION
1681 West 820 North
Provo, Utah 84601

Inspected by: aw

LD2003(C)

LARSON DAVIS
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TECHNICIAN FINAL INSPECTION

1681 West 820 North
Provo, Utah 84601

Inspected by: BW

LD2014 (C)

Acoustic Calibration

Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
1000 Hz	114.01	113.80	114.20	0.14	Pass

Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using S-time-weighted sound level

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.16	-0.20	-1.20	0.80	0.21	Pass
1000	0.05	0.00	-0.70	0.70	0.21	Pass
8000	-2.16	-3.00	-5.50	-1.50	0.21	Pass

-- End of measurement results--

Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
Low Range, 20 dB gain	64.39

-- End of measurement results--

-- End of Report--

Signatory: Ron Harris

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Provo, UT 84601, United States
716-684-0001

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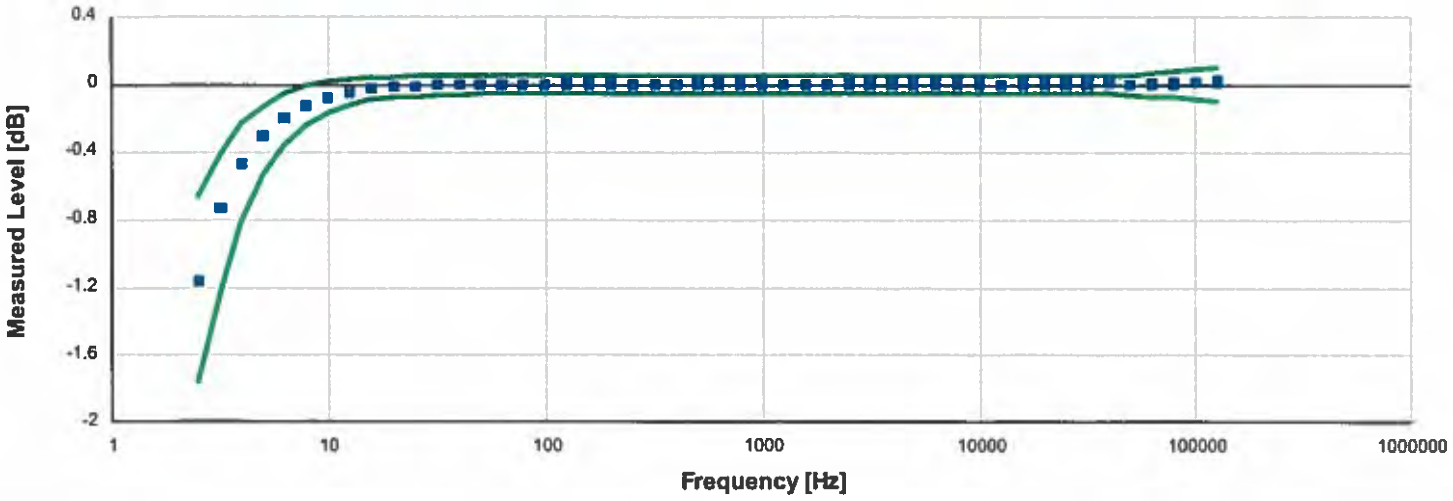
Frequency Response



Frequency response electrically tested at 120.0 dB µV

Frequency [Hz]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
2.50	-1.17	-1.76	-0.66	0.07	Pass
3.20	-0.73	-1.20	-0.40	0.08	Pass
4.00	-0.47	-0.81	-0.23	0.08	Pass
5.00	-0.31	-0.53	-0.13	0.07	Pass
6.30	-0.19	-0.36	-0.05	0.07	Pass
7.90	-0.13	-0.24	-0.01	0.07	Pass
10.00	-0.08	-0.17	0.03	0.06	Pass
12.60	-0.05	-0.13	0.04	0.06	Pass
15.80	-0.03	-0.09	0.04	0.06	Pass
20.00	-0.01	-0.08	0.05	0.06	Pass
25.10	-0.01	-0.07	0.05	0.06	Pass
31.60	0.00	-0.07	0.05	0.06	Pass
39.80	0.00	-0.06	0.05	0.06	Pass
50.10	0.00	-0.06	0.05	0.06	Pass
63.10	0.00	-0.05	0.05	0.06	Pass
79.40	0.00	-0.05	0.05	0.06	Pass
100.00	0.00	-0.05	0.05	0.06	Pass
125.90	0.01	-0.05	0.05	0.06	Pass
158.50	0.01	-0.05	0.05	0.06	Pass
199.50	0.01	-0.05	0.05	0.06	Pass
251.20	0.01	-0.05	0.05	0.06	Pass
316.20	0.01	-0.05	0.05	0.06	Pass
398.10	0.01	-0.05	0.05	0.06	Pass
501.20	0.01	-0.05	0.05	0.06	Pass
631.00	0.01	-0.05	0.05	0.06	Pass
794.30	0.01	-0.05	0.05	0.06	Pass
1,000.00	0.01	-0.05	0.05	0.06	Pass
1,258.90	0.00	-0.05	0.05	0.06	Pass
1,584.90	0.01	-0.05	0.05	0.06	Pass
1,995.30	0.01	-0.05	0.05	0.06	Pass
2,511.90	0.01	-0.05	0.05	0.06	Pass
3,162.30	0.01	-0.05	0.05	0.06	Pass

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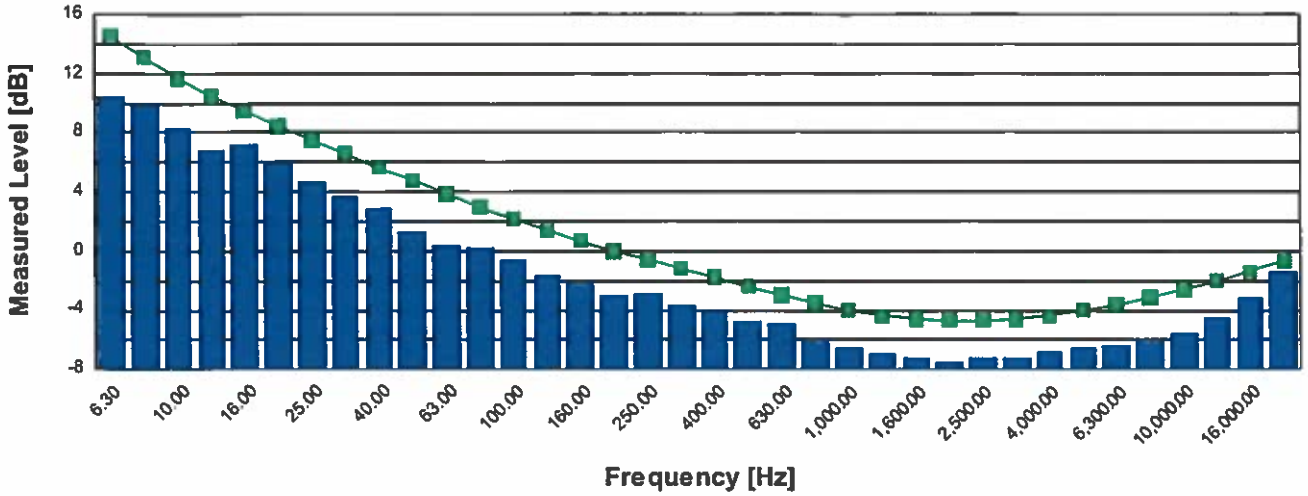
Frequency [Hz]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
3,981.10	0.01	-0.05	0.05	0.06	Pass
5,011.90	0.01	-0.05	0.05	0.06	Pass
6,309.60	0.01	-0.05	0.05	0.06	Pass
7,943.30	0.01	-0.05	0.05	0.06	Pass
10,000.00	0.01	-0.05	0.05	0.06	Pass
12,589.30	0.01	-0.05	0.05	0.06	Pass
15,848.90	0.01	-0.05	0.05	0.06	Pass
19,952.60	0.01	-0.05	0.05	0.06	Pass
25,118.90	0.01	-0.05	0.05	0.06	Pass
31,622.80	0.01	-0.05	0.05	0.06	Pass
39,810.70	0.01	-0.05	0.05	0.06	Pass
50,118.70	0.01	-0.06	0.06	0.07	Pass
63,095.70	0.01	-0.07	0.07	0.07	Pass
79,432.80	0.01	-0.08	0.08	0.07	Pass
100,000.00	0.01	-0.09	0.09	0.07	Pass
125,892.50	0.02	-0.10	0.10	0.24	Pass

DC Bias and 1kHz Reference Measurements

Measurement	Test Result [V]	Lower limit [V]	Upper limit [V]	Expanded Uncertainty	Result
DC Voltage	18.04	15.50	18.50	0.19	Pass
1000 Hz Reference	0.96	0.92	0.98	0.03	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	10.50	14.60	Pass
8.00	10.00	13.10	Pass
10.00	8.30	11.70	Pass
12.50	6.80	10.50	Pass
16.00	7.20	9.50	Pass
20.00	6.00	8.50	Pass
25.00	4.70	7.50	Pass
31.50	3.70	6.60	Pass
40.00	2.90	5.70	Pass
50.00	1.30	4.80	Pass
63.00	0.40	3.90	Pass
80.00	0.20	3.00	Pass
100.00	-0.50	2.20	Pass
125.00	-1.60	1.40	Pass
160.00	-2.20	0.70	Pass
200.00	-3.00	0.00	Pass
250.00	-2.90	-0.60	Pass
315.00	-3.70	-1.20	Pass
400.00	-4.10	-1.80	Pass
500.00	-4.80	-2.40	Pass
630.00	-4.90	-3.00	Pass
800.00	-6.10	-3.50	Pass
1,000.00	-6.50	-4.00	Pass
1,250.00	-6.90	-4.40	Pass
1,600.00	-7.10	-4.60	Pass
2,000.00	-7.40	-4.70	Pass
2,500.00	-7.10	-4.70	Pass
3,150.00	-7.20	-4.60	Pass
4,000.00	-6.80	-4.40	Pass
5,000.00	-6.50	-4.00	Pass
6,300.00	-6.40	-3.60	Pass
8,000.00	-6.10	-3.10	Pass
10,000.00	-5.60	-2.60	Pass
12,500.00	-4.50	-2.00	Pass
16,000.00	-3.10	-1.40	Pass
20,000.00	-1.40	-0.70	Pass

Self-generated Noise

Bandwidth	Test Result [dB]	Upper limit [dB]	Result
A-weighted	5.80	8.00	Pass
Broadband	12.90	15.50	Pass

-- End of measurement results--

Signatory: Whitney Anderson

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Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

LARSON DAVIS
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Calibration Certificate

Certificate Number 2016007144

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	831	***Procedure Number***	D0001.8384		
Serial Number	0004229	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	9 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis Model 831	***Temperature***	23.48	°C	± 0.01 °C
		Humidity	50.6	%RH	± 0.5 %RH
		Static Pressure	85.82	kPa	± 0.03 kPa

Evaluation Method

Tested with:
PRM831. S/N 046381
377C20. S/N 163246

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	06/21/2016	06/21/2017	006311
Hart Scientific 2626-S Humidity/Temperature Sensor	06/17/2016	06/17/2017	006946
Larson Davis CAL200 Acoustic Calibrator	07/26/2016	07/26/2017	007027
Larson Davis Model 831	03/01/2016	03/01/2017	007182
1/2 inch Microphone - P - 0V	03/07/2016	03/07/2017	007185
Larson Davis CAL291 Residual Intensity Calibrator	09/24/2015	09/24/2016	007287

Calibration Certificate

Certificate Number 2016005757

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	046381	***Technician***	Whitney Anderson		
Test Results	**Pass**	***Calibration Date***	28 Jun 2016		
Initial Condition	As Manufactured	***Calibration Due***			
		Temperature	23.26	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Humidity***	49.6	%RH	± 0.5 %RH
		Static Pressure	86.46	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Sound Level Meter / Real Time Analyzer	11/05/2015	11/05/2016	001150
Hart Scientific 2626-H Temperature Probe	06/17/2015	07/22/2016	006798
Agilent 34401A DMM	06/07/2016	06/07/2017	007165
SRS DS360 Ultra Low Distortion Generator	11/10/2015	11/10/2016	007167

Calibration Certificate

Certificate Number 2016007089

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	377C20	***Procedure Number***	D0001.8387		
Serial Number	163246	***Technician***	Abraham Ortega		
Test Results	**Pass**	***Calibration Date***	8 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
		Temperature	23.5	°C	± 0.01 °C
Description	1/2 inch Microphone - RI - 0V	***Humidity***	31.5	%RH	± 0.5 %RH
		Static Pressure	101.65	kPa	± 0.03 kPa

Evaluation Method Tested electrically using an electrostatic actuator.

Compliance Standards Compliant to Manufacturer Specifications.

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Sound Level Meter / Real Time Analyzer	07/15/2016	07/15/2017	001230
Microphone Calibration System	09/03/2015	09/03/2016	001233
1/2" Preamplifier	12/15/2015	12/15/2016	001274
Agilent 34401A DMM	12/04/2015	12/04/2016	001329
Larson Davis CAL250 Acoustic Calibrator	01/05/2016	01/05/2017	003030
1/2" Preamplifier	12/15/2015	12/15/2016	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	09/11/2015	09/11/2016	006507
1/2 inch Microphone - RI - 200V	08/17/2015	08/17/2016	006511
1/2 inch Microphone - RI - 200V	08/08/2016	08/08/2017	006519
Larson Davis 1/2" Preamplifier 7-pin LEMO	09/11/2015	09/11/2016	006530
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/14/2015	08/14/2016	006531

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Calibration Certificate

Certificate Number 2016007137

Customer:
Environmental Acoustics
1400 Hummel Avenue
Lemoyne, PA 17111, United States

Model Number	831	***Procedure Number***	D0001.8378		
Serial Number	0004229	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	9 Aug 2016		
Initial Condition	As Manufactured	***Calibration Due***			
Description	Larson Davis Model 831	***Temperature***	23.25	°C	± 0.01 °C
		Humidity	49.8	%RH	± 0.5 %RH
		Static Pressure	85.86	kPa	± 0.03 kPa

Evaluation Method Tested electrically using PRM831 S/N 046381 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	06/17/2016	06/17/2017	006946
SRS DS360 Ultra Low Distortion Generator	06/13/2016	06/13/2017	007117

Acoustic Calibration

Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
1000 Hz	114.00	113.80	114.20	0.14	Pass

Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using S-time-weighted sound level

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.16	-0.20	-1.20	0.80	0.21	Pass
1000	-0.01	0.00	-0.70	0.70	0.21	Pass
8000	-2.14	-3.00	-5.50	-1.50	0.21	Pass

-- End of measurement results--

Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
Low Range, 20 dB gain	64.33

-- End of measurement results--

-- End of Report--

Signatory: Ron Harris

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Sensitivity

Measurement	Test Result [mV/Pa]	Lower limit [mV/Pa]	Upper limit [mV/Pa]	Expanded Uncertainty [mV/Pa]	Result
Open Circuit Sensitivity	43.90	43.15	58.21	1.00	Pass

-- End of measurement results--

Capacitance

Measurement	Test Result [pF]				
Capacitance	13.00			‡	

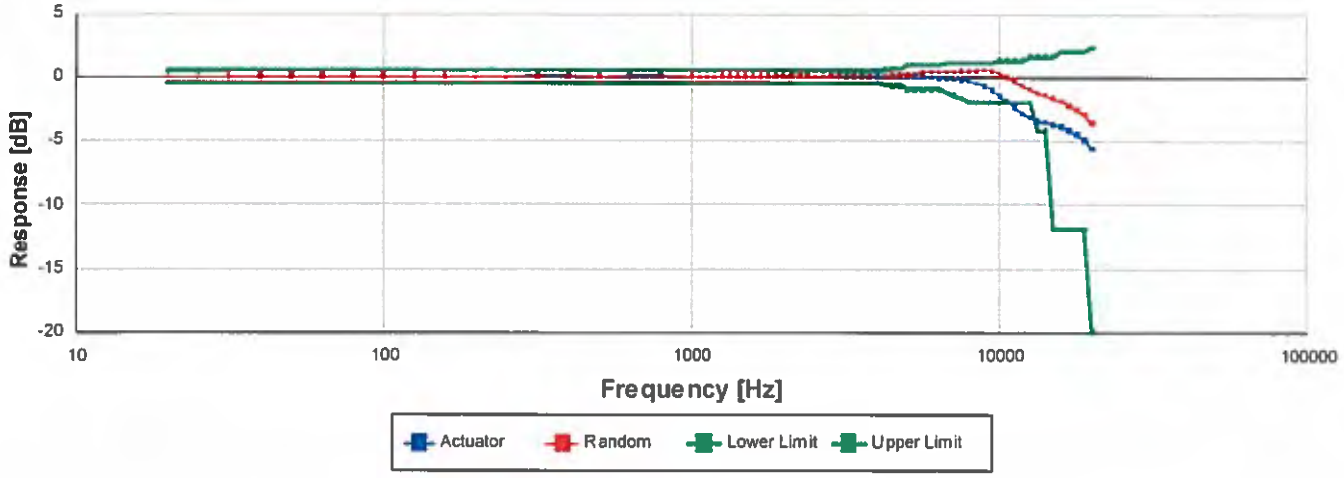
-- End of measurement results--

Lower Limiting Frequency

Measurement	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Result
-3 dB Frequency	1.83	1.00	2.40	Pass ‡

-- End of measurement results--

Frequency Response



Data is normalized for 0 dB @ 251.19 Hz.

Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
19.95	-0.03	-0.03	-0.50	0.50	Pass ‡
25.12	0.00	0.00	-0.50	0.50	Pass ‡
31.62	0.01	0.01	-0.50	0.50	Pass ‡
39.81	0.02	0.02	-0.50	0.50	Pass ‡
50.12	0.02	0.02	-0.50	0.50	Pass ‡
63.10	0.02	0.02	-0.50	0.50	Pass ‡
79.43	0.02	0.02	-0.50	0.50	Pass ‡
100.00	0.01	0.01	-0.50	0.50	Pass ‡
125.89	0.01	0.01	-0.50	0.50	Pass ‡
158.49	0.01	0.01	-0.50	0.50	Pass ‡
199.53	0.00	0.00	-0.50	0.50	Pass ‡

Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
251.19	0.00	0.00	-0.50	0.50	Pass ‡
316.23	0.00	0.06	-0.50	0.50	Pass ‡
398.11	-0.01	0.05	-0.50	0.50	Pass ‡
501.19	-0.01	0.01	-0.50	0.50	Pass ‡
630.96	-0.01	0.13	-0.50	0.50	Pass ‡
794.33	-0.01	0.06	-0.50	0.50	Pass ‡
1,000.00	-0.01	0.01	-0.50	0.50	Pass ‡
1,059.25	-0.01	-0.01	-0.50	0.50	Pass ‡
1,122.02	-0.02	-0.01	-0.50	0.50	Pass ‡
1,188.50	-0.02	0.00	-0.50	0.50	Pass ‡
1,258.93	-0.02	0.02	-0.50	0.50	Pass ‡
1,333.52	-0.02	0.03	-0.50	0.50	Pass ‡
1,412.54	-0.02	0.03	-0.50	0.50	Pass ‡
1,496.24	-0.02	0.02	-0.50	0.50	Pass ‡
1,584.89	-0.02	0.02	-0.50	0.50	Pass ‡
1,678.80	-0.02	0.03	-0.50	0.50	Pass ‡
1,778.28	-0.02	0.04	-0.50	0.50	Pass ‡
1,883.65	-0.01	0.07	-0.50	0.50	Pass ‡
1,995.26	-0.01	0.08	-0.50	0.50	Pass ‡
2,113.49	-0.01	0.07	-0.50	0.50	Pass ‡
2,238.72	-0.01	0.04	-0.50	0.50	Pass ‡
2,371.37	-0.01	0.01	-0.50	0.50	Pass ‡
2,511.89	-0.01	-0.01	-0.50	0.50	Pass ‡
2,660.73	-0.01	0.00	-0.50	0.50	Pass ‡
2,818.38	-0.01	0.02	-0.50	0.50	Pass ‡
2,985.38	-0.01	0.06	-0.50	0.50	Pass ‡
3,162.28	-0.01	0.09	-0.50	0.50	Pass ‡
3,349.65	-0.01	0.12	-0.50	0.50	Pass ‡
3,548.13	0.00	0.13	-0.50	0.50	Pass ‡
3,758.37	0.00	0.13	-0.50	0.50	Pass ‡
3,981.07	0.00	0.13	-0.50	0.50	Pass ‡
4,216.97	0.00	0.14	-0.63	0.63	Pass ‡
4,466.84	-0.01	0.16	-0.70	0.70	Pass ‡
4,731.51	-0.01	0.20	-0.70	0.70	Pass ‡
5,011.87	-0.02	0.24	-1.00	1.00	Pass ‡
5,308.84	-0.03	0.29	-1.00	1.00	Pass ‡
5,623.41	-0.04	0.35	-1.00	1.00	Pass ‡
5,956.62	-0.06	0.41	-1.00	1.00	Pass ‡
6,309.57	-0.09	0.44	-1.00	1.00	Pass ‡
6,683.44	-0.14	0.45	-1.25	1.20	Pass ‡
7,079.46	-0.19	0.45	-1.50	1.20	Pass ‡
7,498.94	-0.25	0.46	-1.70	1.20	Pass ‡
7,943.28	-0.36	0.47	-2.00	1.20	Pass ‡
8,413.95	-0.51	0.50	-2.00	1.20	Pass ‡
8,912.51	-0.68	0.56	-2.00	1.20	Pass ‡
9,440.61	-1.00	0.51	-2.00	1.20	Pass ‡
10,000.00	-1.47	0.30	-2.00	1.38	Pass ‡
10,592.54	-1.90	0.08	-2.00	1.38	Pass ‡
11,220.19	-2.39	-0.26	-2.00	1.38	Pass ‡
11,885.02	-2.87	-0.66	-2.00	1.38	Pass ‡
12,589.25	-3.18	-0.95	-2.00	1.68	Pass ‡
13,335.21	-3.42	-1.21	-4.20	1.68	Pass ‡
14,125.38	-3.52	-1.37	-4.20	1.68	Pass ‡

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Frequency [Hz]	Actuator [dB]	Random [dB]	Lower limit [dB]	Upper limit [dB]	Result
14,962.36	-3.71	-1.64	-11.90	1.68	Pass ‡
15,848.93	-3.86	-1.86	-11.90	2.08	Pass ‡
16,788.04	-4.16	-2.19	-11.90	2.08	Pass ‡
17,782.80	-4.51	-2.54	-11.90	2.08	Pass ‡
18,836.49	-4.90	-2.90	-11.90	2.08	Pass ‡
19,952.62	-5.62	-3.57	-100.00	2.38	Pass ‡

-- End of measurement results--

Signatory: *Abraham Ortega*

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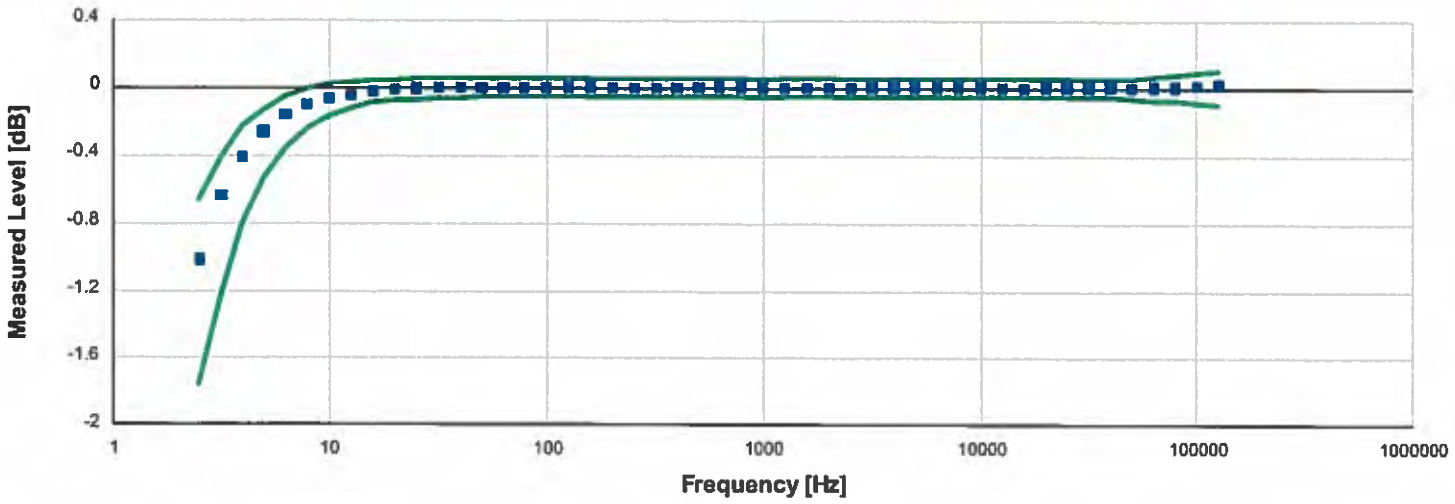
Frequency Response



Frequency response electrically tested at 120.0 dB µV

Frequency [Hz]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
2.50	-1.02	-1.76	-0.66	0.07	Pass
3.20	-0.63	-1.20	-0.40	0.08	Pass
4.00	-0.41	-0.81	-0.23	0.08	Pass
5.00	-0.26	-0.53	-0.13	0.07	Pass
6.30	-0.17	-0.36	-0.05	0.07	Pass
7.90	-0.11	-0.24	-0.01	0.07	Pass
10.00	-0.06	-0.17	0.03	0.06	Pass
12.60	-0.04	-0.13	0.04	0.06	Pass
15.80	-0.02	-0.09	0.04	0.06	Pass
20.00	-0.01	-0.08	0.05	0.06	Pass
25.10	0.00	-0.07	0.05	0.06	Pass
31.60	0.00	-0.07	0.05	0.06	Pass
39.80	0.00	-0.06	0.05	0.06	Pass
50.10	0.00	-0.06	0.05	0.06	Pass
63.10	0.00	-0.05	0.05	0.06	Pass
79.40	0.00	-0.05	0.05	0.06	Pass
100.00	0.00	-0.05	0.05	0.06	Pass
125.90	0.01	-0.05	0.05	0.06	Pass
158.50	0.01	-0.05	0.05	0.06	Pass
199.50	0.01	-0.05	0.05	0.06	Pass
251.20	0.01	-0.05	0.05	0.06	Pass
316.20	0.00	-0.05	0.05	0.06	Pass
398.10	0.01	-0.05	0.05	0.06	Pass
501.20	0.01	-0.05	0.05	0.06	Pass
631.00	0.01	-0.05	0.05	0.06	Pass
794.30	0.01	-0.05	0.05	0.06	Pass
1,000.00	0.01	-0.05	0.05	0.06	Pass
1,258.90	0.00	-0.05	0.05	0.06	Pass
1,584.90	0.00	-0.05	0.05	0.06	Pass
1,995.30	0.01	-0.05	0.05	0.06	Pass
2,511.90	0.01	-0.05	0.05	0.06	Pass
3,162.30	0.01	-0.05	0.05	0.06	Pass

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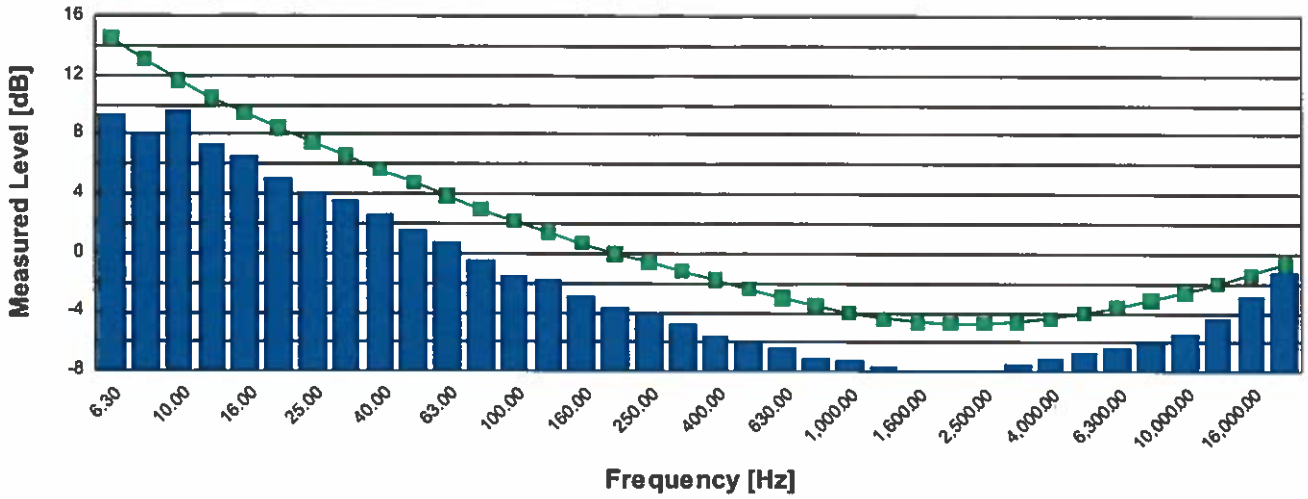
Frequency [Hz]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
3,981.10	0.01	-0.05	0.05	0.06	Pass
5,011.90	0.01	-0.05	0.05	0.06	Pass
6,309.60	0.01	-0.05	0.05	0.06	Pass
7,943.30	0.01	-0.05	0.05	0.06	Pass
10,000.00	0.01	-0.05	0.05	0.06	Pass
12,589.30	0.01	-0.05	0.05	0.06	Pass
15,848.90	0.01	-0.05	0.05	0.06	Pass
19,952.60	0.01	-0.05	0.05	0.06	Pass
25,118.90	0.01	-0.05	0.05	0.06	Pass
31,622.80	0.01	-0.05	0.05	0.06	Pass
39,810.70	0.01	-0.05	0.05	0.06	Pass
50,118.70	0.01	-0.06	0.06	0.07	Pass
63,095.70	0.01	-0.07	0.07	0.07	Pass
79,432.80	0.01	-0.08	0.08	0.07	Pass
100,000.00	0.01	-0.09	0.09	0.07	Pass
125,892.50	0.02	-0.10	0.10	0.24	Pass

DC Bias and 1kHz Reference Measurements

Measurement	Test Result [V]	Lower limit [V]	Upper limit [V]	Expanded Uncertainty	Result
DC Voltage	18.10	15.50	18.50	0.19	Pass
1000 Hz Reference	0.96	0.92	0.98	0.03	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	9.40	14.60	Pass
8.00	8.10	13.10	Pass
10.00	9.70	11.70	Pass
12.50	7.40	10.50	Pass
16.00	6.60	9.50	Pass
20.00	5.10	8.50	Pass
25.00	4.20	7.50	Pass
31.50	3.60	6.60	Pass
40.00	2.70	5.70	Pass
50.00	1.60	4.80	Pass
63.00	0.80	3.90	Pass
80.00	-0.40	3.00	Pass
100.00	-1.50	2.20	Pass
125.00	-1.80	1.40	Pass
160.00	-2.90	0.70	Pass
200.00	-3.60	0.00	Pass
250.00	-4.00	-0.60	Pass
315.00	-4.80	-1.20	Pass
400.00	-5.50	-1.80	Pass
500.00	-6.00	-2.40	Pass
630.00	-6.30	-3.00	Pass
800.00	-7.00	-3.50	Pass
1,000.00	-7.20	-4.00	Pass
1,250.00	-7.60	-4.40	Pass
1,600.00	-7.80	-4.60	Pass
2,000.00	-7.80	-4.70	Pass
2,500.00	-7.80	-4.70	Pass
3,150.00	-7.50	-4.60	Pass
4,000.00	-7.00	-4.40	Pass
5,000.00	-6.60	-4.00	Pass
6,300.00	-6.30	-3.60	Pass
8,000.00	-6.00	-3.10	Pass
10,000.00	-5.40	-2.60	Pass
12,500.00	-4.30	-2.00	Pass
16,000.00	-2.90	-1.40	Pass
20,000.00	-1.20	-0.70	Pass

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Self-generated Noise

Bandwidth	Test Result [dB]	Upper limit [dB]	Result
A-weighted	5.40	8.00	Pass
Broadband	12.60	15.50	Pass

-- End of measurement results--

Signatory: *Whitney Anderson*

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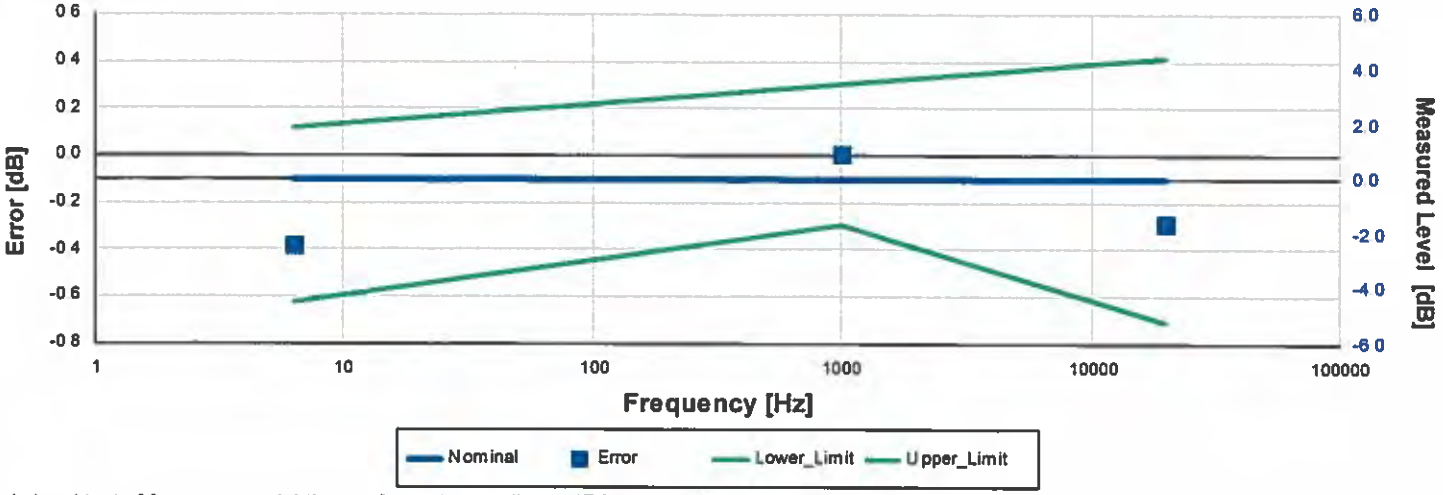
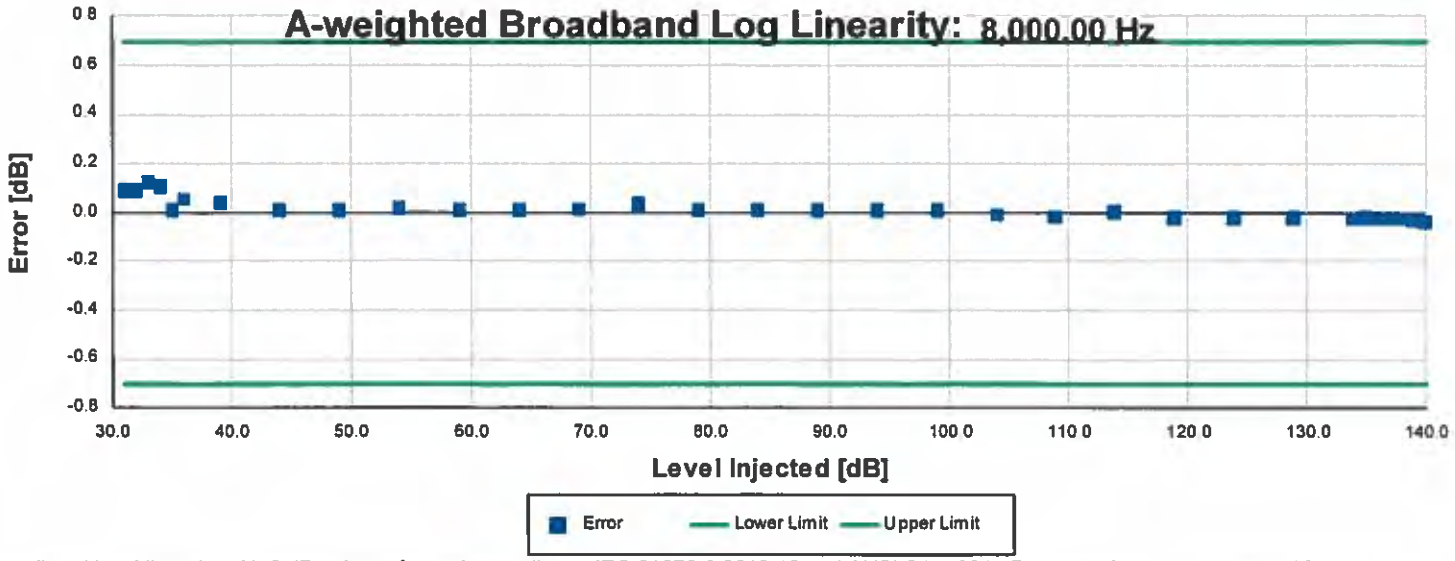
Z-weight Filter Response



Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.38	-0.38	-0.63	0.12	0.09	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.09	Pass
19,952.62	-0.29	-0.29	-0.71	0.41	0.09	Pass

-- End of measurement results--



Broadband level linearity with 0 dB gain performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
31.00	0.09	-0.70	0.70	0.09	Pass
32.00	0.10	-0.70	0.70	0.09	Pass
33.00	0.12	-0.70	0.70	0.09	Pass
34.00	0.11	-0.70	0.70	0.09	Pass
35.00	0.01	-0.70	0.70	0.09	Pass
36.00	0.06	-0.70	0.70	0.09	Pass
39.00	0.04	-0.70	0.70	0.09	Pass
44.00	0.01	-0.70	0.70	0.09	Pass
49.00	0.01	-0.70	0.70	0.09	Pass
54.00	0.02	-0.70	0.70	0.09	Pass
59.00	0.01	-0.70	0.70	0.09	Pass
64.00	0.01	-0.70	0.70	0.09	Pass
69.00	0.02	-0.70	0.70	0.09	Pass
74.00	0.03	-0.70	0.70	0.09	Pass
79.00	0.01	-0.70	0.70	0.09	Pass
84.00	0.01	-0.70	0.70	0.09	Pass
89.00	0.01	-0.70	0.70	0.09	Pass
94.00	0.01	-0.70	0.70	0.09	Pass
99.00	0.01	-0.70	0.70	0.09	Pass
104.00	-0.01	-0.70	0.70	0.09	Pass
109.00	-0.02	-0.70	0.70	0.09	Pass
114.00	0.00	-0.70	0.70	0.09	Pass
119.00	-0.02	-0.70	0.70	0.09	Pass
124.00	-0.02	-0.70	0.70	0.09	Pass
129.00	-0.02	-0.70	0.70	0.09	Pass
134.00	-0.03	-0.70	0.70	0.09	Pass
135.00	-0.02	-0.70	0.70	0.09	Pass
136.00	-0.02	-0.70	0.70	0.09	Pass
137.00	-0.03	-0.70	0.70	0.09	Pass
138.00	-0.03	-0.70	0.70	0.09	Pass
139.00	-0.03	-0.70	0.70	0.09	Pass
140.00	-0.04	-0.70	0.70	0.09	Pass

-- End of measurement results--

Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [µs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
137.00	40	Negative Pulse	135.90	134.45	136.45	0.09	Pass
		Positive Pulse	135.90	134.45	136.45	0.09	Pass
	30	Negative Pulse	134.97	134.45	136.45	0.09	Pass
		Positive Pulse	134.97	134.45	136.45	0.09	Pass

-- End of measurement results--

Positive Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.09	Pass
	5	OVLD	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
128.00	3	-0.17	± 0.50	0.10	Pass
	5	-0.17	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
118.00	3	-0.17	± 0.50	0.10	Pass
	5	-0.17	± 1.00	0.09	Pass
	10	-0.04	± 1.50	0.09	Pass
108.00	3	-0.19	± 0.50	0.13	Pass
	5	-0.15	± 1.00	0.09	Pass
	10	-0.29	± 1.50	0.09	Pass

-- End of measurement results--

Negative Pulse Crest Factor

200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
138.00	3	OVLD	± 0.50	0.09	Pass
	5	OVLD	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
128.00	3	-0.17	± 0.50	0.09	Pass
	5	-0.16	± 1.00	0.09	Pass
	10	OVLD	± 1.50	0.09	Pass
118.00	3	-0.17	± 0.50	0.09	Pass
	5	-0.16	± 1.00	0.09	Pass
	10	-0.04	± 1.50	0.09	Pass
108.00	3	-0.19	± 0.50	0.09	Pass
	5	-0.15	± 1.00	0.09	Pass
	10	-0.29	± 1.50	0.09	Pass

-- End of measurement results--

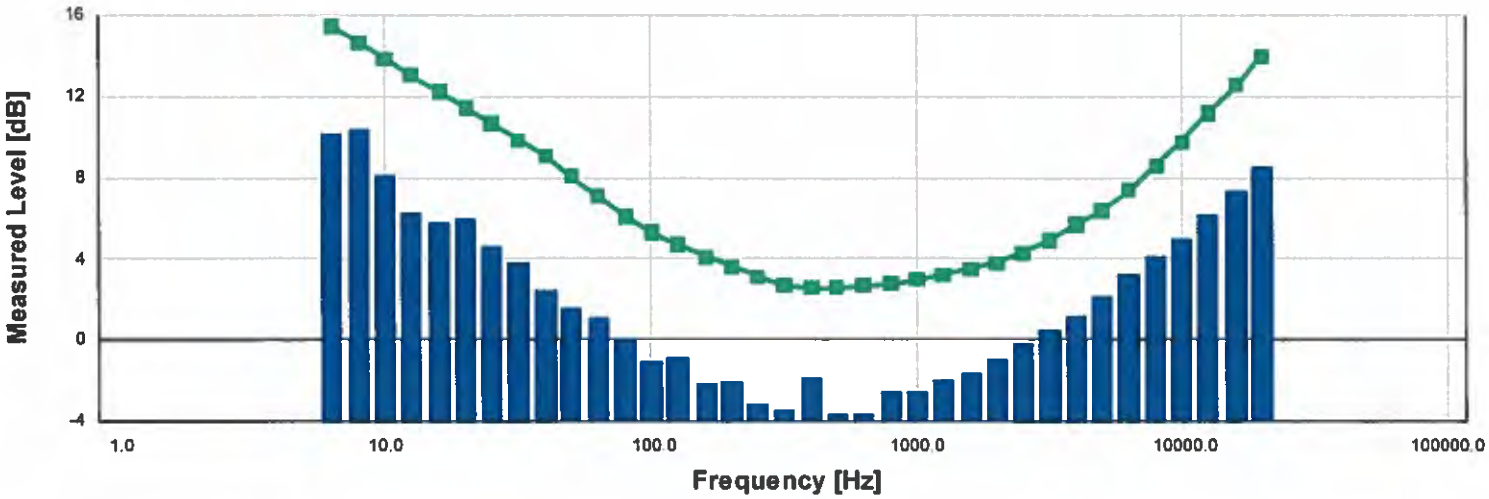
Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
Normal Range	93.58	93.20	94.80	0.09	Pass
Low Range	93.58	93.48	93.68	0.09	Pass
20 dB Gain	93.58	93.48	93.68	0.09	Pass
20 dB Gain, Linearity	24.14	23.88	25.28	0.12	Pass

-- End of measurement results--

1/3-Octave Self-Generated Noise



The SLM is set to low range and 0 dB gain. 1/3-Octave self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	10.19	15.50	Pass
8.00	10.37	14.70	Pass
10.00	8.13	13.90	Pass
12.50	6.29	13.10	Pass
16.00	5.83	12.30	Pass
20.00	5.99	11.50	Pass
25.00	4.61	10.70	Pass
31.50	3.82	9.90	Pass
40.00	2.51	9.10	Pass
50.00	1.60	8.10	Pass
63.00	1.12	7.10	Pass
80.00	0.01	6.10	Pass
100.00	-1.11	5.30	Pass
125.00	-0.88	4.70	Pass
160.00	-2.14	4.10	Pass
200.00	-2.08	3.60	Pass
250.00	-3.13	3.10	Pass
315.00	-3.42	2.70	Pass
400.00	-1.87	2.60	Pass
500.00	-3.64	2.60	Pass
630.00	-3.58	2.70	Pass
800.00	-2.56	2.80	Pass
1,000.00	-2.56	3.00	Pass
1,250.00	-1.93	3.20	Pass
1,600.00	-1.64	3.50	Pass
2,000.00	-0.94	3.80	Pass
2,500.00	-0.18	4.30	Pass
3,150.00	0.50	4.90	Pass
4,000.00	1.20	5.70	Pass
5,000.00	2.14	6.40	Pass
6,300.00	3.29	7.40	Pass
8,000.00	4.12	8.60	Pass
10,000.00	5.06	9.80	Pass
12,500.00	6.20	11.20	Pass
16,000.00	7.38	12.60	Pass

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
20,000.00	8.52	14.00	Pass

-- End of measurement results--

Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	13.17	15.00	Pass
C-weight Noise Floor	14.46	17.30	Pass
Z-weight Noise Floor	21.81	24.50	Pass

-- End of measurement results--

Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	137.53	137.20	138.80	0.09	Pass
THD	-73.61		-60.00	0.01	Pass
THD+N	-65.87		-60.00	0.01	Pass

-- End of measurement results--

-- End of Report--

Signatory: *Ron Harris*

Larson Davis
Configuration and Final Inspection

Sound Level Meter Serial Number 4229

Preamplifier Serial Number 046381

Microphone Serial Number 163426

Calibrated By _____

Inspected By _____

Although this sound level meter has been factory calibrated, **Larson Davis recommends an acoustic calibration be performed prior to making measurements** with your new sound level meter.

Several factors such as changes in atmospheric air pressure can influence microphone sensitivity and therefore we recommend regular, routine acoustic calibration for best results.

Thank you for purchasing Larson Davis.

☎ 716-926-8243
www.larsondavis.com

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A PCB PIEZOTRONICS DIV.

D2140.0017-1

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

QA FINAL INSPECTION
1681 West 820 North
Provo, Utah 84601

Inspected by: _____

LD2003(C)

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

TECHNICIAN FINAL INSPECTION

1681 West 820 North
Provo, Utah 84601

Inspected by: _____

LD2014 (C)

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

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.35355

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

Date Calibrated: **1/14/2016** *Cal Due:* **1/14/2017**

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	25747	Jul 2, 2015	Scantek, Inc./ NVLAP	Jul 2, 2016
DS-360-SRS	Function Generator	61646	Aug 12, 2015	ACR Env./ A2LA	Aug 12, 2017
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Aug 13, 2015	ACR Env. / A2LA	Aug 13, 2016
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 18, 2014	ACR Env./ A2LA	Nov 18, 2016
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Oct 1, 2015	ACR Env./ A2LA	Apr 1, 2017
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
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 24, 2015	Scantek, Inc./ NVLAP	Jul 24, 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 (%)
23.8	99.96	43.7

Calibrated by:	Valentin Buzduga	**Authorized signatory:**	Mariana Buzduga
Signature		Signature	
Date	1/14/2016	Date	1/15/2016

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.36372

Instrument: **Microphone**
Model: **UC-59**
Manufacturer: **Rion**
Serial number: **04608**
Composed of:

Customer: **Environmental Acoustics, Inc.**
Tel/Fax: **717-737-4680/717-737-4685**

Date Calibrated: **5/31/2016** *Cal Due:* **5/31/2017**

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

Contains non-accredited tests: __**Yes** _**X**_ **No**
Address: **1400 Hummel Avenue**
Lemoyne, PA 17043

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-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 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	14052	Aug 24, 2015	Scantek, Inc./ NVLAP	Aug 24, 2016
4180-Brüel&Kjær	Microphone	2246115	Oct 26, 2015	NPL-UK / UKAS	Oct 26, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Lydon Bawkins	**Authorized signatory:**	Valentin Burduga
Signature	Lydon Bawkins	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®
NVLAP Lab Code: 200625-0

Calibration Certificate No.36195

Instrument: **Microphone**
Model: **UC-59**
Manufacturer: **Rion**
Serial number: **04607**
Composed of:

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

Customer: **Environmental Acoustics**
Tel/Fax: **717-730-4680/-4685**
Address: **1400 Hummel Avenue**
Lemoyne, PA. 17043

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-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 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2015	Scantek, Inc./ NVLAP	Nov 10, 2016
1203-Norsonic	Preamplifier	92268	Oct 14, 2015	Scantek, Inc./ NVLAP	Oct 14, 2016
4192-Brüel&Kjær	Microphone	2854675	Nov 11, 2015	NPL-UK / UKAS	Nov 11, 2017

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Jeremy Gotwalt	**Authorized signatory:**	Valentin Ruzdga
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®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.41308

Instrument:	**Sound Level Meter**
Model:	**831**
Manufacturer:	**Larson Davis**
Serial number:	**0004228**
Tested with:	**Microphone 377C20 s/n 163246** **Preamplifier PRM831 s/n 046381**
Type (class):	**1**
Customer:	**Environmental Acoustics**
Tel/Fax:	**717-763-7212 x2480 / 717-763-8150**

Date Calibrated: **8/17/2018** *Cal Due:* **8/17/2019**

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: **207 Senate Avenue**
Camp Hill, PA 17011

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 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018

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 (%)
22.0	100.26	53.2

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	8/17/2018	Date	8/17/2018

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.41309

Instrument:	**Microphone**	*Date Calibrated:*	**8/14/2018** *Cal Due:* **8/14/2019**
Model:	**377C20**	*Status:*	**Received** / **Sent**
Manufacturer:	**PCB Piezotronics**	*In tolerance:*	X / X
Serial number:	**163246**	*Out of tolerance:*	
Composed of:		*See comments:*	

Contains non-accredited tests: __Yes _X_ No

Customer:	**Environmental Acoustics**	*Address:*	**207 Senate Avenue**
Tel/Fax:	**717-763-7212 x2480/717-763-8150**		**Camp Hill, PA 17011**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-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 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019
4180-Brüel&Kjær	Microphone	2246115	Oct 24, 2017	DANAK / DPLA	Oct 24, 2019

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	8/14/2018	Date	8/17/2018

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.41306

LIMITED USE

Instrument:	**Sound Level Meter**	*Date Calibrated:* **8/16/2018**	*Cal Due:* **8/16/2019**
Model:	**831**	*Status:*	**Received** / **Sent**
Manufacturer:	**Larson Davis**	*In tolerance:*	
Serial number:	**0004229**	*Out of tolerance:*	X / X
Tested with:	**Microphone 377C20 s/n 163243**	*See comments:*	X
	Preamplifier PRM831 s/n 046380	*Contains non-accredited tests:*	**__Yes _X_ No**
Type (class):	**1**	*Calibration service:*	**__ Basic _X_ Standard**
Customer:	**Environmental Acoustics**	*Address:*	**207 Senate Avenue**
			Camp Hill, PA 17011
Tel/Fax:	**717-763-7212 x2480 / 717-763-8150**		

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. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018

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 (%)
21.5	100.33	47.6

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	8/16/2018	Date	8/17/2018

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.41307

LIMITED USE

Instrument:	**Microphone**	*Date Calibrated:*	**8/14/2018** *Cal Due:* **8/14/2019**
Model:	**377C20**	*Status:*	**Received** / **Sent**
Manufacturer:	**PCB Piezotronics**	*In tolerance:*	
Serial number:	**163243**	*Out of tolerance:*	X / X
Composed of:		*See comments:*	X
		Contains non-accredited tests:	__Yes _X_ No
Customer:	**Environmental Acoustics**	*Address:*	**207 Senate Avenue**
Tel/Fax:	**717-763-7212 x2480/717-763-8150**		**Camp Hill, PA 17011**

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 2/25/2015

Instrumentation used for calibration: N-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 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1017 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018
1203-Norsonic	Preamplifier	14059	Feb 12, 2018	Scantek, Inc./ NVLAP	Feb 12, 2019
4180-Brüel&Kjær	Microphone	2246115	Oct 24, 2017	DANAK / DPLA	Oct 24, 2019

Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E. Marshall
Date	8/14/2018	Date	8/16/2018

Appendix C

Appendix C
Traffic Volume Breakdown

Map Key	Location	Traffic Calculation			
		Auto	MT	HT	Total
CSVT MAINLINE					
7	SB N. OF 61 CONN	2634	81	87	2802
8	NB N. OF 61 CONN	2039	133	145	2317
9	SB BTWN RAMPS	1714	53	57	1823
10	SB S. OF 61 CONN	2167	66	72	2305
11	NB. S. OF 61 CONN	2467	161	175	2803
12	NB BTWN RAMPS	1506	99	107	1711
CSVT US 11/15/522 SELINSGROVE INTERCHANGE					
29	11/15 SB On Ramp to NB CSVT	181	7	5	193
30	522 NB On Ramp to SB CSVT	118	5	3	126
31	11/15 SB On Ramp to SB CSVT	800	29	22	851
32	SB CSVT Off Ramp @ 522	1197	47	30	1273
33	NB CSVT Off Ramp @ 11/15	573	21	16	610
34	522 NB On Ramp to NB CSVT	760	30	19	809
35	SB 11/15 N. of Sel. Interchange	1620	103	77	1800
36	NB 11/15 N. of Sel. Interchange	1163	74	56	1292
37	SB 11/15 Btwn. Sel Intg Ramps	1526	97	73	1696
38	NB 11/15 Btwn. Sel Intg Ramps	1422	90	68	1580
39	SB 522 S. of Sel. Interchange	1561	106	68	1734
40	NB 522 S. of Sel. Interchange	1190	81	52	1322
CSVT / PA 61 INTERCHANGE					
A	Ramp J	463	12	7	482
B	Ramp H	910	42	26	979
C	Ramp F	1026	41	25	1092
D	Ramp G	564	26	16	606
5	Connector EB	1954	73	45	2072
6	Connector WB	1016	44	27	1086
Existing SR 11/15 between Kmart and Winfield Interchange (YEAR 2024)					
	NB	501	18	14	533
	SB	455	17	12	484
Existing SR 11/15 between Kmart and Winfield Interchange (YEAR 2044)					
	SB	363	13	10	386
	NB	317	12	9	337
PA 61 / US 11/15 INTERCHANGE					
1	SR 61 EB S. of Interchange	1731	69	42	1842
2	SR 61 WB N. of Baldwin Ramp	978	39	24	1040
3	WB SR 61 btwn WB ramps	635	25	15	676
4	EB S. of Map F	1117	44	27	1188
13	EB N. of Map F	755	30	18	803
14	NB 11/15 N. of Ramp to VM	1486	118	85	1689
15	SB 11/15 S. of Ramp F*	1240	61	46	1348
16	SB 11/15 S. of Conn Signal	1669	83	62	1814
17	NB 11/15 S. of Conn Signal	2038	158	120	2316
E	EB Off Ramp M	1244	16	10	1269
F	11/15 SB to EB SR 61	339	26	20	385
G	11/15 to WB Conn-Ramp L	386	14	11	411
H	WB Conn to SB 11/15	358	4	3	365
J	SB 11/15 N. of VM Bridge	1654	83	60	1798
LOCAL ROADS					
18	11th Avenue S. of CSVT - NB	92	7	4	102
	SB	75	2	0	77
19	Stetler N. of CSVT - NB	37	3	0	41
	SB	47	3	1	51
20	Grangers - EB	60	5	1	66
	WB	85	4	0	89
21	Sunbury Rd S. of Park - EB	36	2	0	38
	WB	29	6	1	36
22	Park S. of Fisher - NB	129	7	7	143
	SB	141	3	4	148
23	Park N. of Fisher - NB	61	4	3	68
	SB	67	2	2	71
24	Fisher E. of Park - NB	72	2	1	75
	SB	75	3	1	78
25	App Rd N. of Mill - NB	279	11	4	294
	SB	347	14	5	365
26	Airport Rd S. of Mill - NB	95	4	1	100
	SB	146	6	2	154
27	Mill Rd W. Of Airport/App - EB	668	18	17	703
	WB	517	28	24	568
28	Attig Rd W. of Fisher - EB	25	0	0	25
	WB	20	1	0	21
41	Cortland Ave Connector (2-way)	62	1	0	63

NOTES:

1. Burns Volume Figure with 50% Ridge Diversions dated 1/18/2017
   1a. Adjustment was made to Burns volume at locations G, 3, 6, 29, & 32. Refer to Traffic Memo "CSVT – Traffic Forecasts at the US 522 In
2. Volumes collected by GF 1/19/2016
3. Volumes collected by GF 11/3/2015 to 11/5/2015
4. Volumes collected by GF 3/23/2016
5. Calculated by GF using ITE Trip Generation (refer to 11/13/2018 "Cortland Analysis" Excel file)

* Locations 29-40: Truck percents assumed similar to SR 61 Interchange since no data provided in Burns model

** Defined as trucks with less than 3 axles. FHWA classes 4 and 5.

*** Defined as trucks with 3 axles or more. FHWA classes 6 through 13. Both categories exclude unclassified vehicles

Appendix D

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 1
Noise Wall Identification (i.e., Wall 1): NSA 1 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: Two
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction):
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☐ Yes ☑ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 2
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 100%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 5,557
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 3
   c. SF/BR = 2a/2b 1,852
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☑ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☑ Yes ☐ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☑ Yes ☐ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 3
Noise Wall Identification (i.e., Wall 1): NSA 3 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 2
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction):
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 2
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 100%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 43,276
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 2
   c. SF/BR = 2a/2b 21,638
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☑ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☑ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date June 8, 2020
Project Name Central Valley Transportation Project
County Snyder
SR, Section 0015 - Section 088
Community Name and/or NSA # NSA 4
Noise Wall Identification (i.e., Wall 1) NSA 4 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 12
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 12
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 25%
   c. Is the percentage 50 or greater? ☐ Yes ☑ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☐ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☐ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☐ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☐ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☐ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☐ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall _____
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) _____
   c. SF/BR = 2a/2b _____
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☐ Yes ☑ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed EL-Aassar Date: June 8, 2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 5
Noise Wall Identification (i.e., Wall 1): NSA 5 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 12
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 12
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 100%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 44,799
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 12
   c. SF/BR = 2a/2b 3,733
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☑ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☑ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 6
Noise Wall Identification (i.e., Wall 1): NSA 6 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 42
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 42
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 0
   c. Is the percentage 50 or greater? ☐ Yes ☑ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☐ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☐ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☐ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☐ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☐ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☐ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall _____
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) _____
   c. SF/BR = 2a/2b _____
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☐ Yes ☑ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed EL-Aassar Date: June 8, 2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 7
Noise Wall Identification (i.e., Wall 1): NSA 7 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 21
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction):
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 21
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 67%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 30,637
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 18
   c. SF/BR = 2a/2b 1,702
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☑ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☑ Yes ☐ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☑ Yes ☐ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 8
Noise Wall Identification (i.e., Wall 1): NSA 8 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 16
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 16
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 100%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 50,678
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 16
   c. SF/BR = 2a/2b 3,167
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☑ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 9
Noise Wall Identification (i.e., Wall 1): NSA 9 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: Four
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 4
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 100
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 72,158
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 12
   c. SF/BR = 2a/2b 6,013
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☑ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☑ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☑ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☑ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date June 8, 2020
Project Name Central Valley Transportation Project
County Snyder
SR, Section 0015 - Section 088
Community Name and/or NSA # NSA 11
Noise Wall Identification (i.e., Wall 1) NSA 11 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 18
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 18
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 6%
   c. Is the percentage 50 or greater? ☐ Yes ☑ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☐ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☐ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☐ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☐ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☐ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☐ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall _____
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) _____
   c. SF/BR = 2a/2b _____
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☐ Yes ☑ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed EL-Aassar Date: June 8, 2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 13
Noise Wall Identification (i.e., Wall 1): NSA 13 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 31
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction):
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 31
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 74%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 47,923
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 24
   c. SF/BR = 2a/2b 1,997
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☑ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☑ Yes ☐ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☑ Yes ☐ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 14A
Noise Wall Identification (i.e., Wall 1): NSA 14A Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 67
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction): February 6, 2006
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☑ Yes ☐ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 62
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 90%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 88,503
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 65
   c. SF/BR = 2a/2b 1,362
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☑ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No

   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No

   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☑ Yes ☐ No

   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☑ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.

   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No

   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☑ Yes ☐ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 14B
Noise Wall Identification (i.e., Wall 1): NSA 14B Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 31
   - Category C units impacted: 1
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 32
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 9%
   c. Is the percentage 50 or greater? ☐ Yes ☑ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☐ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☐ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☐ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☐ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☐ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☐ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall _____
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) _____
   c. SF/BR = 2a/2b _____
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☐ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor? ☐ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☐ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☐ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☐ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☐ Yes ☑ No

Is the Noise Wall REASONABLE? ☐ Yes ☑ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed EL-Aassar Date: June 8, 2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – Noise Wall

Date: June 8, 2020
Project Name: Central Valley Transportation Project
County: Snyder
SR, Section: 0015 - Section 088
Community Name and/or NSA #: NSA 15
Noise Wall Identification (i.e., Wall 1): NSA 15 Barrier

General

1. Type of project (new location, reconstruction, etc.): New Location

2. Total number of impacted receptor units in community
   - Category A units impacted: N/A
   - Category B units impacted: 33
   - Category C units impacted: N/A
   - Category D units impacted (if interior analysis required): N/A
   - Category E units impacted: N/A

Warranted

1. Community Documentation
   a. Date community was permitted (for new developments or developments planned for or under construction)
   b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI): January, 8, 2019
   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 (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.
   a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1? ☐ Yes ☑ No
   b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)? ☑ Yes ☐ No

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category? ☐ Yes ☑ No

Feasibility – Questions 1c through 7 must all be answered "yes" for a noise barrier to be determined to be feasible.

1. Impacted receptor units
   a. Total number of impacted receptor units: 33
   b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss: 88%
   c. Is the percentage 50 or greater? ☑ Yes ☐ No
2. Can the noise wall be designed and physically constructed at the proposed location? ☑ Yes ☐ No
3. Can the noise wall be constructed without causing a safety problem? ☑ Yes ☐ No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel? ☑ Yes ☐ No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations? ☑ Yes ☐ No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner? ☑ Yes ☐ No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner? ☑ Yes ☐ No

Reasonableness

1. Community Desires Related to the Barrier
   a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall 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 benefited receptor unit owners do not desire the noise wall." ☐ Yes ☐ No

2. Square Footage Per Benefited Receptor (SF/BR) Evaluation
   a. Area (SF) of the proposed noise wall 72,383
   b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss) 42
   c. SF/BR = 2a/2b 1,723
   d. Is 2c less than or equal to the MaxSF/BR value of 2000? ☑ Yes ☐ No

3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does the noise wall reduce design year exterior_noise levels by at least 7 dB(A) for at least one benefited receptor? ☑ Yes ☐ No
   b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No
   c. Does the noise wall provide insertion losses of greater than 7 dB(A) while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns" evaluation? ☑ Yes ☐ No
   d. Does the noise wall reduce future exterior levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60 dB(A) range (65-68) for Category E receptors? ☑ Yes ☐ No
   e. Does the noise wall reduce design year noise levels back to existing levels? ☑ Yes ☐ No

4. Noise Reduction Design Goals (Activity Category D) A "yes" answer is required to Question 4a. for the barrier to be determined to be reasonable. Question 4b represents a desirable goal that need not be met for a noise wall to be determined reasonable. However, this goal must be addressed and should be considered in the determination of the recommended noise wall.
   a. Does noise wall reduce design year interior_noise levels by at least 7 dB(A) for the facility's analysis point? ☐ Yes ☐ No
   b. While conforming to the MaxSF/BR criteria and justified by a "point of diminishing returns' evaluation, does the noise wall provide an interior insertion loss above the 7 dB(A) minimum ☐ Yes ☐ No

Decision

Is the Noise Wall WARRANTED? ☑ Yes ☐ No

Is the Noise Wall FEASIBLE? ☑ Yes ☐ No

Is the Noise Wall REASONABLE? ☑ Yes ☐ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date:_____

PennDOT, Engineering District Environmental Manager

Ahmed El-Aassar Date: 06/08/2020

Qualified Professional Performing the Analysis
(name, title, and company name)

Appendix E

List of Preparers

- Ahmed El-Aassar, PhD, P.E., Group Lead
- Adam Alexander, ENV SP, Senior Noise Analyst
- Sondra Peterson, Noise Analyst
- Kevin Brown, Noise Analyst