PRELIMINARY ENGINEERING NOISE ANALYSIS REPORT

Pennsylvania Turnpike Commission
SAP Contract No. 4400003204
WBS Element A-037.50T001-2
Full-Depth Roadway Reconstruction
MP-A38 to MP-A44
Montgomery and Bucks Counties, Pennsylvania

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November 2014

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Widening the Northeast Extension (I-476) from MP A38 to MP A44
Bucks and Montgomery Counties
PRELIMINARY ENGINEERING NOISE ANALYSIS
November 2014

Executive Summary

The Pennsylvania Turnpike Commission (PTC) proposes to reconstruct its Northeast Extension toll road. The proposed project entails the full depth reconstruction and widening of the Pennsylvania Turnpike Northeast Extension (I-476) from approximately Milepost (MP) A38 to MP A44 and the reconstruction of the Quakertown Interchange. The project will result in widening I-476 from four (4) travel lanes to six (6) travel lanes with full, twelve (12) –foot left and right-hand shoulders. The proposed widening consists of approximately seven (7) miles of roadway and will include full depth roadway reconstruction, widening of mainline bridges and medians, the replacement of overhead bridges, culvert extensions, drainage modifications, construction of storm water management facilities, and necessary horizontal or vertical adjustments to approach roadways associated with modified overhead bridges. Construction would generally follow the existing centerline. The study corridor traverses Salford Township in Montgomery County and West Rockhill and Milford Townships in Bucks County, Pennsylvania. 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 Type I noise abatement.

For analysis purposes, the project study area was divided into fifteen (15) Noise Study Areas (NSAs) as shown in Figures 2A through 2L. 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 3 and 11.

Based on the evaluation of the noise levels associated with the preliminary engineering plans developed to date, noise abatement features were determined to be feasible and reasonable within NSA 12. 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 I-476:

- NSA 12 Barrier – A noise barrier averaging 18.9 feet in height along I-476 Southbound, with a length of approximately 1,159 feet.

Introduction

The Pennsylvania Turnpike Commission (PTC) proposes to reconstruct its Northeast Extension toll road. The proposed project entails the full depth reconstruction and widening of the Pennsylvania Turnpike Northeast Extension (I-476) from approximately Milepost (MP) A38 to MP A44 and the reconstruction of the Quakertown Interchange. The project will result in widening I-476 from four (4) travel lanes to six (6) travel lanes with full, twelve (12) –foot left and right-hand shoulders. The proposed widening consists of approximately seven (7) miles of roadway and will include full depth roadway reconstruction, widening of mainline bridges and medians, the replacement of overhead bridges, culvert extensions, drainage modifications, construction of storm water management facilities, and necessary horizontal or vertical adjustments to approach roadways associated with modified overhead bridges. Construction would generally follow the existing centerline. The study corridor traverses Salford Township in Montgomery County and West Rockhill and Milford Townships in Bucks County, Pennsylvania. 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 Type I noise abatement. The project location and the study area are depicted in Figure 1.

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 December, 2013. 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 2039) noise level was predicted to equal or exceed 66 dB(A) 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 Figure 2A through 2L:

NSA 1: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from Clump Road to approximately 1,300 feet north of Wambold Road. See Figures 2A and 2B.

NSA 2: Activity Category B land uses are located adjacent to the southbound travel lanes (west side) of I-476, from Badman Road to Reller Road. See Figures 2A and 2B.

NSA 3: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from south of Skymount Road to Upper Ridge Road. See Figure 2D.

NSA 4: Activity Category B and C land uses are located adjacent to the southbound travel lanes (west side) of the I-476, from South of Skymount Road to Upper Ridge Road. See Figures 2C and 2D.

NSA 5: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from Upper Ridge Road to Trumbauersville Road. See Figures 2D and 2E.

NSA 6: Activity Category B land uses are located adjacent to the southbound travel lanes (west side) of the I-476, from Upper Ridge Road to Trumbauersville Road. See Figures 2D and 2E.

NSA 7: An Activity Category C land use (Fox Hollow golf course) is located adjacent to the northbound travel lanes (east side) of I-476. See Figure 2F.

NSA 8: Activity Category B land uses are located adjacent to the southbound travel lanes (west side) of I-476, from north of Trumbauersville Road to Doerr Road. See Figures 2F and 2G.

NSA 9: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from north of Kumry Road to 2,500 feet north of Kumry Road. See Figure 2H.

NSA 10: Activity Category B and C land uses are located adjacent to the southbound travel lanes (west side) of I-476, from Doerr Road to John Fries Highway. See Figures 2H, 2I and 2K.

NSA 11: An Activity Category E land use (motel) is located adjacent to the northbound travel lanes (east side) of I-476, adjacent to John Fries Highway. See Figure 2J.

NSA 12: Activity Category B land uses are located adjacent to the southbound travel lanes (west side) of I-476 on Red Bud Road within the Spinnerstown Crossing subdivision. See Figure 2K.

NSA 13: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from 350 feet south of Steinsburg Road to Steinsburg Road. See Figure 2L.

NSA 14: Activity Category B land uses are located adjacent to the southbound travel lanes (west side) of I-476, from Steinsburg Road to approximately 2,700 feet north of Steinsburg Road. See Figure 2L.

NSA 15: Activity Category B land uses are located adjacent to the northbound travel lanes (east side) of I-476, from Steinsburg Road to approximately 2,200 feet north of Steinsburg Road. See Figure 2L.

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 36 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 contained in Appendix B.

It should be noted that short-term measurements were taken at various times of the day between June 5 and 25, 2013 and did not necessarily represent the noisiest condition at any particular measurement site (receiver[1]). In addition, measurement sites were positioned in order to enable validation of the noise prediction model and to assist in defining existing noise levels for second-row residences and for receivers located approximately 500 feet from I-476. As such, in certain locations, noise measurement sites do not exactly correspond with noise analysis sites (receivers). Measurements were used primarily for purposes of noise model validation, with year 2014 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 56 to 69 dB(A).

[1] **In this report, the term "receptor" is used to represent a dwelling unit, or in the case of an Activity Category C non-residential land use, an equivalent residential receptor (ERU. The term "receiver" is used to describe a particular analysis point in the FHWA TNM. It is important to note that, while in most cases one receiver represents one receptor, there are locations identified in this report where a receiver represents more than one receptor. These locations are identified in the various tables, where the "Receptor ID" column represents the FHWA TNM receiver point and the "Number of Units" column represents the number of receptors represented by that receiver.*

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, with FHWA TNM validation data files included on the CD-ROM which accompanies this report. Measured versus modeled noise levels were within the acceptable 3 dB(A) range for all sites evaluated, except Site M9-2 due to loud noise from expansion joints. The results of the validation process was 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 2014) and future (year 2039) noise levels for both no-barrier and barrier conditions is 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 if noise levels are approaching or exceeding 67 dB(A) (66 dB(A) or higher) or create a substantial noise increase (10 dB(A)) in Pennsylvania. The future year noise levels were compared to the absolute NAC levels (66 dB(A)) 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 absolute 66 dB(A) criteria level for Activity Category land uses B and C and the absolute 71 dB(A) 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 2014 and 2039.

In addition to their use in evaluating noise impacts, noise analysis sites (receivers) 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 widen along the existing alignment and any traffic management techniques would be contrary to the efficient functioning of I-476 as an Interstate highway. 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 3 and 11) due to noise levels approaching or exceeding 67 dB(A) (66 dB(A) or higher). 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 achieve at least a 7 dB(A) noise reduction at one receptor.

A summary of abatement considerations within each NSA follows. See referenced tables for more details related to all barrier options considered.

NSA 1 (See Figures 2A, 2B and Table 4): Five of the seven 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 and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 80% 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 was 10,758 > 2000).

- Case 2 consisted of a 12 feet high wall 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 achieved but square footage per benefited receptor SF/BR 10,327 > 2000).

- Case 3 consisted of a shorter 10 feet high wall and was determined to be feasible ($\geq$5 dB(A) insertion loss provided for 80% 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 6,003 > 2000).

- Case 4 consisted of a shorter 8 feet high wall and was determined to be not feasible ($\geq$5 dB(A) insertion loss provided for 40% of impacted receptors).

- Case 5 consisted of an optimizing of Case 4 and was determined to be feasible ($\geq$5

dB(A) insertion loss provided for 80% 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 5,751 > 2000).

NSA 2 (See Figure 2A, 2B and Table 5): One of the four receptors evaluated within this NSA was 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 three abatement options were considered for NSA 2:

- Case 1 consisted of a 10 feet high wall 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 achieved but square footage per benefited receptor SF/BR 27,535 > 2000).

- Case 2 consisted of a shorter 10 feet high wall 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 achieved but square footage per benefited receptor SF/BR 7,002 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 achieved but square footage per benefited receptor SF/BR 6,602 > 2000).

NSA 3 (See Figures 2C, 2D and Table 6): The receptor representative of the property within this NSA was not predicted to have levels at or above 66 dB(A) and was not predicted to create a substantial noise increase of 10 dB(A) with the Build Alternative. Therefore consideration of abatement is not required for this NSA.

NSA 4 (See Figure 2C, 2D and Table 7): One of the six receptors evaluated within this NSA are 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 three abatement options were considered for NSA 4:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible ($\geq$5 dB(A) insertion loss not provided for the lone impacted receptor).

- Case 2 consisted of a 14 feet high wall and was determined to be not feasible ($\geq$5 dB(A) insertion loss not provided for the lone impacted receptor).

- Case 3 consisted of a 20 feet high wall and was determined to be not feasible ($\geq$5 dB(A) insertion loss not provided for the lone impacted receptor).

NSA 5 (See Figure 2D, 2E and Table 8): One of the two receptors evaluated within this NSA was 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 three abatement options were considered for NSA 5:

- Case 1 consisted of a 10 feet high wall 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 and square footage per benefited receptor SF/BR 10,029 > 2000).

- Case 2 consisted of a 12 feet high wall 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 and square footage per benefited receptor SF/BR 12,035 > 2000).

- Case 3 consisted of a 20 feet high wall 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 and square footage per benefited receptor SF/BR 20,058 > 2000).

NSA 6 (See Figure 2D, 2E and Table 9): Two 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 warranted.

The following three abatement options were considered for NSA 6:

- Case 1 consisted of a 10 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved and square footage per benefited receptor SF/BR 9,845 > 2000).

- Case 2 consisted of a 12 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved and square footage per benefited receptor SF/BR 11,815 > 2000).

- Case 3 consisted of a 20 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved and square footage per benefited receptor SF/BR 19,691 > 2000).

NSA 7 (See Figure 2F and Table 10): This NSA includes the Fox Hollow golf course, the receptors 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. In accordance

with PennDOT Pub. 24 and after consultation with PennDOT, PTC has suggested that the equivalent receptor unit (ERU) to be calculated based on the following assumptions:

- Average Round Length: 4.25 hours
- Tee Time Increment (new group tees off): 15 minutes
- Average Persons Per Round: 3.70 persons
- Closing Time (last group tees off): these times are generally set 1.5 hours earlier than the end of Civil Twilight for each month

Based on these assumptions, the ERU was calculated to be 0.15 < 1 and consistent with the techniques used on previous PTC projects, a grid of receptors spaced at 130 feet was established to represent the property and to evaluate noise impacts and abatement options.

The following three abatement options were considered for NSA 7:

- Case 1 consisted of a 10 feet high wall and was determined to be feasible ($\geq$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 27,344 > 2000).

- Case 2 consisted of a shorter 10 feet high wall 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 10,003 > 2000).

- Case 3 consisted of a shorter 10 feet high wall 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 9,673 > 2000).

NSA 8 (See Figure 2F, 2G and Table 11): All three 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 three abatement options were considered for NSA 8:

- Case 1 consisted of a 10 feet high wall 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 not achieved and square footage per benefited receptor SF/BR 11,499 > 2000).

- Case 2 consisted of a 12 feet high wall 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 13,799 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 10,009 > 2000).

NSA 9 (See Figure 2H and Table 12): Two of the four 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 three abatement options were considered for NSA 9:

- Case 1 consisted of a 10 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was not achieved and square footage per benefited receptor SF/BR 11,041 > 2000).

- Case 2 consisted of a 12 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% 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 17,666 > 2000).

- Case 3 consisted of an optimizing of Case 2 and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% 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 5,996 > 2000).

NSA 10A (See Figure 2H and Table 13A): NSA 10 was studied as two separate areas for mitigation purposes. Two of the four receptors evaluated within NSA 10A were predicted to have levels at or above 66 dB(A) with the Build Alternative. As such, consideration of noise abatement within NSA 10A was warranted.

The following three abatement options were considered for NSA 10A:

- Case 1 consisted of a 10 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% of impacted receptors) but not reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved and square footage per benefited receptor SF/BR 20,938 > 2000).

- Case 2 consisted of a 12 feet high wall and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% 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 8,375 > 2000).

- Case 3 consisted of an optimizing of Case 2 and was determined to be feasible (≥5 dB(A) insertion loss provided for 50% 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 13,521 > 2000).

NSA 10B (See Figure 2I, 2K and Table 13B): NSA 10 was studied as two separate areas for mitigation purposes. Three of the seven receptors evaluated within NSA 10B were predicted to have levels at or above 66 dB(A) with the Build Alternative. As such, consideration of noise abatement within NSA 10B was warranted.

The following four abatement options were considered for NSA 10B:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for 0% of impacted receptors).

- Case 2 consisted of a 14 feet high wall 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 7,823 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 8,293 > 2000).

- Case 4 consisted of providing mitigation to R10-7 only 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 9,087 > 2000).

NSA 11 (See Figure 2J and Table 14): The FHWA TNM receiver in this NSA represents the 30 units in this motel that faces the highway within this NSA was not predicted to have levels at or above 71 dB(A) and was not predicted to create a substantial noise increase of 10 dB(A) with the Build Alternative. Therefore consideration of abatement was not required for this NSA.

NSA 12 (See Figure 2K and Table 15): This NSA includes the Spinnerstown Crossing subdivision, Six of the thirty-one receptors 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 12:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for only 33% of impacted receptors.

- Case 2 consisted of a 12 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for only 33% of impacted receptors.

- Case 3 consisted of a 14 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for only 33% of impacted receptors.

- Case 4 consisted of a 20 feet high wall 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 5,686 > 2000).

- Case 5 consisted of an optimizing of Case 4 and was determined to be feasible (≥5 dB(A) insertion loss provided for 80% of impacted receptors) and reasonable (goal of 7 dB(A) insertion loss for at least one receptor was achieved also square footage per benefited receptor SF/BR 1,997 < 2000). The recommended barrier is approximately 1,159 feet in length with an average height of 18.9 feet and was predicted to provide an average I.L. of 6.8 dB(A) for the 11 benefited receptors as shown in Figure 3.

NSA 13 (See Figure 2L and Table 16): The one property evaluated within this NSA is 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 three abatement options were considered for NSA 13:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for 0% of impacted receptors).

- Case 2 consisted of a 18 feet high wall 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 18,054 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 14,626 > 2000).

NSA 14 (See Figure 2L and Table 17): Two of the twelve 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 three abatement options were considered for NSA 14:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for 0% of impacted receptors).

- Case 2 consisted of a 12 feet high wall 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 3,843 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 2,245 > 2000). Since the 2,245 SF/BR value approaches the 2,000 SF/BR reasonableness criteria and all other reasonableness criteria are met, this case will be reevaluated during the final design noise analysis phase when more detailed project-related plans, cross sections, and other information are available.

NSA 15 (See Figure 2L and Table 18): Two of the five 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 three abatement options were considered for NSA 15:

- Case 1 consisted of a 10 feet high wall and was determined to be not feasible (≥5 dB(A) insertion loss provided for 0% of impacted receptors).

- Case 2 consisted of a 14 feet high wall 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 6,838 > 2000).

- Case 3 consisted of an optimizing of Case 2 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 5,858 > 2000).

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. If required during the final design noise analysis, a more detailed consideration of construction noise and associated abatement/mitigation will be undertaken, consistent with the availability and detail of anticipated construction scheduling and operations. Construction of temporary noise barriers and the early construction of permanent noise barriers will be considered as will

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.

Conclusion

Normal traffic growth can be expected to generally increase noise levels in the project area. 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, a noise barrier was determined to be feasible and reasonable for NSA 12.

During the final design phase, a detailed optimization of barrier lengths, heights, costs and locations will be coordinated with the final design engineering process to insure compatibility and the most cost-effective and efficient barrier design. This process may result in barrier heights, lengths, and locations changing from those discussed in this document.

The PTC is committed to construction of the feasible and reasonable noise abatement measures discussed above contingent upon the following conditions:

- Detailed noise analyses during the final design process;
- Analysis and determination of the feasibility and reasonableness of noise abatement measures, methodology, and criteria;
- Community input regarding desires, types, heights, and locations, as well as aesthetic considerations;
- Preferences regarding compatibility with adjacent land uses, particularly as addressed by officials having jurisdiction over such land uses;
- Safety and engineering aspects as related to the roadway user and the adjacent property owner

It is likely that the noise abatement measures for the identified noise impacted areas will be constructed if found to be feasible and reasonable based on the contingencies listed above.

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.
Noise Measurement Results

Site ID Number	Address of Measurement Site	Date	Time Period		Hourly Traffic Based on Concurrent Traffic Counts						Measured Noise Level (dBA)
				Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles	Total	
M1-1	17 Wambold Rd	6.5.13	9:15am	I-476 NB	1011	57	252	30	3	1353	64.5
				I-476 SB	1242	21	213	9	0	1485	
M1-2	67 Wambold Rd	6.5.13	8:47am	I-476 NB	855	51	189	0	3	1098	65.7
				I-476 SB	1185	24	177	3	0	1389	
M1-3	1960 Wambold Rd	6.4.13	9:15am	I-476 NB	2271	27	13	0	6	2317	60.3
				I-476 SB	1311	27	102	6	6	1452	
M1-4	Wambold Rd	6.5.13	8:15am	I-476 NB	932	63	126	0	3	1124	66.7
				I-476 SB	1656	18	186	3	3	1866	
M2-1	97 Badman Rd	6.5.13	9:52am	I-476 NB	939	60	192	63	3	1257	67.5
				I-476 SB	1089	39	234	0	3	1365	
M2-2	143 Badman Rd	6.5.13	10:34am	I-476 NB	828	96	213	6	21	1164	56.8
				I-476 SB	999	24	153	6	0	1182	
M2-3	127 Badman Rd	6.5.13	11:01am	I-476 NB	894	48	246	0	0	1188	57.3
				I-476 SB	1080	15	186	0	0	1281	
M3-1	1905 Upper Ridge Rd	6.25.13	3:02pm	I-476 NB	1700	120	190	0	10	2020	61.8
				I-476 SB	1040	30	130	20	0	1220	
M4-1	Boulder Woods Campground (pond)	6.25.13	10:15am	I-476 NB	1323	66	201	15	0	1605	61.7
				I-476 SB	1290	66	222	3	0	1581	
M4-2	Residence Camp Skymount Rd	6.25.13	11:34am	I-476 NB	1080	51	240	21	0	1392	61.8
				I-476 SB	1065	60	255	3	0	1383	
M4-3	1100 Camp Skymount Rd	6.25.13	11:00am	I-476 NB	1227	54	318	21	0	1620	60.3
				I-476 SB	1227	48	204	18	3	1500	
M4-4	1190 Skymount Rd.	6.6.13	10:16am	I-476 NB	996	48	213	21	9	1287	62.3
				I-476 SB	1101	39	201	0	0	1341	
M5-1	Residence Old Wood Rd	6.25.13	12:16pm	I-476 NB	1068	57	267	0	3	1395	62.6
				I-476 SB	1062	39	216	3	0	1320	
M5-2	1960 Old Wood Rd	6.6.13	3:46pm	I-476 NB	1791	27	180	3	3	2004	65.4
				I-476 SB	1170	30	153	3	3	1359	
M5-3	Cabins off of Trumbauersville Rd	6.26.13	9:14am	I-476 NB	1254	57	243	6	0	1560	68.4
				I-476 SB	1344	54	198	12	3	1611	
M6-1	Residence Upper Ridge Rd	6.25.13	2:25pm	I-476 NB	1419	96	246	0	3	1764	64.6
				I-476 SB	1185	81	183	9	6	1464	
M6-2	Cabins off of Trumbauersville Rd	6.26.13	8:45am	I-476 NB	1008	69	159	0	0	1236	67.8
				I-476 SB	1506	36	255	9	6	1812	
M7-1	Fox Hollow Golf Club 2020 Trumbauersville, Rd Frt. Meter	6.6.13	9:12am	I-476 NB	990	42	225	15	3	1275	68.6
				I-476 SB	1215	33	237	9	0	1494	
M7-2	Fox Hollow Golf Club 2020 Trumbauersville, Rd Bk Meter @60'	6.6.13	9:12am	I-476 NB	990	42	225	15	3	1275	64.7
				I-476 SB	1215	33	237	9	0	1494	
M8-1	1575 Doerr Rd	6.26.13	8:15am	I-476 NB	1212	48	156	0	3	1419	65.5
				I-476 SB	1752	42	168	3	0	1965	
M8-2	1605 Doerr Rd	6.26.13	7:47am	I-476 NB	1236	66	111	0	3	1416	66.7
				I-476 SB	1926	90	201	15	6	2238	
M9-1	Rosenberger Rd	6.5.13	1:51pm	I-476 NB	1152	63	279	0	15	1509	56.9
				I-476 SB	975	27	159	0	0	1161	
M9-2	Rosenberger Rd	6.5.13	1:21pm	I-476 NB	1188	60	327	3	0	1578	58.2
				I-476 SB	924	48	126	0	0	1098	
M10-1	Kumry Rd	6.5.13	3:03pm	I-476 NB	1251	48	228	0	0	1527	66.3
				I-476 SB	1198	33	153	0	9	1393	
M10-2	1890 Kumry Rd	6.5.13	2:27pm	I-476 NB	1209	54	258	3	9	1533	65.9
				I-476 SB	1041	27	204	0	0	1272	
M10-3	Kumry Rd	6.5.13	3:35pm	I-476 NB	1683	39	198	6	0	1926	60.1
				I-476 SB	1080	42	159	6	6	1293	
M10-4	Krammes Rd	6.5.13	4:14pm	I-476 NB	1767	27	180	6	6	1986	59.6
				I-476 SB	1341	33	126	21	6	1527	
M10-5	Molasses Creek Park, Krammes Rd	6.4.13	9:44am	I-476 NB	873	63	240	24	3	1203	58.6
				I-476 SB	957	63	222	12	0	1254	
M11-1	Comfort Inn, John Fries Highway	6.4.13	7:49am	I-476 NB	951	45	75	0	3	1074	58.3
				I-476 SB	1713	39	195	12	3	1962	
M12-1	1782 Redbud Rd	6.4.13	8:32am	I-476 NB	951	48	216	0	12	1227	60.3
				I-476 SB	1632	33	231	3	0	1899	
M12-2	1774-1770 Redbud Rd	6.4.13	9:01am	I-476 NB	867	48	180	9	0	1104	57.7
				I-476 SB	1143	21	192	12	3	1371	
M13-1	Farmhouse @ MB Research Labs Wentz Rd	6.3.13	4:45pm	I-476 NB	1491	24	150	3	0	1668	63.4
				I-476 SB	1071	9	141	9	6	1236	
M14-1	Heiter Rd	6.4.13	11:26am	I-476 NB	804	78	282	9	9	1182	61.8
				I-476 SB	816	36	195	0	3	1050	
M15-1	2300 Steinsburg Rd	6.4.13	12:10pm	I-476 NB	825	60	228	9	12	1134	66.8
				I-476 SB	777	24	189	0	3	993	
M15-2	Steinsburg Rd	6.4.13	12:39pm	I-476 NB	762	48	315	0	0	1125	67.1
				I-476 SB	741	33	201	0	0	975	
M15-3	2324 Steinsburg Rd	6.6.13	7:52am	I-476 NB	1005	48	132	0	3	1188	55.5
				I-476 SB	906	36	66	6	0	1014	

Table 3.
Noise Validation Results

Site ID Number	Address of Measurement Site	TNM Model Validation Noise Levels in dBA		
		Modeled Leq(h)	Measured Leq	Difference
M1-1	17 Wambold Rd	66.8	64.5	2
M1-2	67 Wambold Rd	66.1	65.7	0
M1-3	1960 Wambold Rd	62.0	60.3	2
M1-4	Wambold Rd	68.4	66.7	2
M2-1	97 Badman Rd	67.8	67.5	0
M2-2	143 Badman Rd	57.5	56.8	1
M2-3	127 Badman Rd	57.4	57.3	0
M3-1	1905 Upper Ridge Rd	58.6	61.8	-3
M4-1	Boulder Woods Campground (pond)	62.2	61.7	1
M4-2	Residence Camp Skymount Rd	64.0	61.8	2
M4-3	1100 Camp Skymount Rd	59.6	60.3	-1
M4-4	1190 Skymount Rd.	62.0	62.3	0
M5-1	Residence Old Wood Rd	62.0	62.6	-1
M5-2	1960 Old Wood Rd	65.6	65.4	0
M5-3	Cabins off of Trumbauersville Rd	70.7	68.4	2
M6-1	Residence Upper Ridge Rd	66.4	64.6	2
M6-2	Cabins off of Trumbauersville Rd	68.8	67.8	1
M7-1	Fox Hollow Golf Club 2020 Trumbauersville, Rd Frt. Meter	68.7	68.6	0
M7-2	Fox Hollow Golf Club 2020 Trumbauersville, Rd Bk Meter @60'	65.0	64.7	0
M8-1	1575 Doerr Rd	64.3	65.5	-1
M8-2	1605 Doerr Rd	65.7	66.7	-1
M9-1	Rosenberger Rd	60.0	56.9	3
M9-2	Rosenberger Rd	64.6	58.2	6
M10-1	Kumry Rd	68.1	66.3	2
M10-2	1890 Kumry Rd	67.9	65.9	2
M10-3	Kumry Rd	62.0	60.1	2
M10-4	Krammes Rd	61.8	59.6	2
M10-5	Molasses Creek Park, Krammes Rd	56.6	58.6	-2
M11-1	Comfort Inn, John Fries Highway	60.4	58.3	2
M12-1	1782 Redbud Rd	60.0	60.3	0
M12-2	1774-1770 Redbud Rd	55.9	57.7	-2
M13-1	Farmhouse @ MB Research Labs Wentz Rd	62.8	63.4	-1
M14-1	Heiter Rd	63.2	61.8	1
M15-1	2300 Steinsburg Rd	67.7	66.8	1
M15-2	Steinsburg Rd	67.0	67.1	0
M15-3	2324 Steinsburg Rd	56.7	55.5	1

Table 4
NSA 1 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)									
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 1	M1-1	1	65	66	73	8	68	6	65	8	68	6	68	5	68	5
	M1-2	1	66	67	69	4	61	8	60	9	61	8	63	6	61	8
	M1-3	1	61	62	65	4	63	1	63	2	64	1	64	1	64	1
	M1-4	1	70	71	76	6	70	6	67	9	71	5	72	4	71	5
	R1-5	1	60	61	61	1	60	1	59	2	60	1	60	1	60	1
	R1-6	1	61	62	67	5	63	3	60	6	63	3	63	3	63	3
	R1-7	1	61	62	66	5	60	6	58	8	60	6	62	4	60	6
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 1 (9.1.14) Case 1: 10 ft		NSA 1 (9.1.14) Case 2: 12 ft		NSA 1 (9.1.14) Case 3: 10 ft Short		NSA 1 (9.1.14) Case 4: 8 ft Short		NSA 1 (9.1.14) Case 5: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:																
Barrier Area (ft^2)							43031		51637		24010		19208		23004	
Total Number of Receptors Impacted							5		5		5		5		5	
Impacted Receptors Receiving ≥ 5 dBA I.L.							4		5		4		2		4	
Percent of Impacted Receptors Receiving ≥ 5 dBA I.L.							80%		100%		80%		40%		80%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**		**No**		**Yes**	
Benefited Receptors (those receiving ≥ 5 dBA I.L.)							4		5		4				4	
Square Footage per Benefited Receptor (SF/BR) ≤ 2000							10,758		10,327		6,003				5,751	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**				**No**	
Average Noise Reduction for Benefited Receptors (dBA)							6.4		8.3		7.1				6.1	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**Yes**		**Yes**		**Yes**				**Yes**	
Total Barrier Length (ft)							4303		4303		2401		2401		2401	
Barrier Height Range (ft)							10		12		10		8		8 to 10	
Average Barrier Height (ft)							10.0		12.0		10.0		8.0		9.6	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels ≥ 66 dBA)

Impacted Receptors Units Receiving ≥ 5 dBA I.L.

Table 5
NSA 2 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 2	M2-1	1	66	69	72	6	65	8	66	7	66	7
	M2-2	1	56	57	61	5						
	M2-3	1	55	56	60	5	58	2	59	1	59	1
	R2-4	1	57	59	64	7						
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 2 (9.1.14) Case 1: 10 ft		NSA 2 (9.1.14) Case 2: 10 ft Short		NSA 2 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							27535		7002		6602	
Total Number of Receptors Impacted							1		1		1	
Impacted Receptors Receiving ≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving ≥ 5 dBA I.L.							100%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving ≥ 5 dBA I.L.)							1		1		1	
Square Footage per Benefited Receptor (SF/BR) ≤ 2000							27,535		7,002		6,602	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							7.6		6.6		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**Yes**		**Yes**		**Yes**	
Total Barrier Length (ft)							2753		700		700	
Barrier Height Range (ft)							10		10		8 to 10	
Average Barrier Height (ft)							10.0		10.0		9.4	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels ≥ 66 dBA)
Impacted Receptors Units Receiving ≥ 5 dBA I.L.

Table 6
NSA 3 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)	
					Noise Levels	Increase Over Existing
NSA 3	**M3-1**	1	57	59	63	5
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039	

NOTES:
dBA = Decibels on the A-weighted scale Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest wh

Table 7
NSA 4 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 4	**M4-1**	1	60	62	64	4	62	1	62	1	62	1
	M4-2	1	59	61	67	7	64	2	64	3	64	3
	M4-3	1	58	60	62	4	61	1	60	1	60	2
	M4-4	1	60	62	63	3	61	3	61	3	61	3
	R4-5	2	58	59	59	1	58	1	58	1	58	1
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 4 (9.1.14) Case 1: 10 ft		NSA 4 (9.1.14) Case 2: 14 ft		NSA 4 (9.1.14) Case 3: 20 ft	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							12314		17239		24628	
Total Number of Receptors Impacted							1		1		1	
Impacted Receptors Receiving≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							0%		0%		0%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**No**		**No**		**No**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)												
Square Footage per Benefited Receptor (SF/BR)≤ 2000												
Barrier Reasonable from a SF/BR Standpoint?												
Average Noise Reduction for Benefited Receptors (dBA)												
Is 7 dBA I.L.goal met for at least one benefited receptor?												
Total Barrier Length (ft)							1231		1231		1231	
Barrier Height Range (ft)							10		14		20	
Average Barrier Height (ft)							10.0		14.0		20.0	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 8
NSA 5 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 5	M5-1	1	60	61	65	5	64	1	64	1	64	1
	M5-2	1	62	62	69	6	63	5	63	6	62	6
	M5-3	2	69	70	72	2	**Demolished**					
	R5-4	2	65	66	68	3	**Demolished**					
	R5-5	2	60	61	64	5	**Demolished**					
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 5 (9.1.14) Case 1: 10 ft		NSA 5 (9.1.14) Case 2: 12 ft		NSA 5 (9.1.14) Case 3: 20 ft	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							10029		12035		20058	
Total Number of Receptors Impacted							1		1		1	
Impacted Receptors Receiving≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							100%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)							1		1		1	
Square Footage per Benefited Receptor (SF/BR)≤ 2000							10,029		12,035		20,058	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							5.2		5.7		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**No**		**No**		**No**	
Total Barrier Length (ft)							1003		1003		1003	
Barrier Height Range (ft)							10		12		20	
Average Barrier Height (ft)							10.0		12.0		20.0	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 9
NSA 6 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 6	M6-1	1	64	65	69	5	64	5	64	5	63	6
	M6-2	1	68	70	72	4	Demolished					
	R6-3	1	63	65	69	6	69	0	69	0	67	2
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 6 (9.1.14) Case 1: 10 ft		NSA 6 (9.1.14) Case 2: 12 ft		NSA 6 (9.1.14) Case 3: 20 ft	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							9845		11815		19691	
Total Number of Receptors Impacted							2		2		2	
Impacted Receptors Receiving≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							50%		50%		50%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)							1		1		1	
Square Footage per Benefited Receptor (SF/BR)≤ 2000							9,845		11,815		19,691	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							4.6		4.9		5.8	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**No**		**No**		**No**	
Total Barrier Length (ft)							984		984		984	
Barrier Height Range (ft)							10		12		20	
Average Barrier Height (ft)							10.0		12.0		20.0	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels≥ 66 dBA)

Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 10
NSA 7 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 7	3A	1	66	67	70	4	63	7	65.5	5	66	5
	3B	1	64	65	67	3	62	6	62.3	5	62	5
	4C	1	58	59	63	5	59	4	59.8	3	60	3
	5C	1	56	57	60	4	57	4	57.9	2	58	2
	2D	1	64	64	69	5	63	6	62.9	6	63	6
	3D	1	60	61	65	5	61	4	61.0	4	61	4
	4D	1	57	58	62	5	59	3	59.1	3	59	3
	5D	1	55	56	59	4	56	3	57.3	2	57	2
	1E	1	67	67	71	5	63	8	63.4	8	64	8
	2E	1	62	63	68	6	62	6	62.3	6	62	6
	3E	1	59	60	65	6	61	4	61.1	3	61	3
	4E	1	56	57	62	5	58	3	59.0	3	59	2
	5E	1	54	55	59	5	56	3	57.1	2	57	2
	6E	1	53	54	57	5	55	2	56.0	1	56	1
	1F	1	65	66	70	5	63	7	63.0	7	63	7
	2F	1	61	62	67	6	62	5	62.3	5	62	5
	3F	1	58	59	64	6	60	4	60.8	3	61	3
	4F	1	56	56	61	6	58	3	59.0	2	59	2
	5F	1	54	55	59	5	56	2	57.0	2	57	2
	6F	1	52	53	57	5	55	2	55.7	1	56	1
	1G	1	64	64	69	5	63	6	63.4	5	64	5
	2G	1	60	60	66	6	62	4	63	3	63	3
	3G	1	58	59	63	5	60	3	61	2	61	2
	4G	1	55	56	60	6	58	3	59	2	59	2
	5G	1	55	56	58	4	56	2	57	1	57	1
	6G	1	52	53	57	5	55	2	55	1	56	1
	1H	1	62	63	68	6	63	6	64	4	64	4
	2H	1	59	60	65	6	61	4	62	3	62	2
	3H	1	56	57	62	6	59	3	60	2	60	2
	4H	1	54	55	60	5	57	2	58	2	58	2
	5H	1	53	54	58	5	56	2	57	1	57	1
	6H	1	51	52	56	5	54	2	55	1	55	1
	1I	1	61	61	67	6	62	5	64	3	64	2
	2I	1	58	59	64	6	60	3	62	2	62	2
	3I	1	56	56	61	6	58	3	59	2	60	2
	4I	1	54	54	59	6	57	2	58	1	58	1
	5I	1	52	53	57	5	55	2	56	1	56	1
	6I	1	51	52	56	5	54	2	55	1	55	1
	1J	1	59	60	66	6	61	4	64	2	64	1
	2J	1	57	58	63	6	60	3	61	1	61	1
	3J	1	55	56	60	6	58	3	59	1	59	1
	4J	1	53	54	58	5	56	2	57	1	58	1
	5J	1	52	53	57	5	55	2	56	1	56	1
	6J	1	50	51	55	5	54	2	54	1	54	1
	1K	1	59	59	64	6	61	4	64	1	64	1
	2K	1	56	57	62	6	59	3	61	1	61	1
	3K	1	54	56	60	5	57	2	59	1	59	1
	4K	1	52	53	58	5	56	2	57	1	57	1
	5K	1	51	52	56	5	55	2	56	1	56	1
	6K	1	50	51	55	5	53	2	54	1	54	1
	1L	1	58	58	63	6	60	3	63	1	63	0
	2L	1	55	56	61	6	58	3	61	1	61	1
	3L	1	53	54	59	6	57	2	58	1	59	1
	4L	1	52	53	57	5	56	2	57	1	57	1
	5L	1	51	52	56	5	54	2	55	1	55	1
	6L	1	50	51	54	5	53	2	54	1	54	1
	7L	1	49	50	53	5	52	2	53	1	53	1
	1M	1	57	57	62	6	60	3	62	0	62	0
	2M	1	55	55	60	6	58	3	60	0	60	0
	3M	1	53	54	58	5	57	2	58	0	58	0
	4M	1	52	53	57	5	55	2	56	1	56	1
	5M	1	50	51	55	5	54	2	55	1	55	1
	6M	1	49	50	54	5	52	2	53	0	53	0
	7M	1	48	49	53	5	51	2	52	1	52	1
	1N	1	56	57	62	6	59	3	61	0	61	0
	2N	1	54	55	60	6	57	2	59	0	59	0
	3N	1	52	53	58	5	56	2	57	0	57	0
	4N	1	51	52	56	5	55	2	56	0	56	0
	5N	1	50	51	55	5	53	2	54	0	54	0
	6N	1	49	50	53	5	52	2	53	0	53	0
	7N	1	48	49	52	5	51	2	52	0	52	0

Table 10
NSA 7 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
	1O	1	55	56	61	6	58	3	61	0	61	0
	2O	1	53	54	59	6	57	2	59	0	59	0
	3O	1	52	53	57	5	56	2	57	0	57	0
	4O	1	51	52	56	5	54	2	55	0	55	0
	5O	1	49	50	54	5	53	1	54	0	54	0
	6O	1	48	50	53	5	52	2	53	0	53	0
	7O	1	48	49	52	4	50	2	52	0	52	0
	2P	1	53	54	58	6	57	2	58	0	58	0
	3P	1	51	52	57	5	55	2	56	0	56	0
	4P	1	50	51	55	5	54	1	55	0	55	0
	5P	1	50	51	54	4	52	1	53	0	54	0
	6P	1	48	49	53	5	51	2	52	0	52	0
	7P	1	47	48	52	4	50	2	51	0	51	0
	3Q	1	51	52	56	5	55	2	56	0	56	0
	4Q	1	50	51	55	5	53	2	54	0	54	0
	7Q	1	47	49	51	4	50	1	51	0	51	0
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 12 (9.7.14) Case 1: 10 ft		NSA 12 (9.7.14) Case 2: 10 ft short		NSA 12 (9.7.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							41016		12004		11607	
Total Number of Receptors Impacted * ERU (0.15)							1.8		1.8		1.8	
Impacted Receptors Receiving ≥ 5 dBA I.L.							1.5		1.2		1.2	
Percent of Impacted Receptors Receiving ≥ 5 dBA I.L.							83%		67%		67%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving ≥ 5 dBA I.L.)							1.5		1.2		1.2	
Square Footage per Benefited Receptor (SF/BR) ≤ 2000							27,344		10,003		9,673	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							6.1		5.7		5.6	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**Yes**		**Yes**		**Yes**	
Total Barrier Length (ft)							4102		1200		1200	
Barrier Height Range (ft)							10		10		8 to 10	
Average Barrier Height (ft)							10.0		10.0		9.7	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels ≥ 66 dBA)
Impacted Receptors Units Receiving ≥ 5 dBA I.L.

Table 11
NSA 8 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 8	M8-1	1	63	66	69	6	64	5	62	7	63	7
	M8-2	1	64	66	72	8	67	5	67	5	68	5
	R8-3	1	60	61	67	7	65	3	64	3	66	1
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 8 (9.1.14) Case 1: 10 ft		NSA 8 (9.1.14) Case 2: 12 ft		NSA 8 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							22997		27597		20018	
Total Number of Receptors Impacted							3		3		3	
Impacted Receptors Receiving≥ 5 dBA I.L.							2		2		2	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							67%		67%		67%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)							2		2		2	
Square Footage per Benefited Receptor (SF/BR)≤ 2000							11,499		13,799		10,009	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							4.9		6.2		5.6	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**No**		**Yes**		**Yes**	
Total Barrier Length (ft)							2300		2300		1701	
Barrier Height Range (ft)							10		12		10 to 12	
Average Barrier Height (ft)							10.0		12.0		11.8	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels≥ 66 dBA)

Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 12
NSA 9 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 9	M9-1	1	57	58	62	5	61	1	61	1	61	1
	M9-2	1	62	62	66	4	61	5	59	7	59	7
	R9-3	1	57	57	61	5	60	1	60	1	60	1
	R9-4	1	62	62	67	5	66	1	66	1	66	1
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 9 (9.1.14) Case 1: 10 ft		NSA 9 (9.1.14) Case 2: 16 ft		NSA 9 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							11041		17666		5996	
Total Number of Receptors Impacted							2		2		2	
Impacted Receptors Receiving≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							50%		50%		50%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)							1		1		1	
Square Footage per Benefited Receptor (SF/BR)≤ 2000							11,041		17,666		5,996	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							5.1		6.9		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**No**		**Yes**		**Yes**	
Total Barrier Length (ft)							1104		1104		401	
Barrier Height Range (ft)							10		16		12 to 16	
Average Barrier Height (ft)							10.0		16.0		14.9	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 13A
NSA 10A Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 10A	M10-1	1	68	71	71	3	68	3	68	3	70	1
	M10-2	1	67	69	69	3	63	7	62	7	63	7
	M10-3	2	61	63	64	3	61	3	59	5	61	4
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 10A (9.1.14) Case 1: 10 ft		NSA 10A (9.1.14) Case 2: 12 ft		NSA 10A (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							20938		25126		13521	
Total Number of Receptors Impacted							2		2		2	
Impacted Receptors Receiving≥ 5 dBA I.L.							1		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							50%		50%		50%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)							1		3		1	
Square Footage per Benefited Receptor (SF/BR)≤ 2000							20,938		8,375		13,521	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							6.7		5.9		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**Yes**		**Yes**		**Yes**	
Total Barrier Length (ft)							2094		2094		1193	
Barrier Height Range (ft)							10		12		10 to 12	
Average Barrier Height (ft)							10.0		12.0		11.3	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels≥ 66 dBA)

Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 13B
NSA 10B Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)							
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 10B	M10-4	1	60	61	68	8	65	3	63	5	63	5	67	1
	M10-5	1	58	59	62	5	59	3	59	3	59	3	59	3
	R10-6	2	57	58	64	7	60	4	58	6	61	3	61	3
	R10-7	2	59	60	66	7	62	4	58	8	60	7	60	7
	R10-8	1	60	61	63	3	60	3	59	4	61	2	62	1
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 10B (9.1.14) Case 1: 10 ft		NSA 10B (9.1.14) Case 2: 14 ft		NSA 10B (9.1.14) Case 3: Optimized		NSA 10B (9.1.14) Case 4: R10-7 only	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:														
Barrier Area (ft^2)							27939		39115		24879		18174	
Total Number of Receptors Impacted							3		3		3		3	
Impacted Receptors Receiving ≥ 5 dBA I.L.							0		3		3		2	
Percent of Impacted Receptors Receiving ≥ 5 dBA I.L.							0%		100%		100%		67%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**No**		**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving ≥ 5 dBA I.L.)							0		5		3		2	
Square Footage per Benefited Receptor (SF/BR) ≤ 2000									7,823		8,293		9,087	
Barrier Reasonable from a SF/BR Standpoint?									**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)									6.3		5.8		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?									**Yes**		**Yes**		**Yes**	
Total Barrier Length (ft)							2794		2794		1805		1312	
Barrier Height Range (ft)							10		14		12 to 14		12 to 14	
Average Barrier Height (ft)							10.0		14.0		13.8		13.9	

NOTES:

dBA = Decibels on the A-weighted scale

Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels ≥ 66 dBA)

Impacted Receptors Units Receiving ≥ 5 dBA I.L.

Table 14
NSA 11 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)	
					Noise Levels	Increase Over Existing
NSA 11	**M11-1**	30	56	58	59	3
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039	

NOTES:
dBA = Decibels on the A-weighted scale Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest wh

Table 15
NSA 12 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)									
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 12	M12-2	1	56	57	63	7	57	7	55	9	56	8	56	8	55	8
	R12-3	1	60	62	66	7	58	8	55	11	56	10	57	9	56	10
	R12-4	1	56	58	65	8	57	7	55	10	56	9	56	9	56	9
	R12-3A	1	58	60	66	8	58	8	55	11	55	11	56	10	55	10
	M12-2A	1	55	57	62	7	57	5	55	8	56	7	56	7	55	7
	R12-5A	1	55	56	62	7	60	2	56	5	58	4	58	4	57	5
	R12-5	1	55	57	62	7	59	3	56	6	57	5	57	5	57	5
	R12-6	1	54	56	61	7	60	1	56	5	58	3	58	3	57	4
	R12-7	1	54	56	60	6	59	1	56	4	58	2	58	2	58	3
	R12-8	1	53	55	59	6	58	1	55	4	58	1	58	1	57	2
	R12-9	1	52	54	56	5	56	1	53	3	56	1	56	1	55	1
	R12-10	1	52	53	56	4	56	0	55	1	56	0	56	0	56	0
	R12-11	1	52	54	56	4	56	0	56	0	54	3	54	2	56	1
	R12-12	1	53	54	57	4	55	2	52	5	54	4	54	4	53	4
	R12-13	1	54	55	58	5	55	3	53	5	54	5	54	4	54	5
	R12-14	1	56	58	60	4	56	4	54	6	56	4	56	4	56	4
	R12-15	3	64	65	64	0	58	6	55	9	58	6	59	5	59	5
	R12-16	1	64	65	62	-2	59	3	58	4	61	1	61	1	61	1
	R12-17	1	57	58	59	3	57	2	54	5	56	3	56	3	56	3
	R12-18	1	52	54	56	4	54	2	52	4	53	3	53	3	53	3
	R12-19	1	51	52	55	4	53	2	51	4	52	3	52	3	52	3
	R12-20	1	51	52	54	4	53	2	50	4	52	3	52	3	51	3
	R12-21	1	51	52	54	4	53	1	51	3	53	2	53	2	53	2
	R12-22	1	51	52	53	2	52	1	51	3	52	1	52	1	52	1
	R12-23	1	51	53	54	3	53	1	52	3	53	2	53	2	53	2
	R12-24	1	53	54	55	2	54	1	53	2	54	1	54	1	54	1
	R12-25	1	55	57	57	2	56	2	55	3	56	2	56	1	56	2
	R12-26	1	59	60	61	2	60	1	58	3	59	2	59	1	59	2
	R12-27	1	65	66	63	-2	63	0	63	1	63	0	63	0	63	0
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 12 (10.16.14) Case 1: 12 ft		NSA 12 (10.16.14) Case 2: 20 ft		NSA 12 (10.16.14) Case 3: 20 ft short		NSA 12 (10.16.14) Case 4: 20 ft Optimized		NSA 12 (10.16.14) Case 5: 22 ft Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:																
Barrier Area (ft^2)							38416		64027		21001		18292		21963	
Total Number of Receptors Impacted							2		2		2		2		2	
Impacted Receptors Receiving ≥ 5 dBA I.L.							2		5		2		2		2	
Percent of Impacted Receptors Receiving ≥ 5 dBA I.L.							100%		250%		100%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**Yes**		**Yes**		**Yes**		**Yes**		**Yes**	
Benefited Receptors (those receiving ≥ 5 dBA I.L.)							5		14		10		9		11	
Square Footage per Benefited Receptor (SF/BR) ≤ 2000							7,683		4,573		2,100		2,032		1,997	
Barrier Reasonable from a SF/BR Standpoint?							**No**		**No**		**No**		**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)							7.0		7.7		7.4		6.8		6.8	
Is 7 dBA I.L.goal met for at least one benefited receptor?							**Yes**		**Yes**		**Yes**		**Yes**		**Yes**	
Total Barrier Length (ft)							3201		3201		1050		1050		1159	
Barrier Height Range (ft)							12		20		20		13 to 20		12 to 22	
Average Barrier Height (ft)							12.0		20.0		20.0		17.4		18.9	
															Recommended	

NOTES:

dBA = Decibels on the A-weighted scale Leq = Equivalent noise level

I.L. = Insertion Loss

All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.

Impacted Receptors (Build noise levels ≥ 66 dBA)

Impacted Receptors Units Receiving ≥ 5 dBA I.L.

Table 16
NSA 13 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 13	**M13-1**	1	62	63	69	7	66	3	62	7	62	7
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 13 (9.1.14) Case 1: 10 ft		NSA 13 (9.1.14) Case 2: 18 ft		NSA 13 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							10030		18054		14626	
Total Number of Receptors Impacted							1		1		1	
Impacted Receptors Receiving≥ 5 dBA I.L.							0		1		1	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							0%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**No**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)									1		1	
Square Footage per Benefited Receptor (SF/BR)≤ 2000									18,054		14,626	
Barrier Reasonable from a SF/BR Standpoint?									**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)									6.7		6.5	
Is 7 dBA I.L.goal met for at least one benefited receptor?									**Yes**		**Yes**	
Total Barrier Length (ft)							1003		1003		902	
Barrier Height Range (ft)							10		18		14 to 18	
Average Barrier Height (ft)							10.0		18.0		16.2	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 17
NSA 14 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 14	M14-1	2	61	63	66	5	62	4	59	7	60	7
	R14-18	2	56	57	61	5	59	2	59	2	59	2
	R14-19	2	58	60	61	3	55	6	54	7	54	7
	R14-20	2	57	58	62	5	60	2	57	5	57	5
	R14-21	3	58	59	63	5	59	3	57	6	58	5
	R14-22	1	55	56	60	4	57	3	54	5	57	3
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 14 (9.1.14) Case 1: 10 ft		NSA 14 (9.1.14) Case 2: 12 ft		NSA 14 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							32026		38431		20205	
Total Number of Receptors Impacted							2		2		2	
Impacted Receptors Receiving≥ 5 dBA I.L.							0		2		2	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							0%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**No**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)									10		9	
Square Footage per Benefited Receptor (SF/BR)≤ 2000									3,843		2,245	
Barrier Reasonable from a SF/BR Standpoint?									**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)									6.0		5.6	
Is 7 dBA I.L.goal met for at least one benefited receptor?									**Yes**		**Yes**	
Total Barrier Length (ft)							3203		3203		1700	
Barrier Height Range (ft)							10		12		10 to 12	
Average Barrier Height (ft)							10.0		12.0		11.9	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

Table 18
NSA 15 Noise Barrier Evaluation

NSA	Site ID	Number of Units	Existing 2014	Future No-Build 2039	Future No Barrier (2039)		Future Barrier (2039)					
					Noise Levels	Increase Over Existing	Noise Levels	I.L.	Noise Levels	I.L.	Noise Levels	I.L.
NSA 15	M15-1	2	61	62	66	5	64	3	60	7	60	7
	M15-2	1	59	60	64	5	62	2	58	6	60	5
	M15-3	2	54	55	58	4	57	2	53	5	55	3
FHWA TNM Data File			Existing 2014	Future No-Build 2039	Future Build 2039		NSA 15 (9.1.14) Case 1: 10 ft		NSA 15 (9.1.14) Case 2: 14 ft		NSA 15 (9.1.14) Case 3: Optimized	
RECOMMENDED NOISE ABATEMENT SYSTEM DETAILS:												
Barrier Area (ft^2)							24421		34190		17574	
Total Number of Receptors Impacted							2		2		2	
Impacted Receptors Receiving≥ 5 dBA I.L.							0		2		2	
Percent of Impacted Receptors Receiving≥ 5 dBA I.L.							0%		100%		100%	
Barrier Feasible Based on 5 dBA Reduction Criteria?							**No**		**Yes**		**Yes**	
Benefited Receptors (those receiving≥ 5 dBA I.L.)									5		3	
Square Footage per Benefited Receptor (SF/BR)≤ 2000									6,838		5,858	
Barrier Reasonable from a SF/BR Standpoint?									**No**		**No**	
Average Noise Reduction for Benefited Receptors (dBA)									5.7		5.9	
Is 7 dBA I.L.goal met for at least one benefited receptor?									**Yes**		**Yes**	
Total Barrier Length (ft)							2442		2442		1198	
Barrier Height Range (ft)							10		14		10 to 16	
Average Barrier Height (ft)							10.0		14.0		14.7	

NOTES:
dBA = Decibels on the A-weighted scale
Leq = Equivalent noise level
I.L. = Insertion Loss
All noise levels are calculated to the tenth of a dBA and rounded for presentation purposes to the nearest whole number.
Impacted Receptors (Build noise levels≥ 66 dBA)
Impacted Receptors Units Receiving≥ 5 dBA I.L.

FIGURES

Project Study Area

Figure 1
Project Location Map
PTC NE Extension MP A-38 to MP A-44
Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Gannett Fleming

Scale (Feet)
3,000 1,500 0 3,000

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

Clump Rd
476
Wambold Rd
M1-1
NSA 1
R1-7
M1-2
M1-4
Badman Rd
M2-3
NSA 2
M2-1
Wambold Rd
R1-6
M1-3
L-1
476

Modeled Sites (RX-X)
Monitored Sites (MX-X)
24-hour Noise Monitoring Location
Noise Study Areas

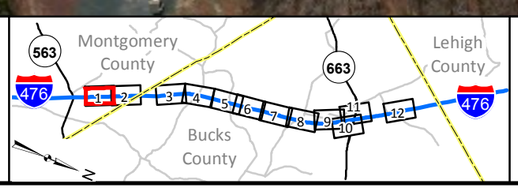


Figure 2A
Noise Study Areas (NSAs) and Noise Receptors
PTC NE Extension MP A-38 to MP A-44
Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Scale (Feet)
200 100 0 200

Gannett Fleming

Sheet 1 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

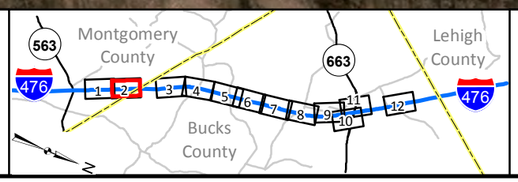


Figure 2B

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 2 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

M4-1

NSA 4

M4-2

M4-3

Camp Skymount Rd

476

I-476 Northeast Extension

476

NSA 3

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

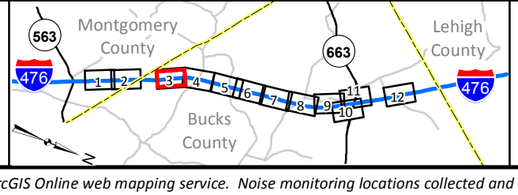


Figure 2C

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 3 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

NSA 4
R4-5
M4-4
Camp Skymount Rd
Upper Ridge Rd
M6-1
NSA 6
476
I-476 Northeast Extension
476
M3-1
Upper Ridge Rd
NSA 3
M5-1
NSA 5
Old Woods Rd
L-2
M5-2

Modeled Sites (RX-X)
Monitored Sites (MX-X)
24-hour Noise Monitoring Location
Noise Study Areas

Figure 2D
Noise Study Areas (NSAs) and Noise Receptors
PTC NE Extension MP A-38 to MP A-44
Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

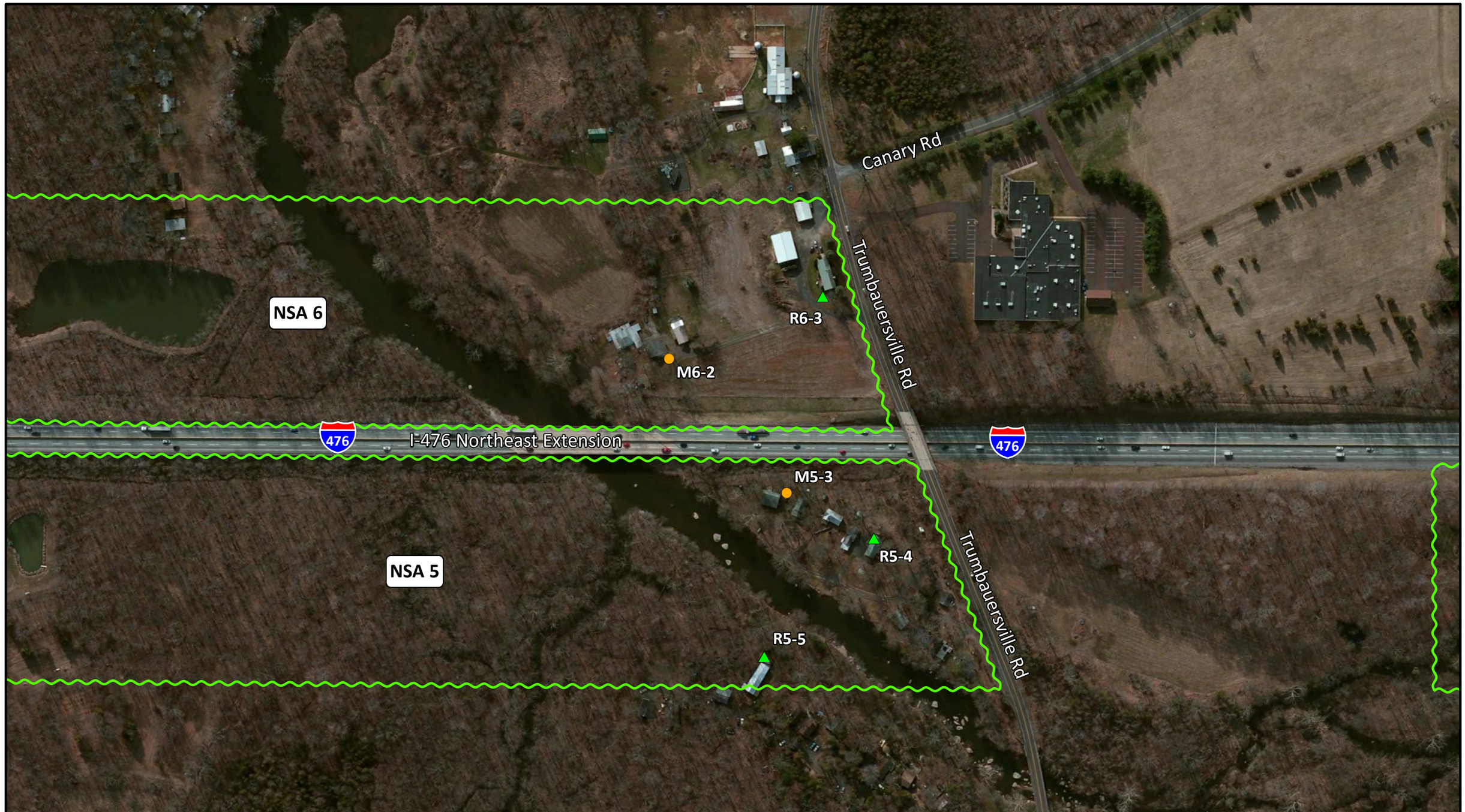
Scale (Feet)
200 100 0 200

Gannett Fleming

Sheet 4 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*



Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

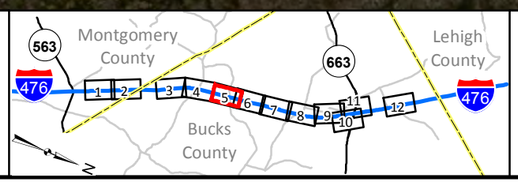


Figure 2E

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 5 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

Doerr Rd

M8-1

NSA 8

476

I-476 Northeast Extension

476

M7-1

M7-2

NSA 7

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

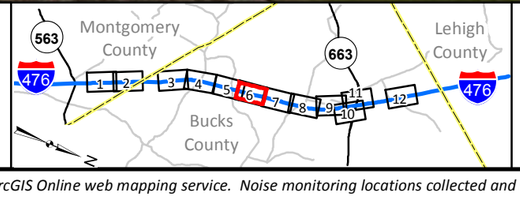


Figure 2F

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

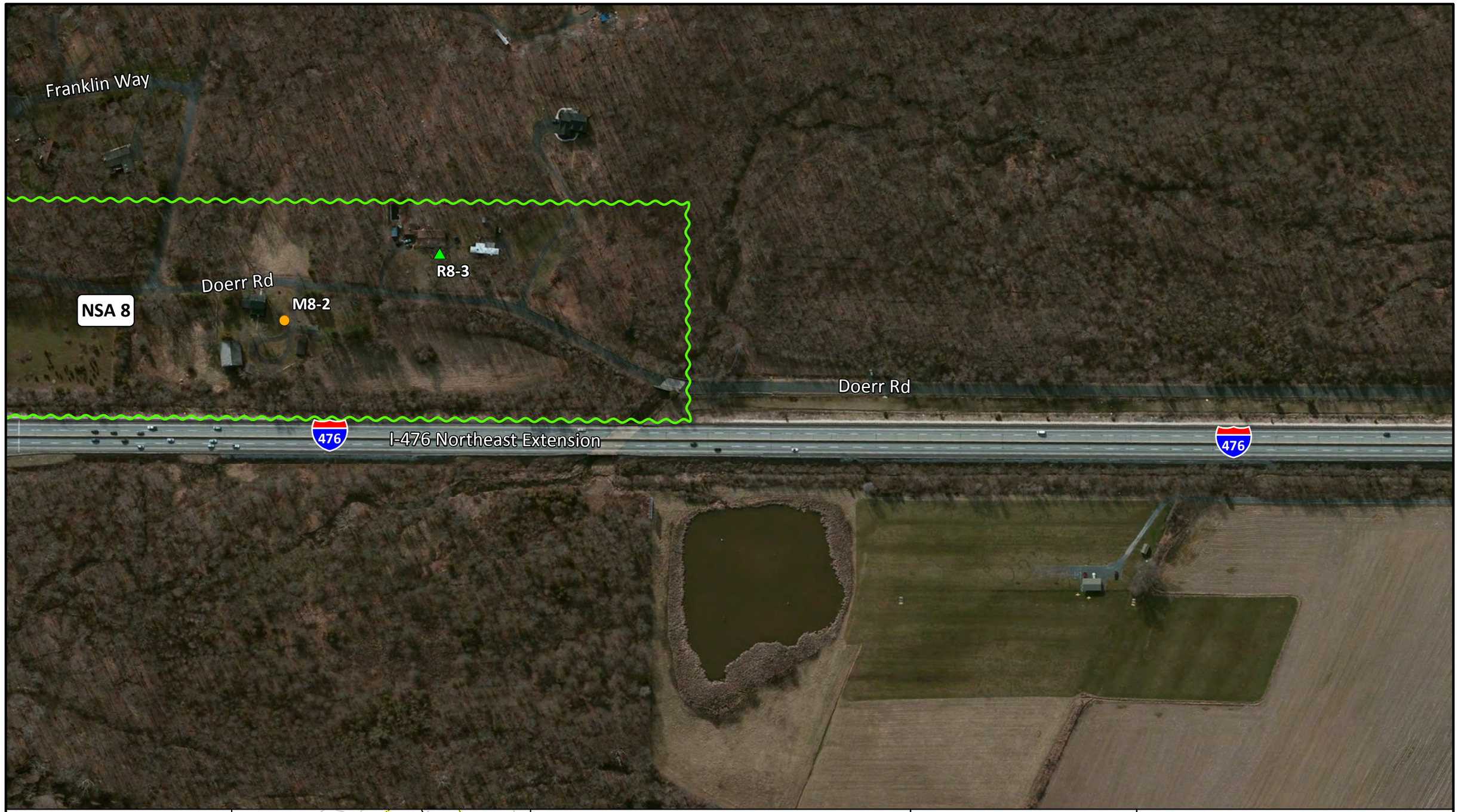
200 100 0 200

Gannett Fleming

Sheet 6 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*



Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

Figure 2G

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 7 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

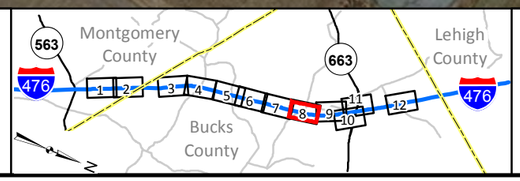


Figure 2H

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

N

Scale (Feet)

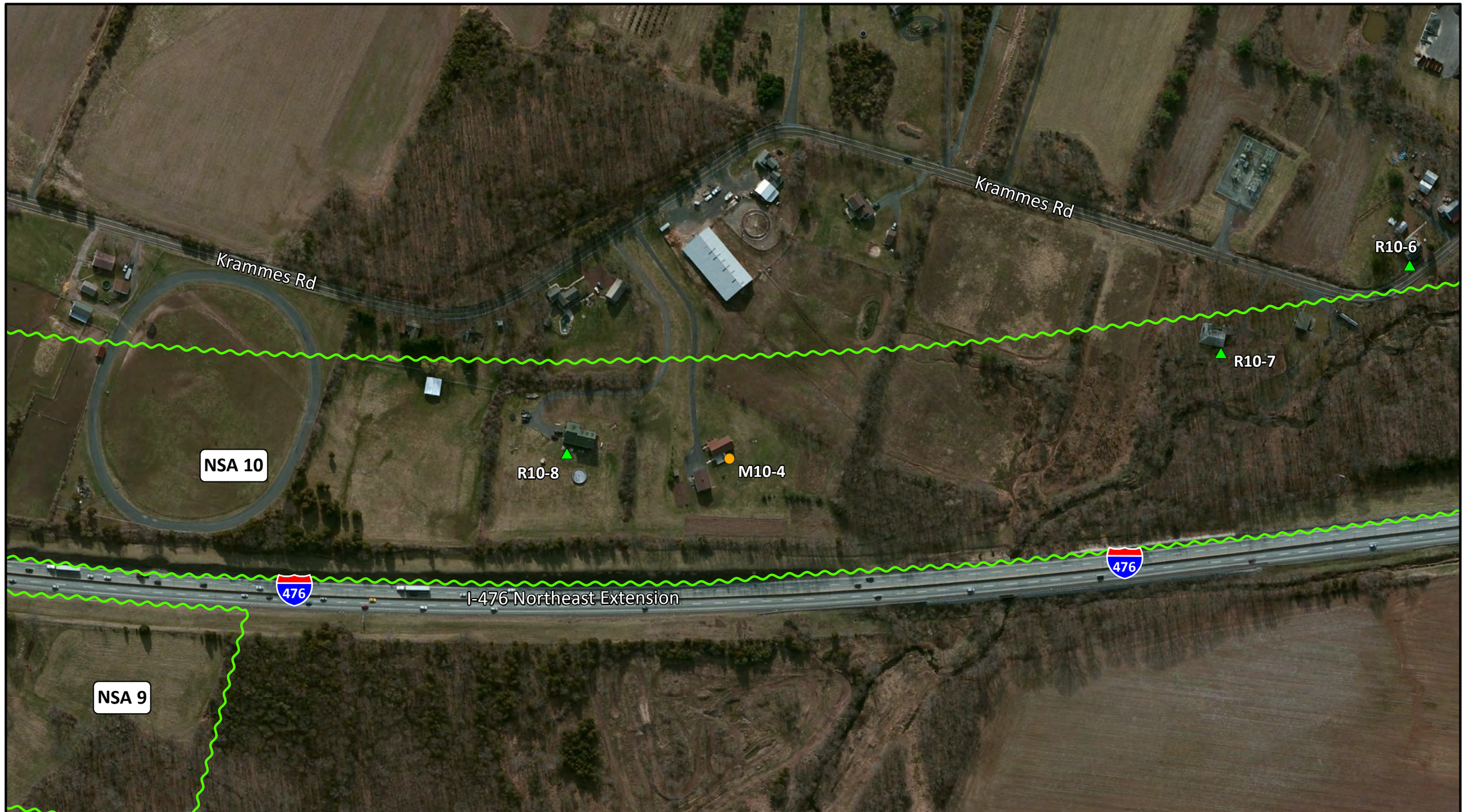
200 100 0 200

Gannett Fleming

Sheet 8 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*



Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

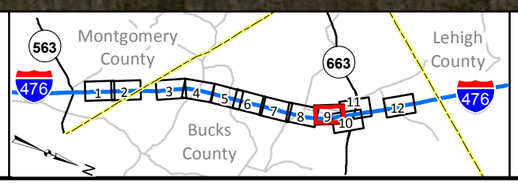


Figure 2I

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 9 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

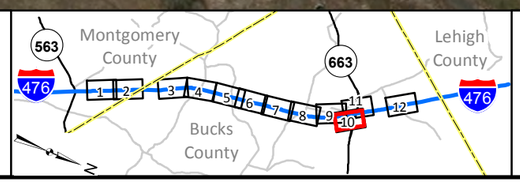


Figure 2J
Noise Study Areas (NSAs) and Noise Receptors
PTC NE Extension MP A-38 to MP A-44
Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Scale (Feet)
200 100 0 200

Gannett Fleming

Sheet 10 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

Modeled Sites (RX-X)

Monitored Sites (MX-X)

24-hour Noise Monitoring Location

Noise Study Areas

Figure 2K

Noise Study Areas (NSAs) and Noise Receptors

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Scale (Feet)

200 100 0 200

Gannett Fleming

Sheet 11 of 12

Map Created On: 11/13/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*

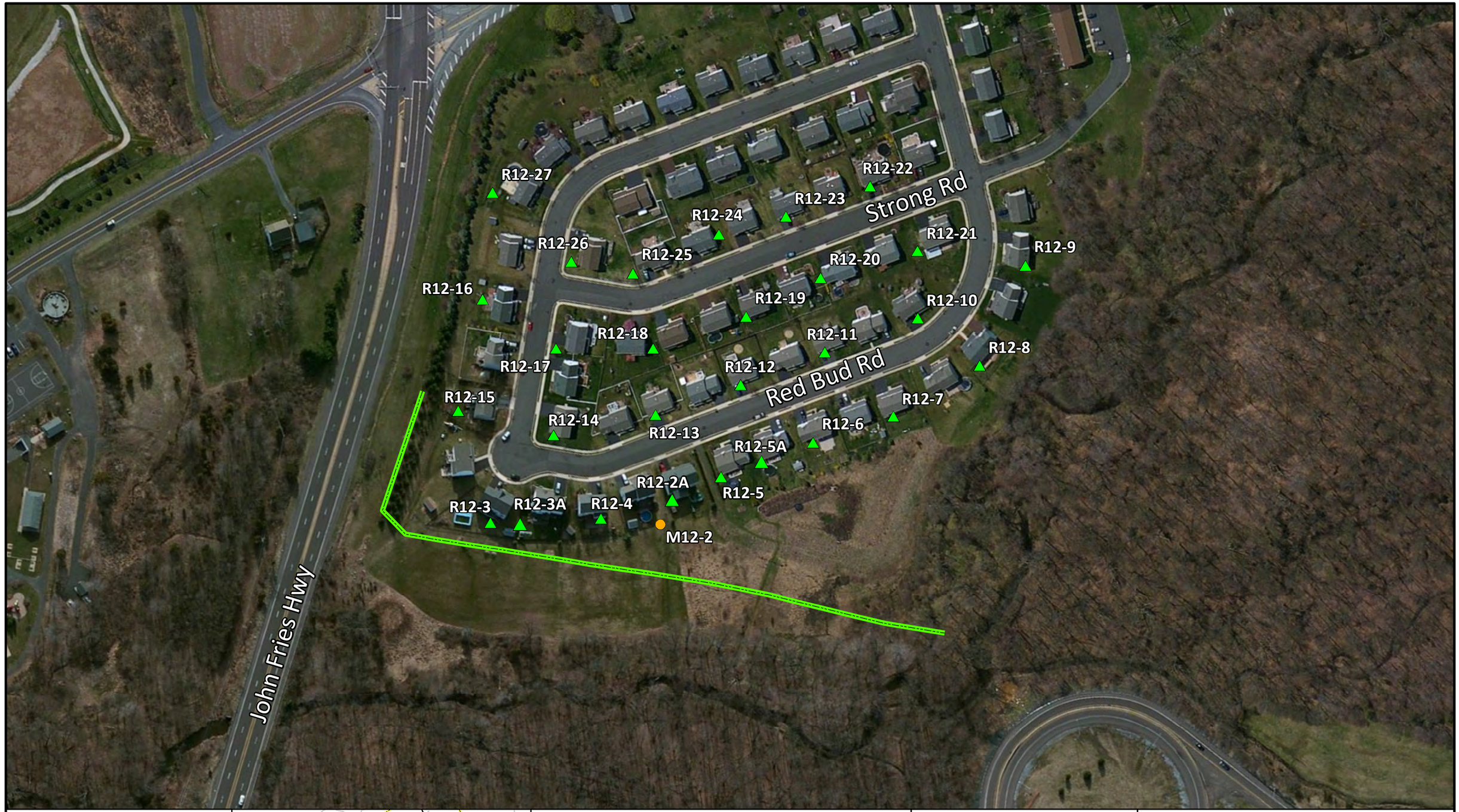
Figure 2L
Noise Study Areas (NSAs) and Noise Receptors
PTC NE Extension MP A-38 to MP A-44
Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Gannett Fleming

Sheet 12 of 12

Map Created On: 9/26/2014

Data Source: *Aerial base map made available from ArcGIS Online web mapping service. Noise monitoring locations collected and mapped by Gannett Fleming.*



Modeled Sites (RX-X)

Monitored Sites (MX-X)

Recommended Noise Barrier

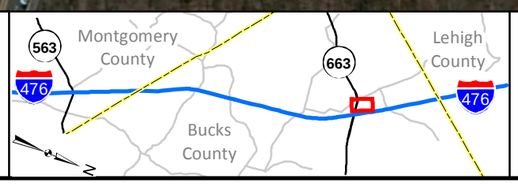


Figure 3

NSA 12 Recommended Noise Barrier

PTC NE Extension MP A-38 to MP A-44

Salford Township, Montgomery County,
West Rockhill & Milford Townships, Bucks County

Scale (Feet)

150 75 0 150

Gannett Fleming

Map Created On: 11/13/2014

Data Source: *2011 aerial base map made available from ArcGIS Online web mapping service. Noise barrier, monitoring and modeling locations modeled and mapped by Gannett Fleming.*

APPENDIX A

Short-term Measurements Field Data Sheets

Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55398-102351

SITE ID MI-1

Gannett Fleming, Inc.

ADDRESS: 17 Wambold

Meter Storage # 37

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 356-365 265-274

GPS PT 860

SLM Calibration before 114 after

Weather: temperature wind speed cloud cover

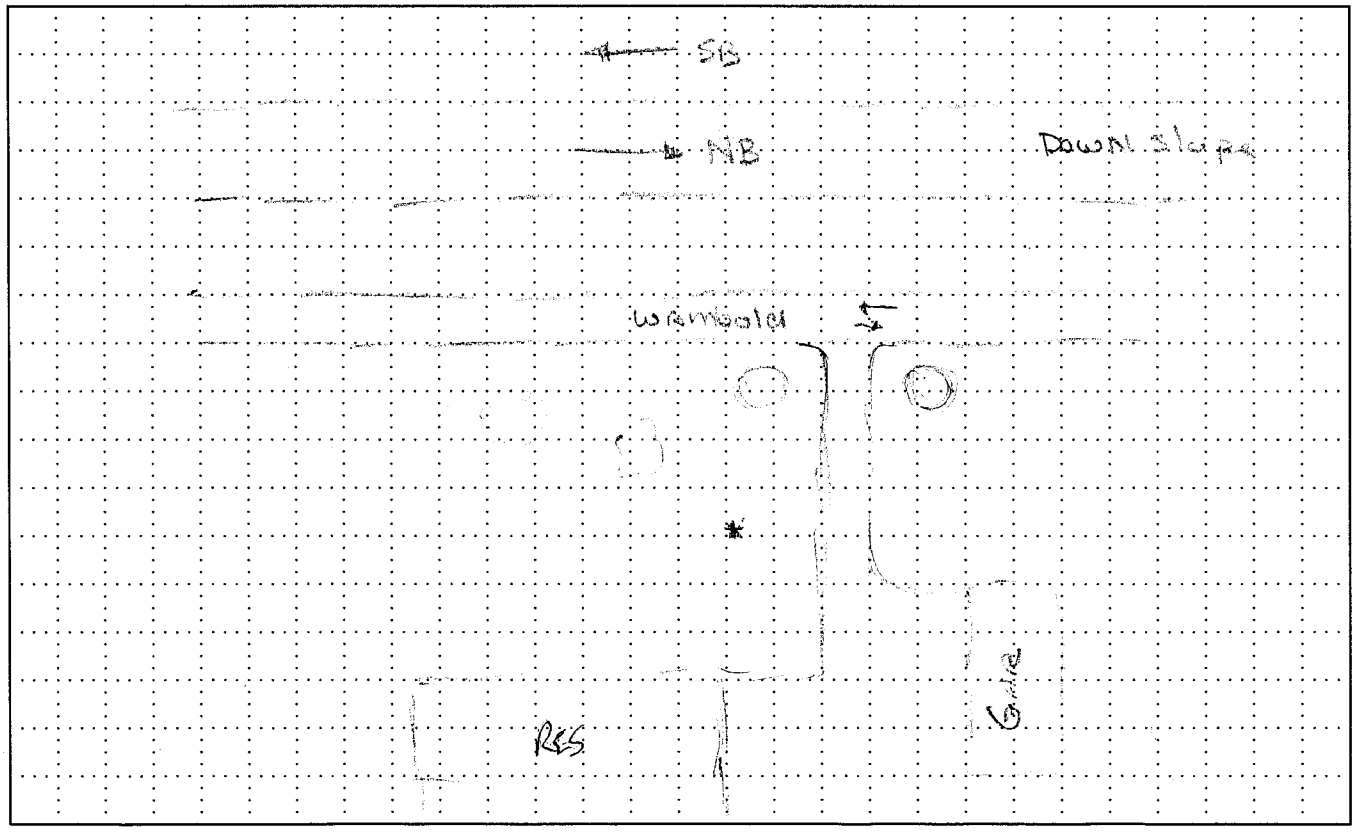
Time:	1st	start	9:15	stop	9:35	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	64.5	Lmax	82.8	Lmin	47.9	SEL	95.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	→		Direction	←		Direction			Direction		
	1st	2nd (new)		1st	2nd		1st	2nd		1st	2nd
auto	337	1011 506	auto	414	1242 -641	auto			auto		
med. trk.	19	57 29	med. trk.	7	21 11	med. trk.			med. trk.		
hvy trk.	84	252 126	hvy trk.	71	213 107	hvy trk.			hvy trk.		
bus	10	30 15	bus	3	9 5	bus			bus		
motorcycle	1	3 3	motorcycle	0	0	motorcycle			motorcycle		

NOTES: EXPANSION JOINT NOISE

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55398-102351

SITE ID MI-2

Gannett Fleming, Inc.

ADDRESS: 67 Wambold

Meter Storage # 36

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

Measurement Data

Photograph #'s 344-355 253-264

GPS PT 859

SLM Calibration before 114 after _____

Weather: temperature _____ wind speed _____ cloud cover _____

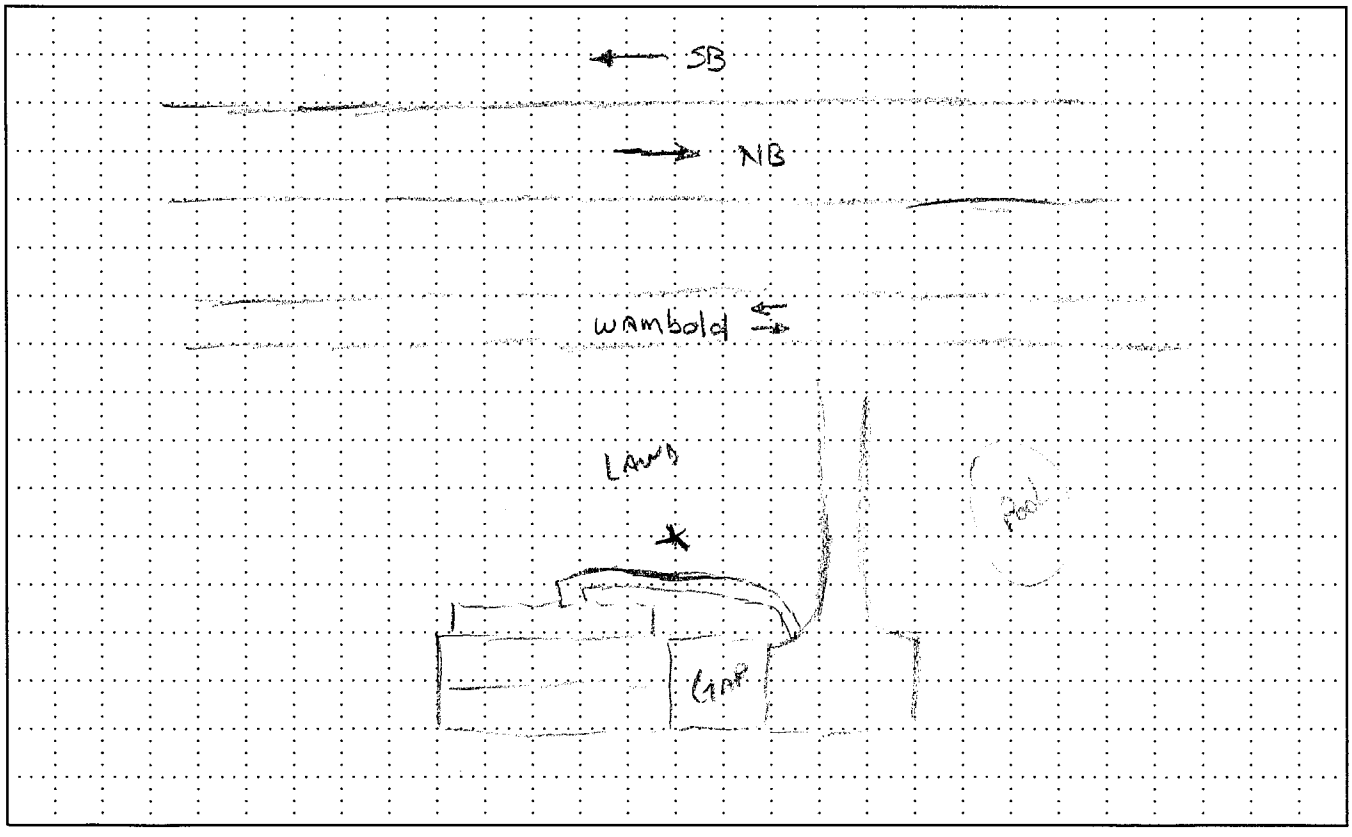
Time:	1st	start 8:47	stop 9:07	total 20					
	2nd	start _____	stop _____	total _____					
Data:	1st	Leq 65.7	Lmax 76.9	Lmin 52.1	SEL 96.5				
	2nd	Leq _____	Lmax _____	Lmin _____	SEL _____				

Traffic Data

Roadway#1 I-476 NB			Roadway#2 I-476 SB			Roadway#3 _____			Roadway#4 _____		
Direction →			Direction ←			Direction			Direction		
	1st	2nd hrly		1st	2nd hrly		1st	2nd		1st	2nd
auto	285	855 428	auto	395	1185 593	auto			auto		
med. trk.	17	51 24	med. trk.	8	24 12	med. trk.			med. trk.		
hvy trk.	63	189 95	hvy trk.	59	177 89	hvy trk.			hvy trk.		
bus	0	0	bus	1	3 2	bus			bus		
motorcycle	1	3 2	motorcycle	0	0	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID M1-3

Gannett Fleming, Inc.

ADDRESS: 1960 WAMBOLD RD

Meter Storage # 32

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

Measurement Data

Photograph #'s _____

GPS PT 855

SLM Calibration before _____ after _____

Weather: temperature _____ wind speed _____ cloud cover _____

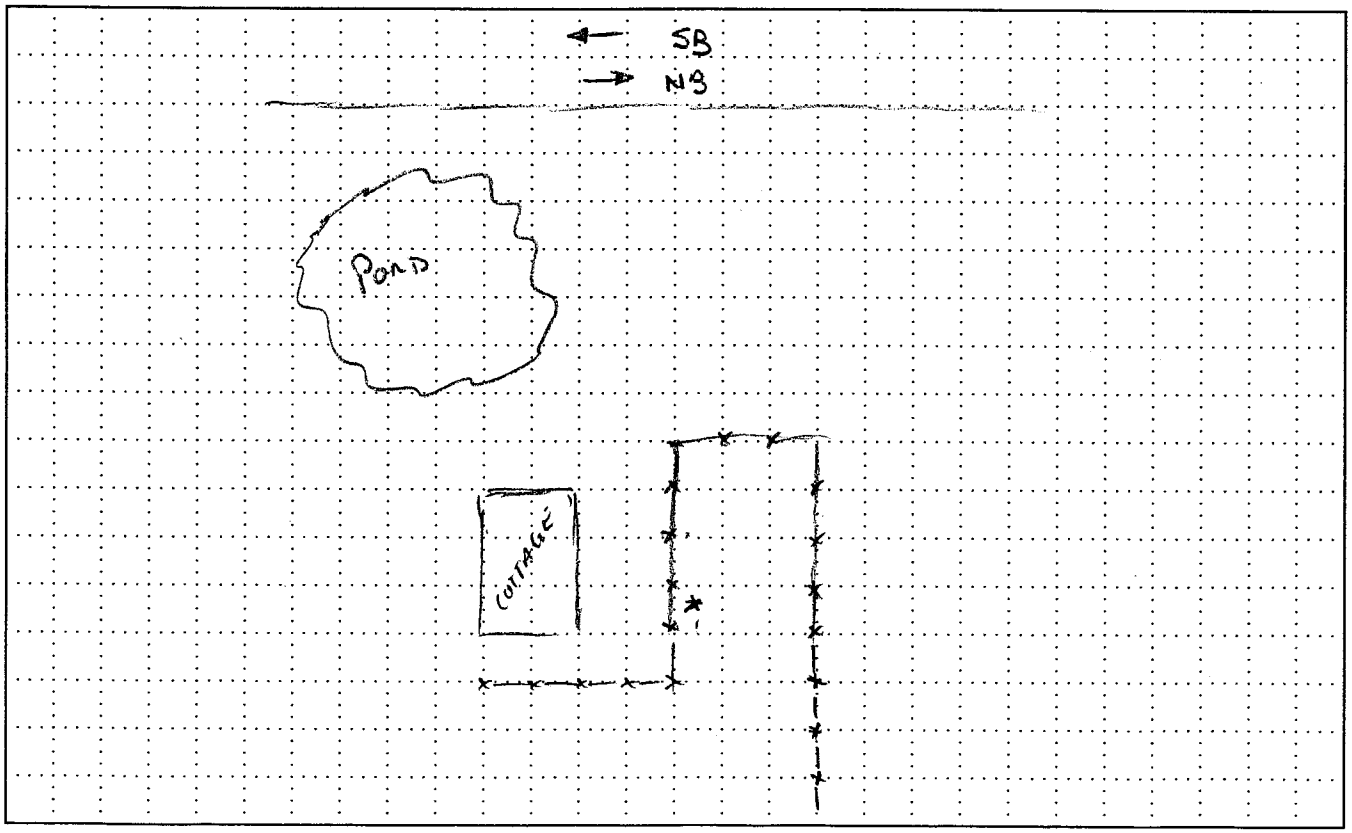
Time:	1st	start	4:54	stop	5:14	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.3	Lmax	82.6	Lmin	51.9	SEL	91.1
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	NB		Direction	SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	757	2271 (new 1136)	auto	437	1311 (656)	auto			auto		
med. trk.	9	27 (14)	med. trk.	9	27 (14)	med. trk.			med. trk.		
hvy trk.	46	138 (69)	hvy trk.	34	102 (51)	hvy trk.			hvy trk.		
bus	0	0 (0)	bus	2	6 (3)	bus			bus		
motorcycle	2	6 (3)	motorcycle	2	6 (3)	motorcycle			motorcycle		

NOTES: Gun club shooting [illegible]

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # SS398-102351

SITE ID M1-4

Gannett Fleming, Inc.

ADDRESS: Wamboldt

Meter Storage # 35

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 335-343 243-252

GPS PT 857

SLM Calibration before 114.0 after 114.0

Weather: temperature 68 wind speed ____ cloud cover ____

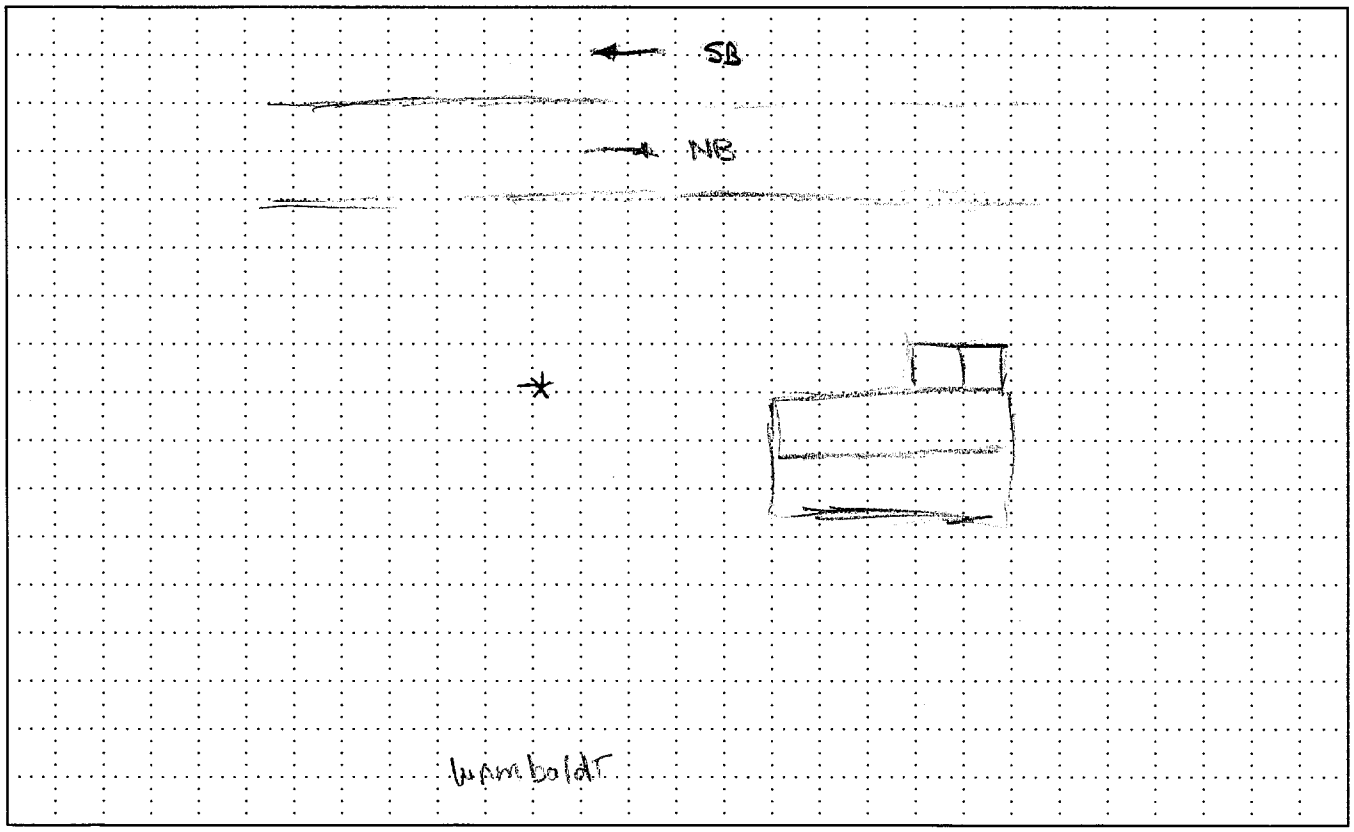
Time:	1st	start	8:15	stop	8:35	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	66.7	Lmax	79.9	Lmin	45.5	SEL	97.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476 NB	1st	2nd		Roadway#2 I-476 SB	1st	2nd		Roadway#3	1st	2nd	Roadway#4	1st	2nd
Direction →				Direction ←				Direction			Direction		
auto	311	933	466	auto	552	1656	828	auto			auto		
med. trk.	21	63	32	med. trk.	6	18	9	med. trk.			med. trk.		
hvy trk.	42	126	63	hvy trk.	62	186	93	hvy trk.			hvy trk.		
bus	0	0	0	bus	1	3	2	bus			bus		
motorcycle	1	3	2	motorcycle	1	3	2	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55398-102351

SITE ID M2-1

Gannett Fleming, Inc.

ADDRESS: 97 BADMAN

HISTORICAL ?

Meter Storage # 38

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 366-371 275-280

SLM Calibration before 114.0 after

GPS PT 861

Weather: temperature 70° wind speed 0-5 cloud cover 40%

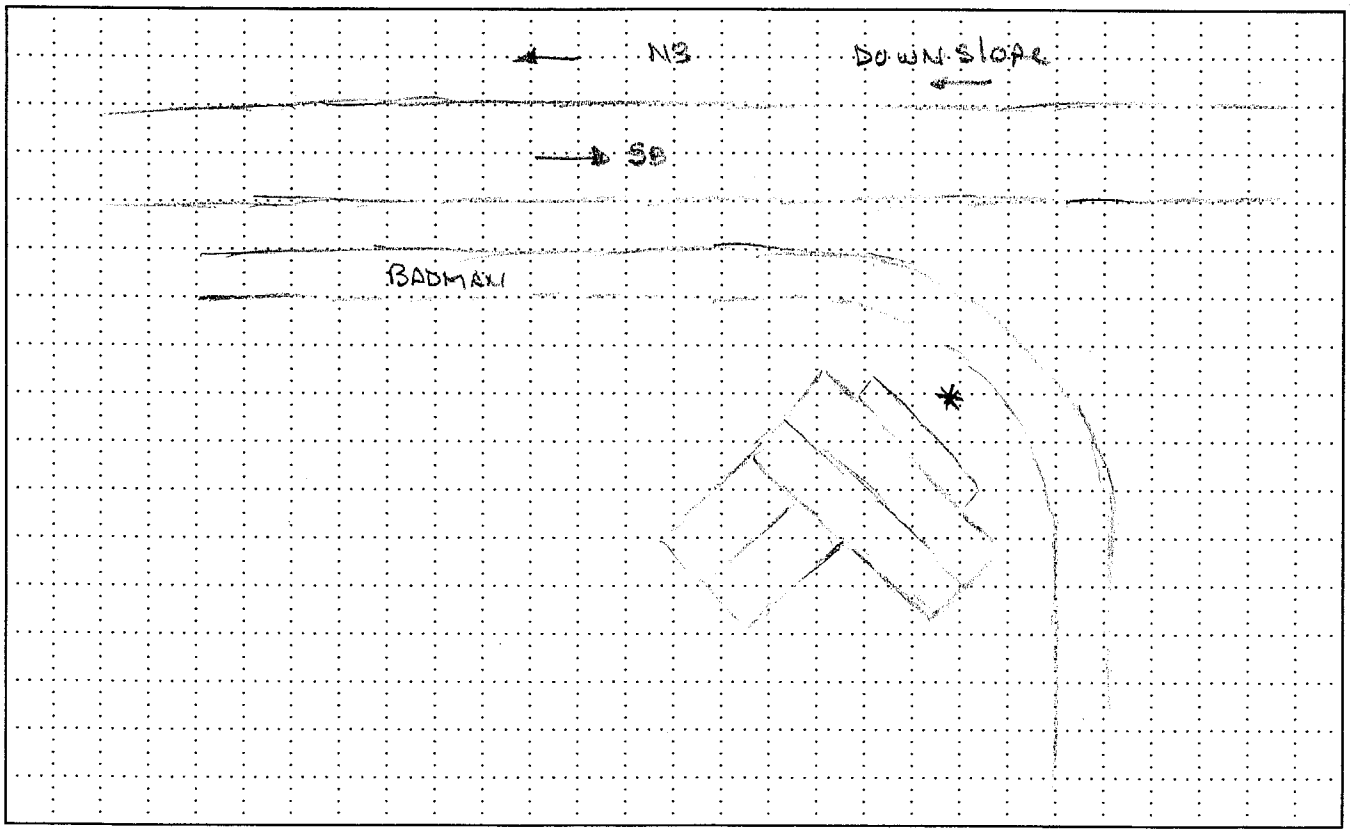
Time:	1st	start	9:52	stop	10:12	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	67.5	Lmax	78.0	Lmin	49.9	SEL	98.3
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB			Roadway#2	I-476 SB			Roadway#3				Roadway#4			
Direction	←			Direction	→			Direction				Direction			
	1st	2nd			1st	2nd			1st	2nd			1st	2nd	
auto	313	939	470	auto	363	1089	545	auto				auto			
med. trk.	20	60	30	med. trk.	13	39	40	med. trk.				med. trk.			
hvy trk.	64	192	96	hvy trk.	78	234	117	hvy trk.				hvy trk.			
bus	21	63	32	bus	0	0	0	bus				bus			
motorcycle	1	3	2	motorcycle	1	3	2	motorcycle				motorcycle			

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55395-102351

SITE ID M2-2

Gannett Fleming, Inc.

ADDRESS: 143 BADMAN RD

Meter Storage # 39

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 372-379 281-288

GPS PT 862

SLM Calibration before 114.0 after

Weather: temperature wind speed cloud cover 0

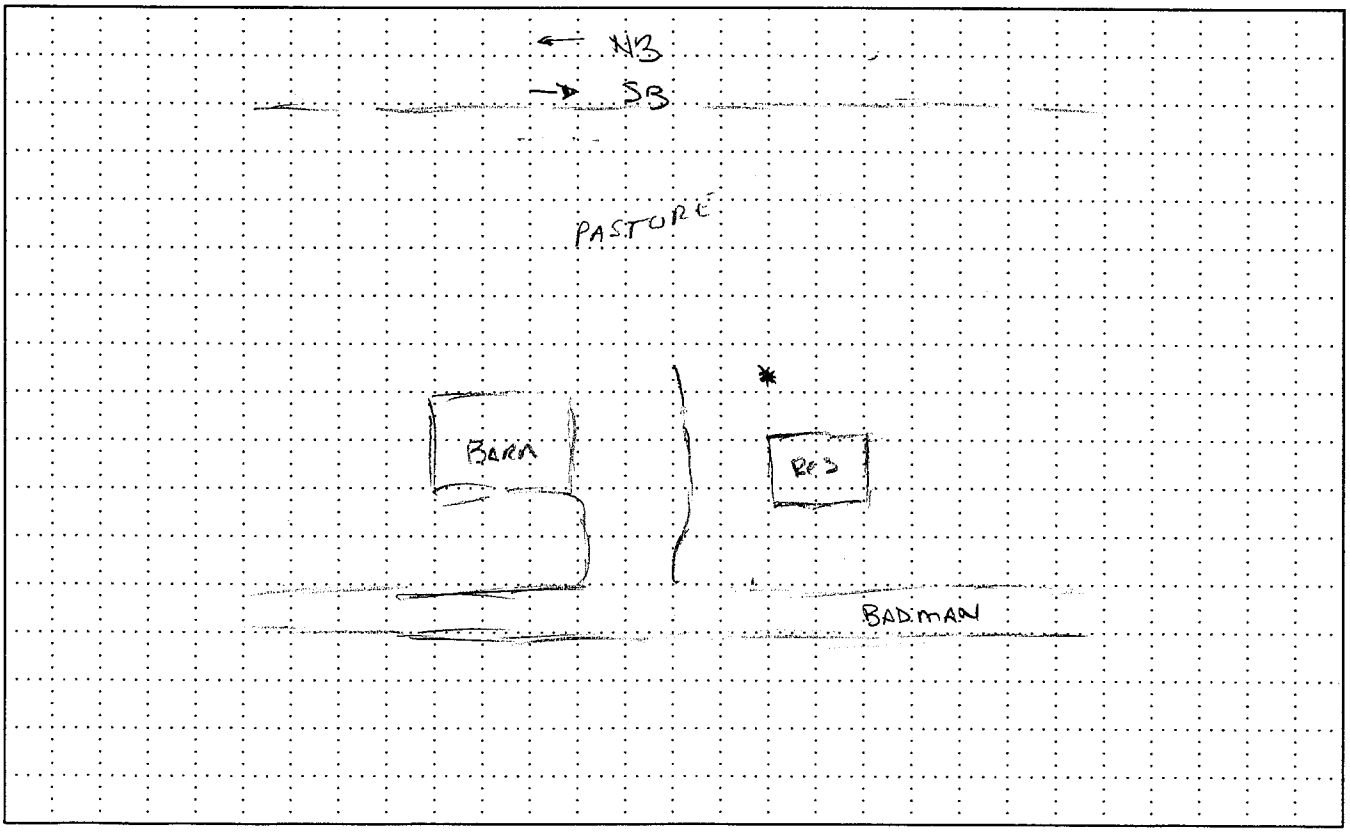
Time:	1st	start	10:34	stop	10:54	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	56.8	Lmax	66.0	Lmin	46.3	SEL	87.6	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I 476 NB		Roadway#2	I 476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	276	828 414	auto	333	999 500	auto			auto		
med. trk.	32	96 48	med. trk.	8	24 12	med. trk.			med. trk.		
hvy trk.	71	213 107	hvy trk.	51	153 77	hvy trk.			hvy trk.		
bus	2	6 3	bus	2	6 3	bus			bus		
motorcycle	7	21 11	motorcycle	0	0 0	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55398-102351

SITE ID M23

Gannett Fleming, Inc.

ADDRESS: 127 BADMAN R

Meter Storage # 40

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 380-385 289-294

GPS PT 864

SLM Calibration before 114.0 after

Weather: temperature 75. wind speed 0 cloud cover 25%

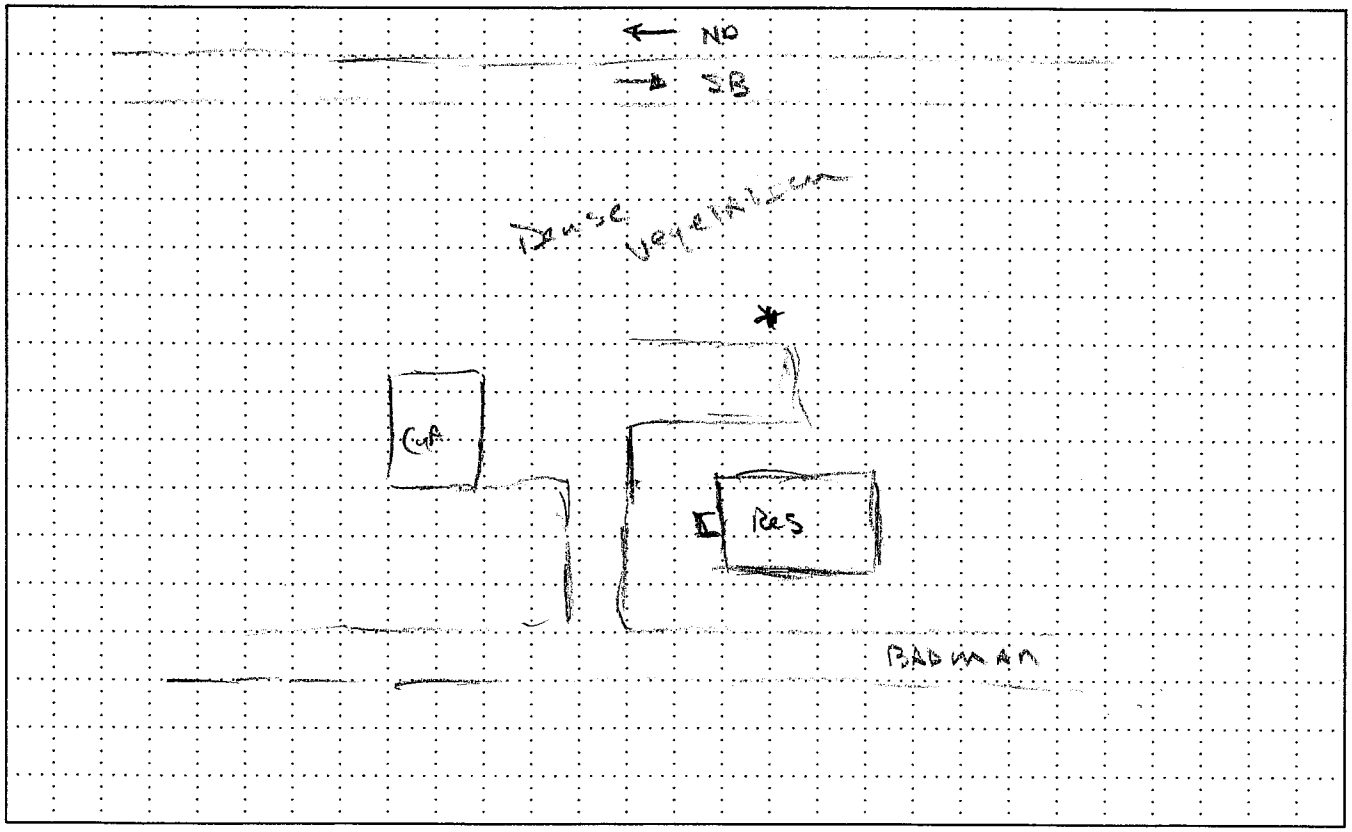
Time:	1st	start	11:01	stop	11:21	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	57.3	Lmax	71.0	Lmin	47.0	SEL	88.0	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476 NB			Roadway#2	I-476 SB			Roadway#3				Roadway#4			
Direction	←			Direction	→			Direction				Direction			
	1st	2nd			1st	2nd			1st	2nd			1st	2nd	
auto	298	894	447	auto	360	1080	540	auto				auto			
med. trk.	16	48	24	med. trk.	5	15	8	med. trk.				med. trk.			
hvy trk.	82	246	123	hvy trk.	62	186	93	hvy trk.				hvy trk.			
bus	0	0		bus	0	0	0	bus				bus			
motorcycle	0	0		motorcycle	0	0	0	motorcycle				motorcycle			

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-13

PROJECT: I-476

JOB # 55398-102351

SITE ID M3-1

Gannett Fleming, Inc.

ADDRESS: 1905 Upper Ridge Rd

Meter Storage # _____

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

Measurement Data

Photograph #'s 33-38

GPS PT _____

SLM Calibration before 94.0 after _____

Weather: temperature _____ wind speed _____ cloud cover _____

Time:	1st	start 3:02	stop 3:08	total 6 min					
	2nd	start _____	stop _____	total _____					
Data:	1st	Leq 61.8	Lmax 70.0	Lmin 55.7	SEL 87.8				
	2nd	Leq _____	Lmax _____	Lmin _____	SEL _____				

Traffic Data

6 min

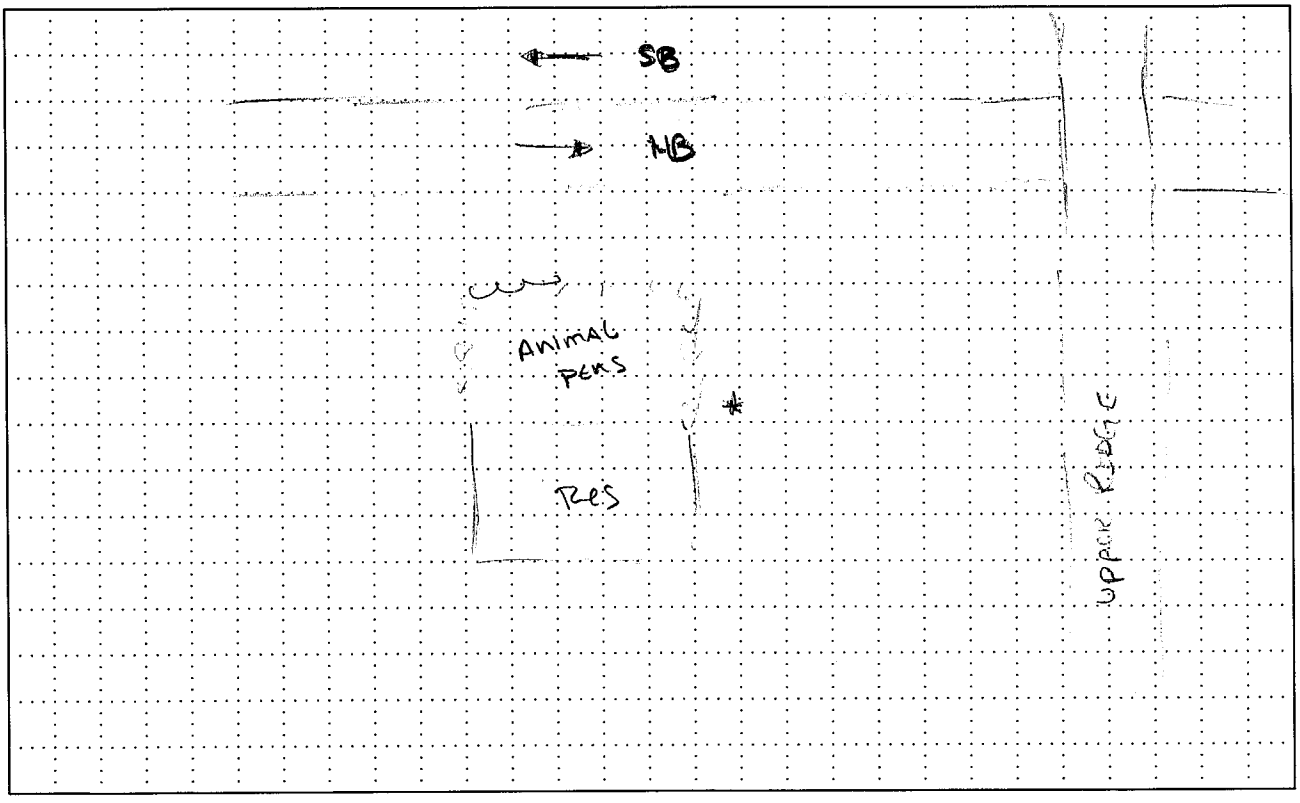
Roadway#1	I-476 NB	Roadway#2	I-476 SB	Roadway#3		Roadway#4	
Direction	→	Direction	←	Direction		Direction	

	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	170	1700 850	auto	104	1040 520	auto			auto		
med. trk.	12	120 60	med. trk.	3	30 15	med. trk.			med. trk.		
hvy trk.	19	190 95	hvy trk.	13	130 65	hvy trk.			hvy trk.		
bus	0	0 0	bus	2	20 10	bus			bus		
motorcycle	1	10 5	motorcycle	0	0 0	motorcycle			motorcycle		

NOTES: Guinea Hens clucking by meter - occassion Dog barking

Stopped Due to Rain

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-13

PROJECT: I-476

JOB # 55398-102351

SITE ID MM-1

Gannett Fleming, Inc.

ADDRESS: Boulder Woods Campground (Pond)

Meter Storage # 0024

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

Measurement Data

Photograph #'s 1-11

GPS PT 1

SLM Calibration before 94.0 after

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

Time:	1st	start	10:15	stop	10:25	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	61.7	Lmax	68.6	Lmin	53.2	SEL	92.5
	2nd	Leq		Lmax		Lmin		SEL	

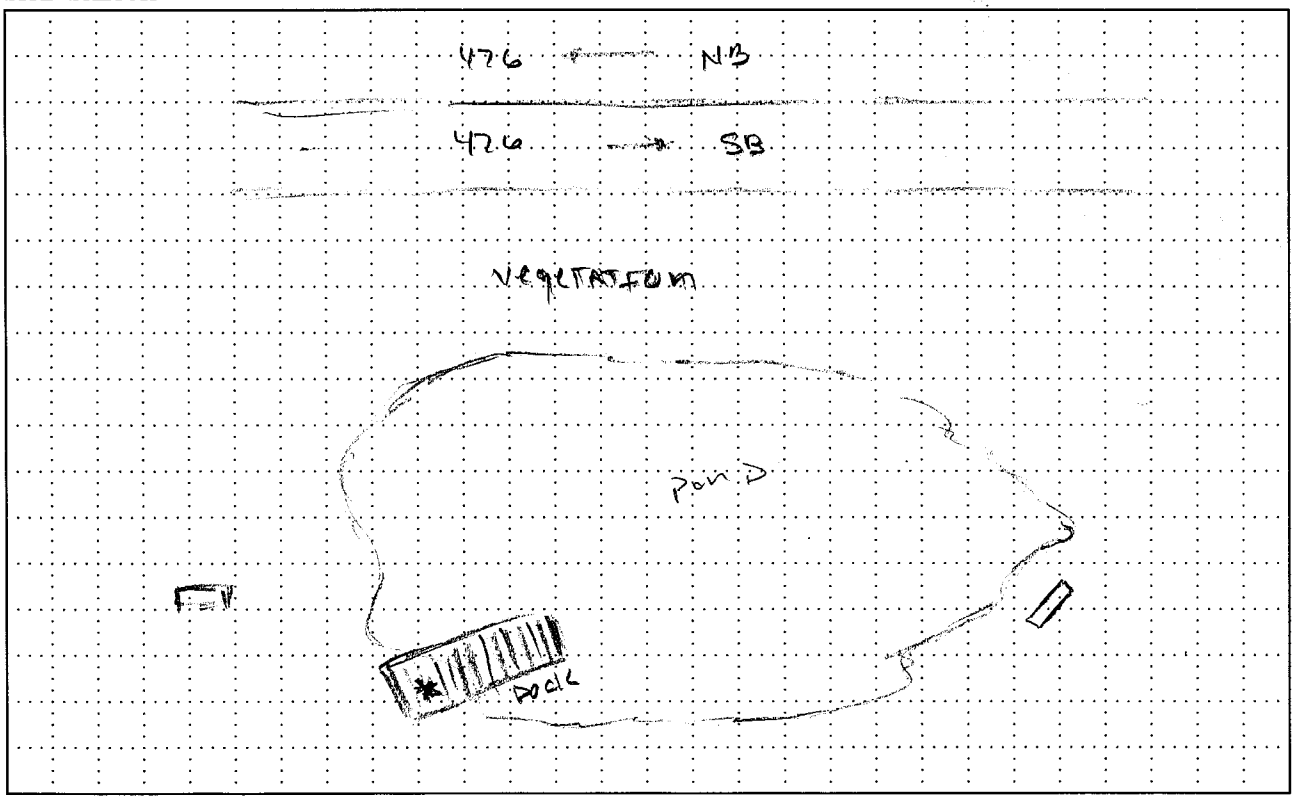
Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	411	1323 662	auto	430	1290 645	auto			auto		
med. trk.	22	66 33	med. trk.	22	66 33	med. trk.			med. trk.		
hvy trk.	67	201 101	hvy trk.	74	222 111	hvy trk.			hvy trk.		
bus	5	15 8	bus	1	3 2	bus			bus		
motorcycle	0	0	motorcycle	0	0	motorcycle			motorcycle		

NOTES: Ref - hear highway - Esp. Jake brakes

Fishing Events, Hay rides etc around pond area, Benches around pond

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-2013

PROJECT: I-476

JOB # 55398-102351

SITE ID M4-2

Gannett Fleming, Inc.

ADDRESS: CAMP SKYMOUNT RD

Meter Storage # 0026

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

Measurement Data

Photograph #'s 13-18

GPS PT 936

SLM Calibration before _____ after _____

Weather: temperature _____ wind speed _____ cloud cover _____

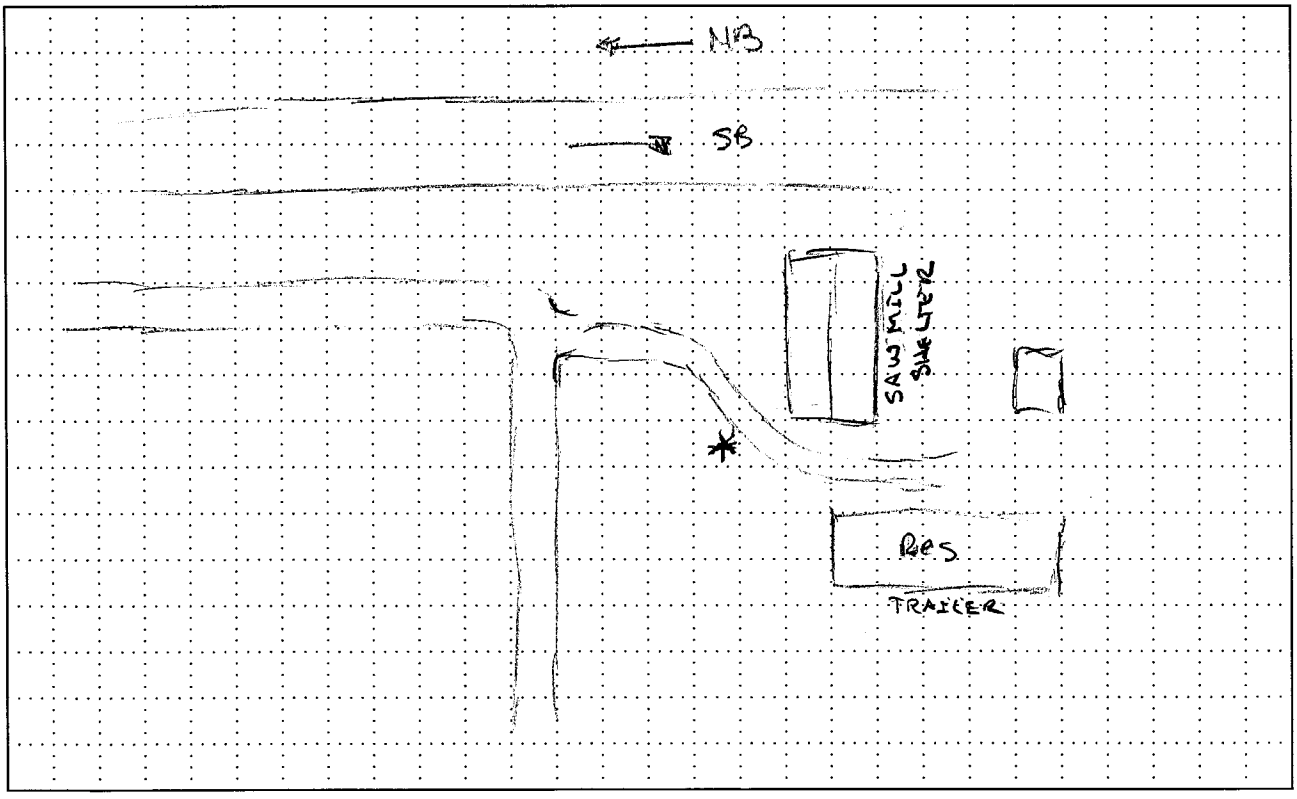
Time:	1st	start	11:34	stop	11:54	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	61.8	Lmax	65.3	Lmin	54.8	SEL	92.6
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	360	1080-540	auto	355	1065-533	auto			auto		
med. trk.	17	51 26	med. trk.	20	60 30	med. trk.			med. trk.		
hvy trk.	80	240 120	hvy trk.	85	255 128	hvy trk.			hvy trk.		
bus	7	21 11	bus	1	3 2	bus			bus		
motorcycle	0	0	motorcycle	0	0	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-13

PROJECT: I-476

JOB # 55398-102351

SITE ID M4-3

Gannett Fleming, Inc.

ADDRESS: 1100 Camp Skymount Rd

Meter Storage # 0025

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

Measurement Data

Photograph #'s 8-12

GPS PT 935

SLM Calibration before 94 after _____

Weather: temperature _____ wind speed _____ cloud cover _____

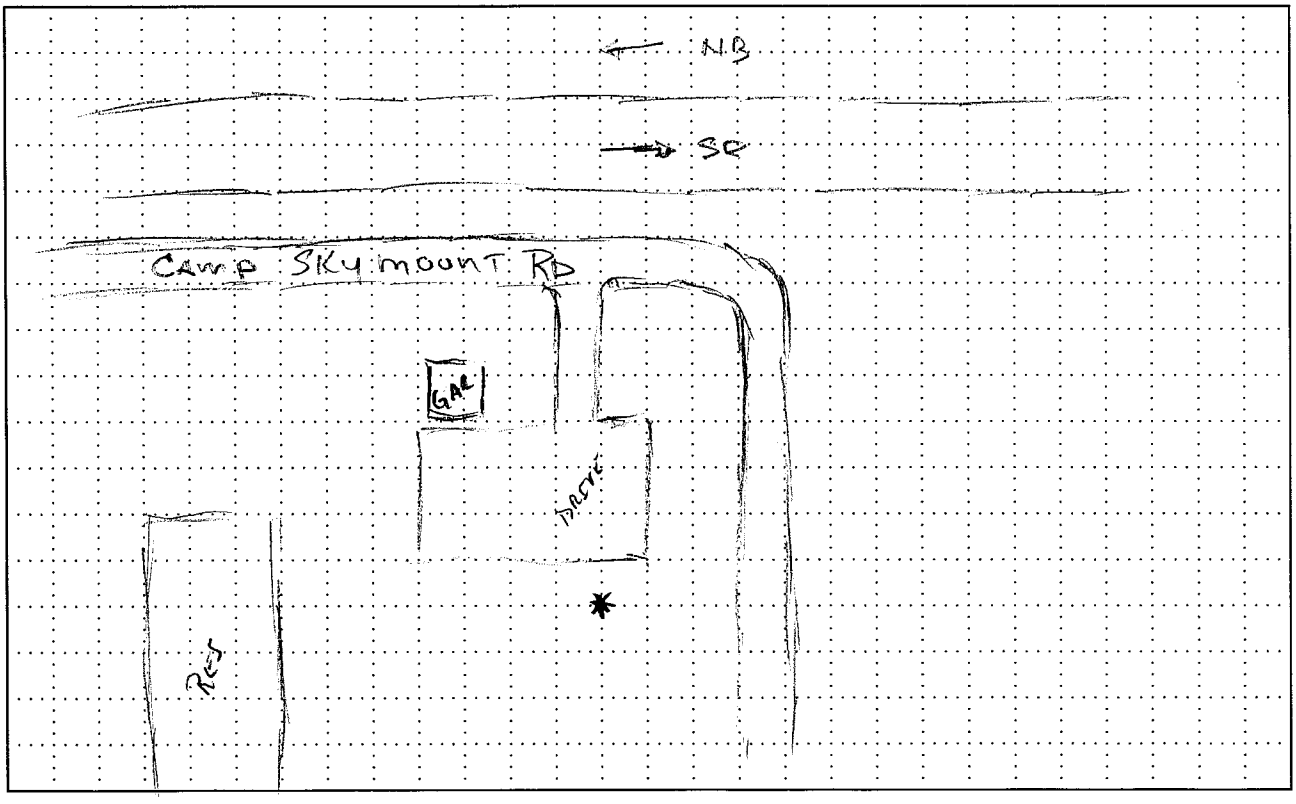
Time:	1st	start	11:00	stop	11:20	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.3	Lmax	65.9	Lmin	52.5	SEL	91.1
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	409	1227 614	auto	409	1227 614	auto			auto		
med. trk.	18	54 27	med. trk.	16	48 24	med. trk.			med. trk.		
hvy trk.	106	318 159	hvy trk.	68	204 102	hvy trk.			hvy trk.		
bus	7	21 11	bus	6	18 9	bus			bus		
motorcycle	0	0	motorcycle	1	3 2	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-6-13

PROJECT: I-476

JOB # 55398-102351

SITE ID - M4-4

Gannett Fleming, Inc.

ADDRESS: 1190 Skymount Rd

Meter Storage # 49

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

Measurement Data

Photograph #'s 443- 352-

GPS PT 875

SLM Calibration before 114.0 after _____

Weather: temperature _____ wind speed 0-5 cloud cover 100%

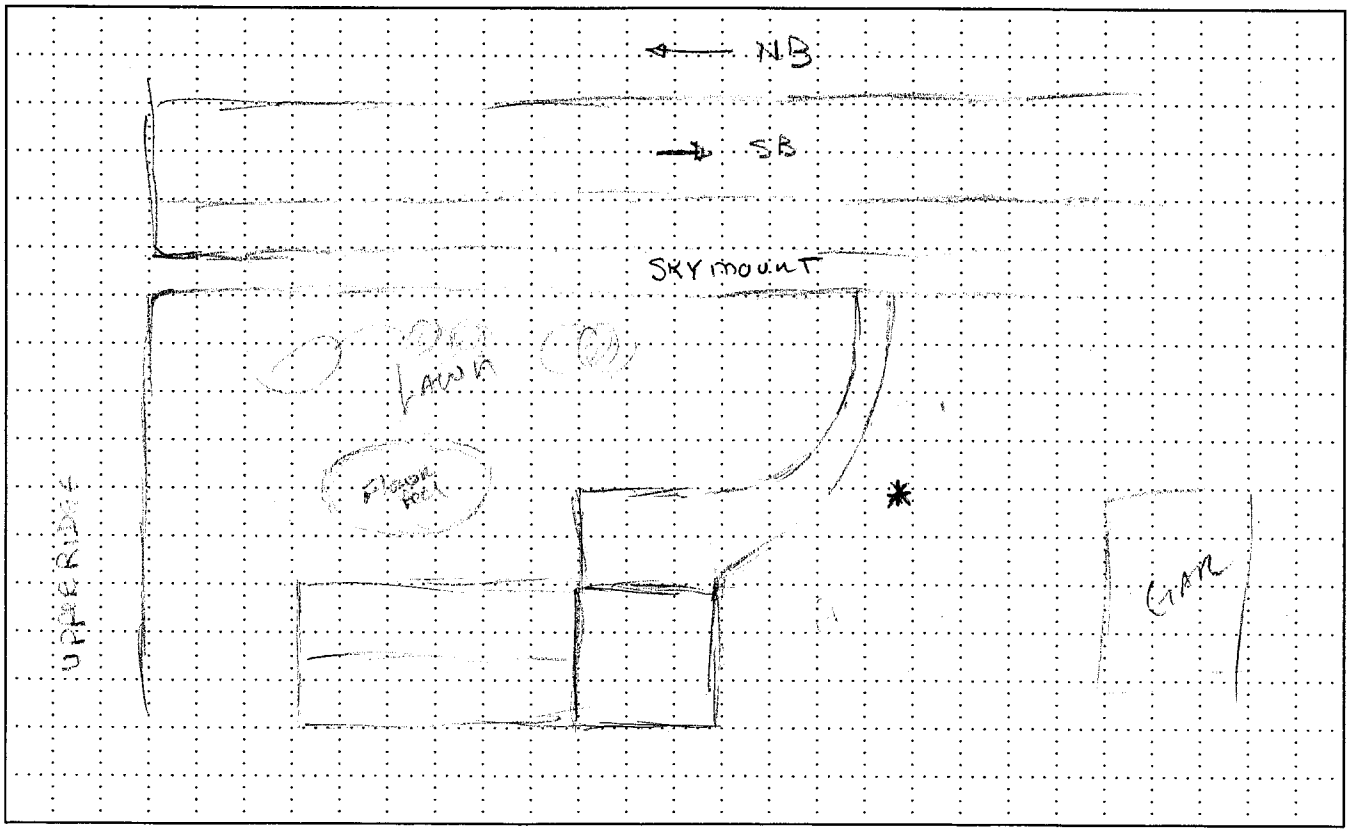
Time:	1st	start	10:16	stop	10:36	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	62.3	Lmax	75.6	Lmin	53.6	SEL	93.1
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	332	996 498	auto	367	1101 551	auto			auto		
med. trk.	16	48 24	med. trk.	13	39 20	med. trk.			med. trk.		
hvy trk.	71	213 107	hvy trk.	67	201 101	hvy trk.			hvy trk.		
bus	7	21 11	bus	0	0	bus			bus		
motorcycle	3	9 5	motorcycle	0	0	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-13

PROJECT: I-476

JOB # 55398-102351

SITE ID MS-1

Gannett Fleming, Inc.

ADDRESS: Old Woods Rd

Meter Storage # _____

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

Measurement Data

Photograph #'s 19-23

SLM Calibration before 94.0 after 94.0 GPS PT 937

Weather: temperature 87° wind speed 0-5 cloud cover 0

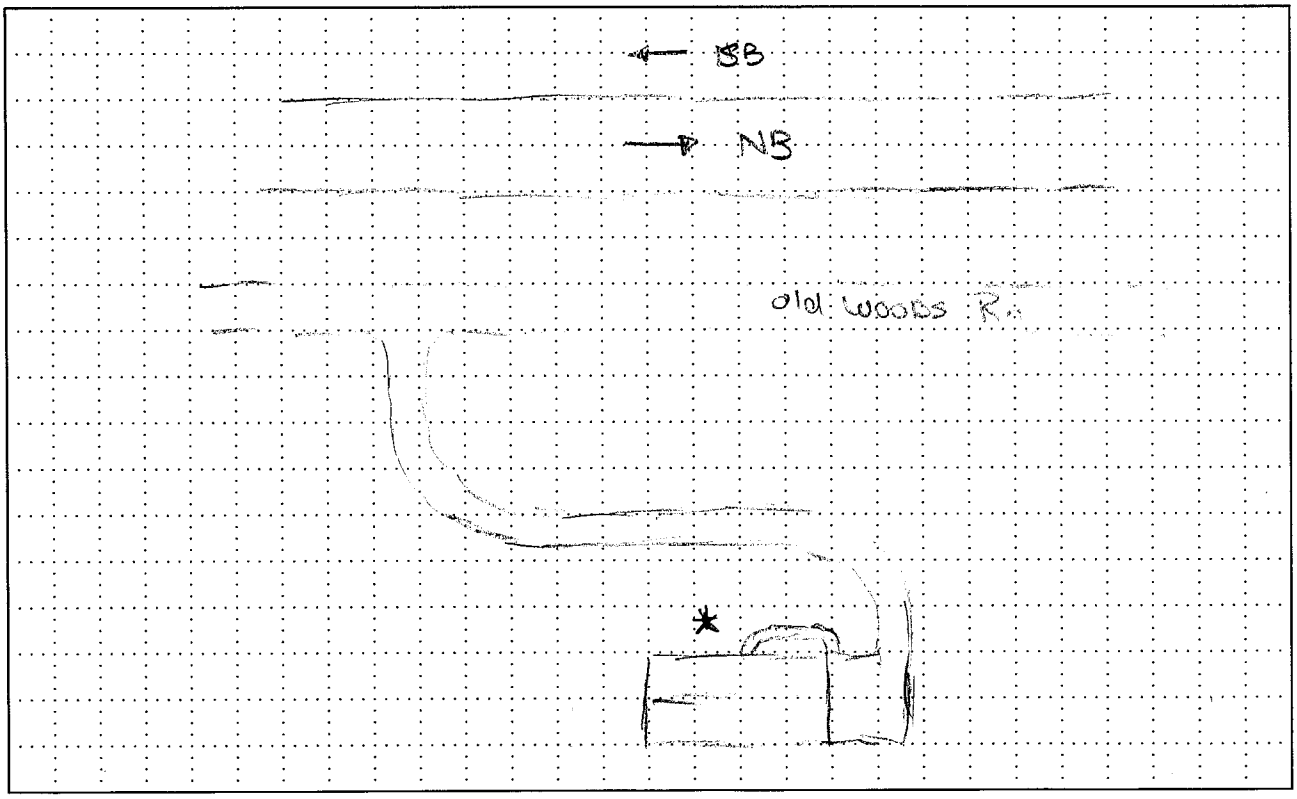
Time:	1st	start	12:16	stop	12:36	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	62.6	Lmax	68.2	Lmin	52.9	SEL	93.4
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

	Roadway#1 I-476 NB			Roadway#2 I-476			Roadway#3 upper RIDGE RD 10m			Roadway#4 old woods 20m		
	Direction →			Direction SB ←			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd	
auto	356	1068	534	354	1062	531	10	120	60	4	3	
med. trk.	19	57	29	13	39	20						
hvy trk.	89	267	134	72	216	108						
bus	0	0	0	1	3	2						
motorcycle	1	3	2	0	0							

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID MS-2

Gannett Fleming, Inc.

ADDRESS: 1960 OLD WOOD RD

Meter Storage # 31

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 853

SLM Calibration before ____ after ____

Weather: temperature ____ wind speed 0-8 cloud cover 100%

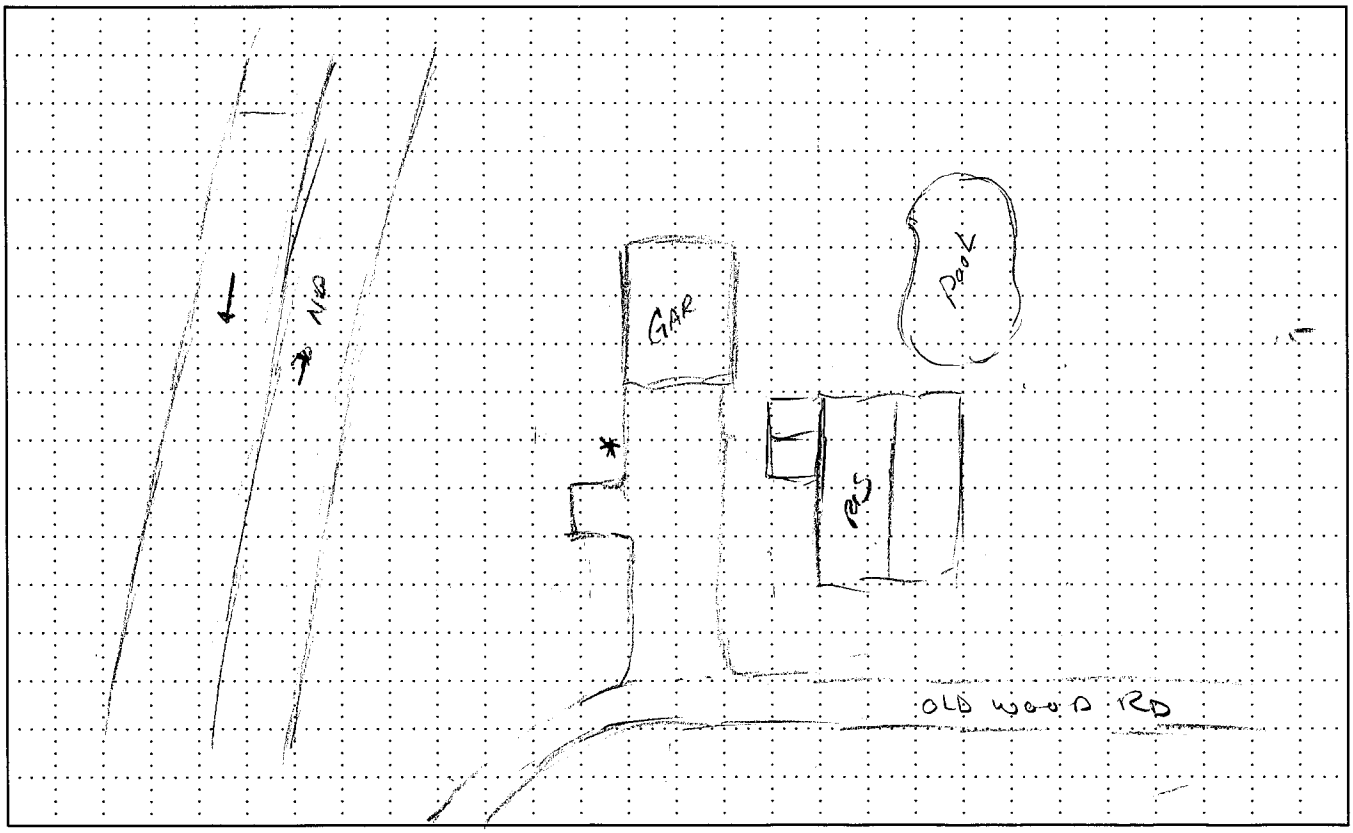
Time:	1st	start	3:46	stop	4:06	total	20			
	2nd	start	65.4	stop	78.2	total	51.4			
Data:	1st	Leq	____	Lmax	____	Lmin	____	SEL	96.2	
	2nd	Leq	____	Lmax	____	Lmin	____	SEL	____	

Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	NB →		Direction	SB ←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	597	1791 (896)	auto	390	1170 (585)	auto			auto		
med. trk.	9	27 (14)	med. trk.	10	30 (15)	med. trk.			med. trk.		
hvy trk.	60	180 (90)	hvy trk.	51	153 (77)	hvy trk.			hvy trk.		
bus	1	3 (2)	bus	1	3 (2)	bus			bus		
motorcycle	1	3 (2)	motorcycle	1	3 (2)	motorcycle			motorcycle		

NOTES: Loud rumble of expansion joints

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-26-13

PROJECT: I-476

JOB # 55398-102351

SITE ID MS-3

Gannett Fleming, Inc.

ADDRESS: CABINS

Trombauersville Rd

Meter Storage # 0032

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

Measurement Data

Photograph #'s 69-

GPS PT 948

SLM Calibration before 94.0 after

Weather: temperature 80 wind speed cloud cover

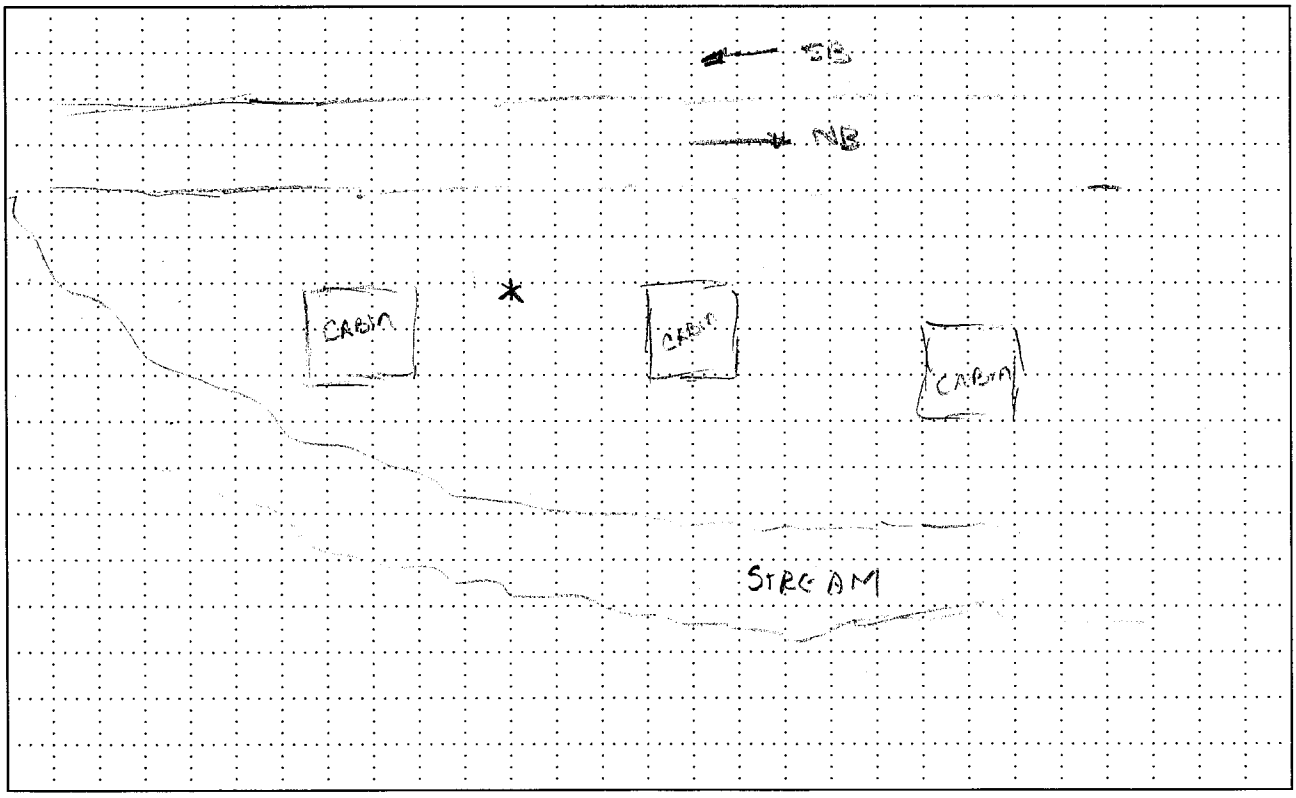
Time:	1st	start 9:14	stop 9:34	total 20					
	2nd	start	stop	total					
Data:	1st	Leq 68.4	Lmax 76.3	Lmin 54.5	SEL 99.2				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

Roadway#1 I-476 NB	1st	2nd		Roadway#2 I-476 SB	1st	2nd		Roadway#3	1st	2nd	Roadway#4	1st	2nd
Direction →				Direction ←				Direction			Direction		
auto	418	1254	627	auto	448	1344	672	auto			auto		
med. trk.	19	57	29	med. trk.	18	54	27	med. trk.			med. trk.		
hvy trk.	81	243	122	hvy trk.	66	198	99	hvy trk.			hvy trk.		
bus	2	6	3	bus	4	12	6	bus			bus		
motorcycle	0	0		motorcycle	1	3	2	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-25-13

PROJECT: I-476

JOB # 55398-102351

SITE ID TM6-1

Gannett Fleming, Inc.

ADDRESS: Upper Ridge Rd

Meter Storage # 0028

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

Measurement Data

Photograph #'s _____

GPS PT 939

SLM Calibration before 90 after _____

Weather: temperature _____ wind speed _____ cloud cover _____

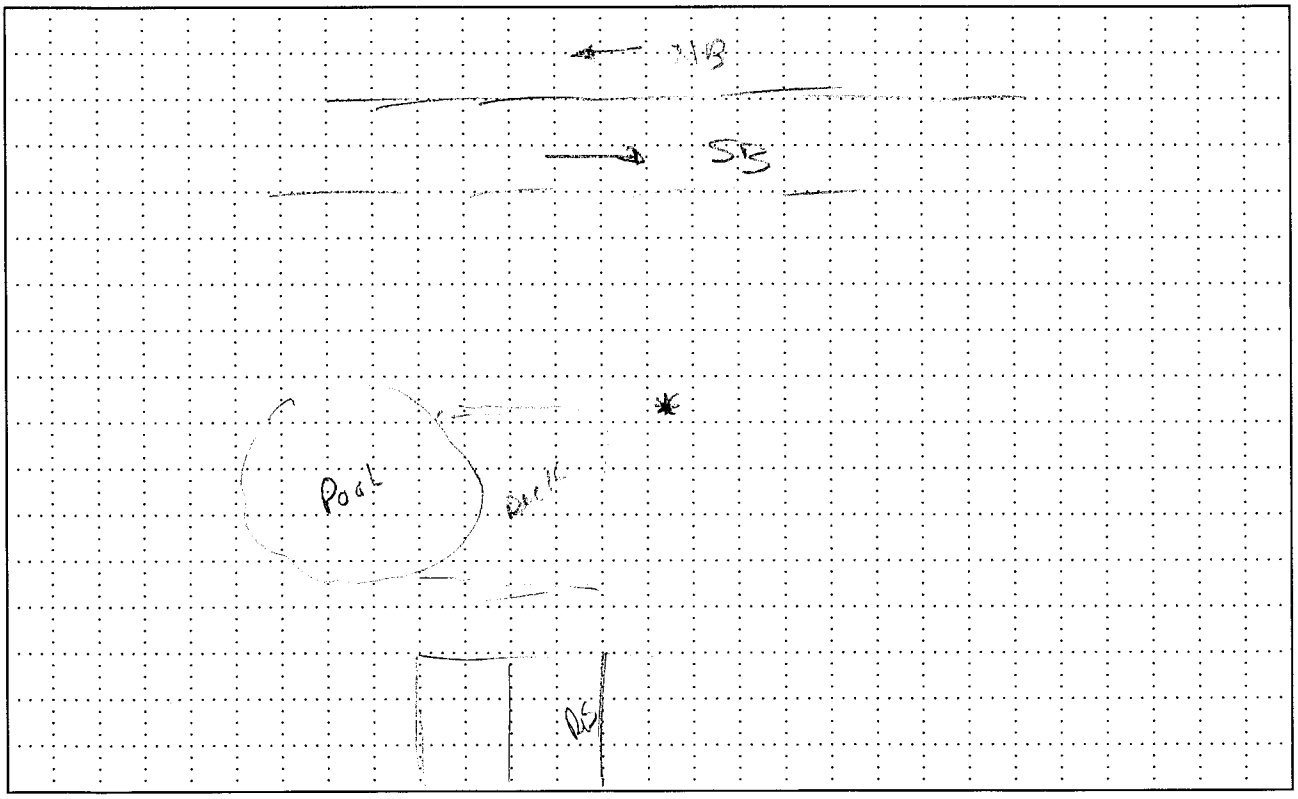
Time:	1st	start	2:25	stop	2:45	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	64.6	Lmax	72.9	Lmin	57.3	SEL	95.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	473	1419 710	auto	395	1185 593	auto			auto		
med. trk.	32	96 48	med. trk.	27	81 41	med. trk.			med. trk.		
hvy trk.	82	246 123	hvy trk.	61	183 92	hvy trk.			hvy trk.		
bus	0	0 0	bus	3	9 5	bus			bus		
motorcycle	1	3 2	motorcycle	0	6 3	motorcycle			motorcycle		

NOTES: Near Seaman Road

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-26-13

PROJECT: I-476

JOB # 55398-10235.1

SITE ID MG-2

Gannett Fleming, Inc.

ADDRESS: - CABINS -

Meter Storage # 0031

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

Measurement Data

Photograph #'s 58-68

GPS PT 947

SLM Calibration before 94.0 after

Weather: temperature 80 wind speed 0 cloud cover 75%

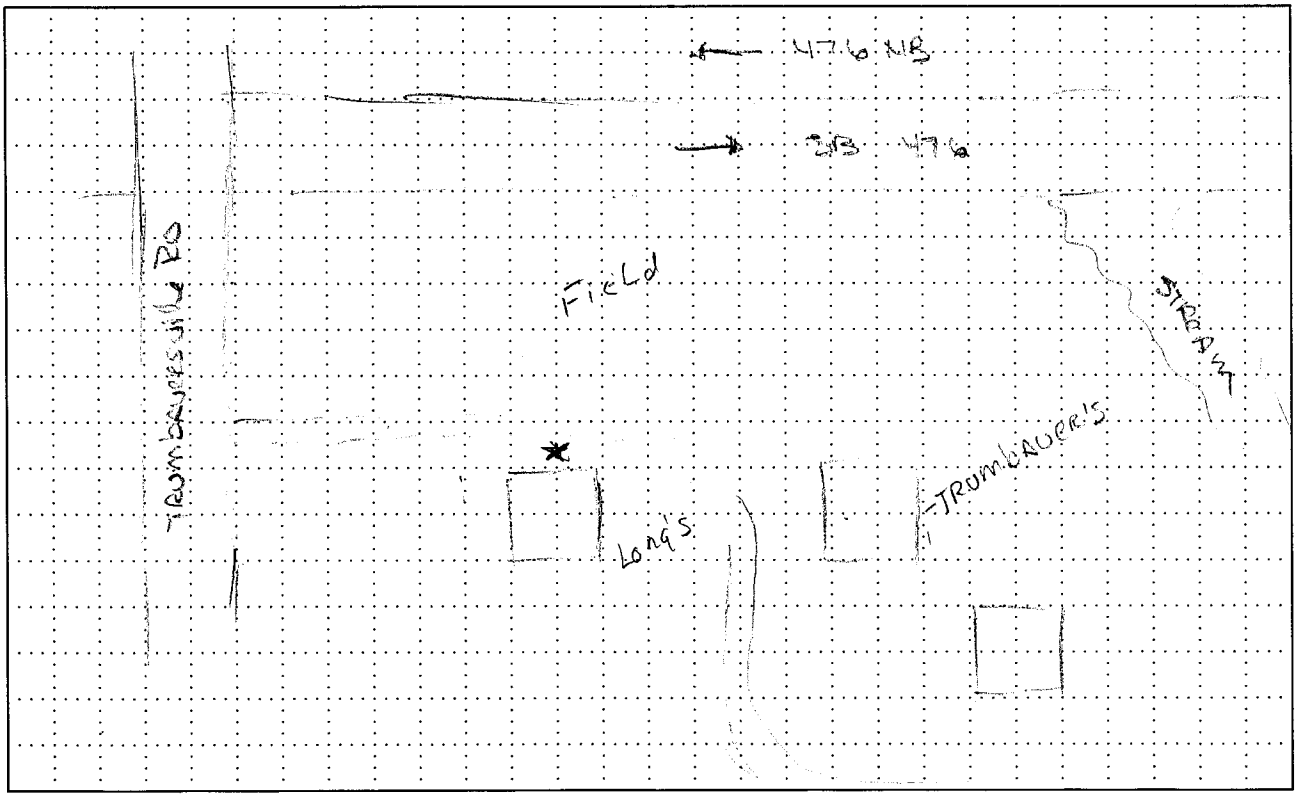
Time:	1st	start	8:45	stop	9:05	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	67.8	Lmax	75.7	Lmin	54.9	SEL	98.6
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	336	1008	auto	502	1506	auto			auto		
med. trk.	23	69	med. trk.	12	36	med. trk.			med. trk.		
hvy trk.	53	159	hvy trk.	85	255	hvy trk.			hvy trk.		
bus	0	0	bus	3	9	bus			bus		
motorcycle	0	0	motorcycle	2	6	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-6-13

PROJECT: I-476

JOB # 55398-102351

SITE ID M71-M7-2

Gannett Fleming, Inc.

ADDRESS: Fox Hollow Golf Club
2020 Rombauerville Rd
Quakertown

Meter Storage # #145-4

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☑ Other Golf course

Measurement Data

Photograph #'s 431-442 340-351

GPS PT 873-874

SLM Calibration before 114.0 after

Weather: temperature wind speed 0-5 cloud cover 100%

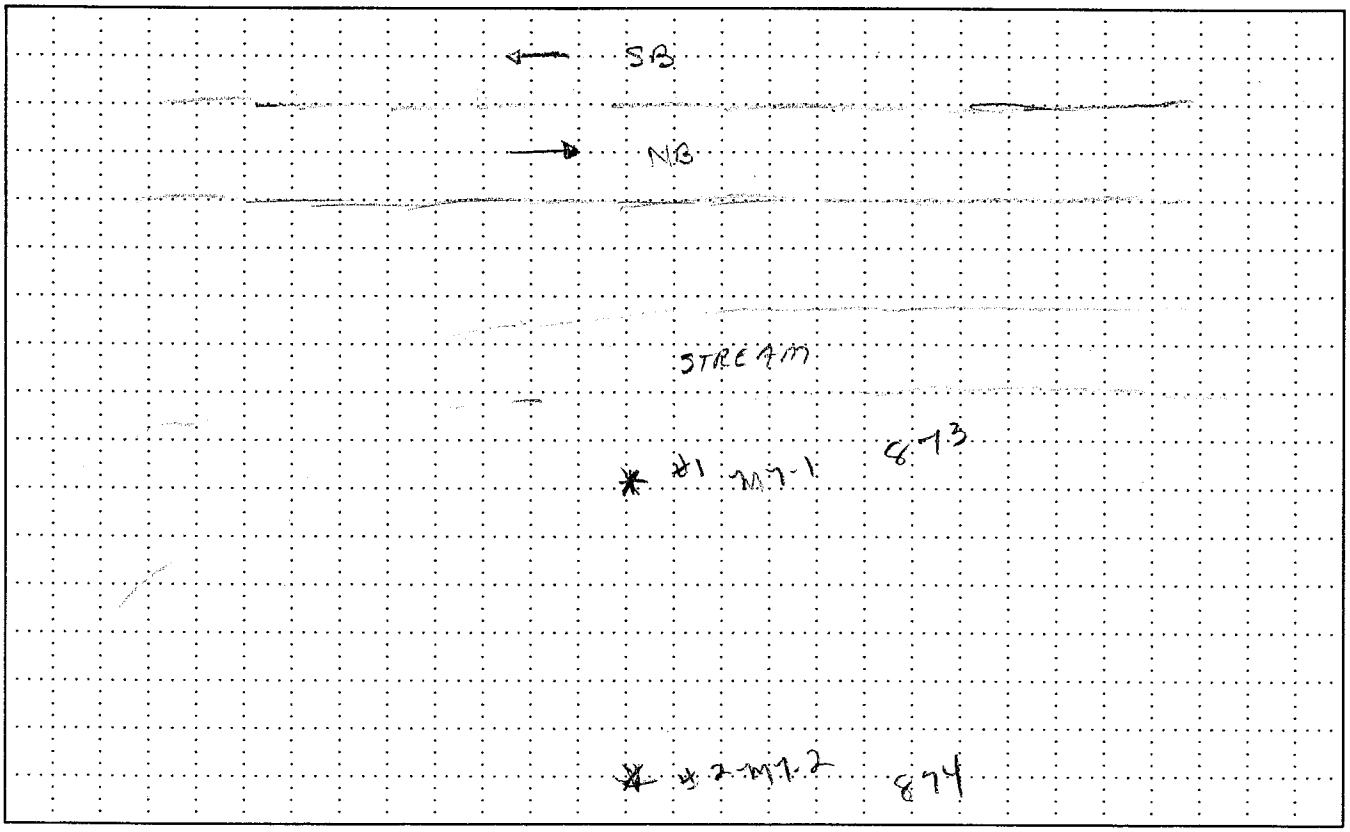
Time:	1st	start	9:12	stop	9:32	total	20		
	2nd	start		stop		total			
Data:	1st #1	Leq	68.6	Lmax	89.6	Lmin	50.1	SEL	99.4
	2nd #2	Leq	64.7	Lmax	71.0	Lmin	51.8	SEL	95.5

Traffic Data

Roadway#1	I-476 →		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	NB		Direction	←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	330	990	auto	405	1215	auto			auto		
med. trk.	24	42	med. trk.	11	33	med. trk.			med. trk.		
hvy trk.	75	225	hvy trk.	79	237	hvy trk.			hvy trk.		
bus	5	15	bus	3	9	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-26-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID MP-1

Gannett Fleming, Inc.

ADDRESS: 1575 DOERR RD.

Meter Storage # 0030

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 48-57

GPS PT 9416

SLM Calibration before 94.0 after

Weather: temperature 75° wind speed 0 cloud cover 75%

Time:	1st	start	8:15	stop	8:35	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	65.5	Lmax	72.4	Lmin	57.3	SEL	96.3	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476 NB	1st	2nd
Direction ←		
auto	404	1212
med. trk.	16	48
hvy trk.	52	156
bus	0	0
motorcycle	1	3

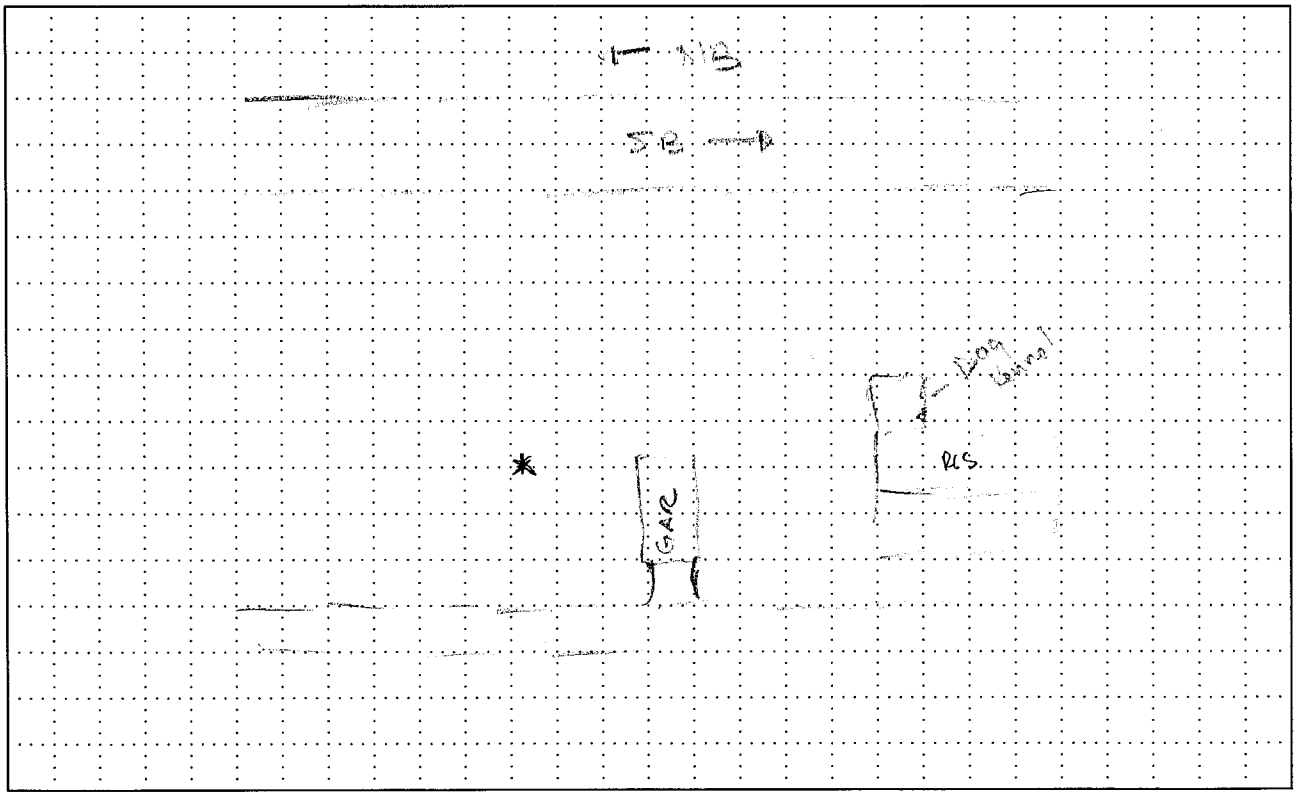
Roadway#2 I-476 SB	1st	2nd
Direction →		
auto	584	1752
med. trk.	14	42
hvy trk.	56	168
bus	1	3
motorcycle	0	0

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: CAN HEAR WHEN TRUCKS HIT JOINTS ON RD.

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-26-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID M8-3

Gannett Fleming, Inc.

ADDRESS: 1605 Doerr Rd

Meter Storage # 0029

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

Measurement Data

Photograph #'s 39-47

SLM Calibration before 94.0 after _____ GPS PT 944

Weather: temperature _____ wind speed 0 cloud cover 50%

Time:	1st	start	7:47	stop	8:07	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	66.7	Lmax	71.5	Lmin	58.3	SEL	97.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476 NB ←	1st	2nd
auto	412	1236
med. trk.	22	66
hvy trk.	37	111
bus	0	0
motorcycle	1	3

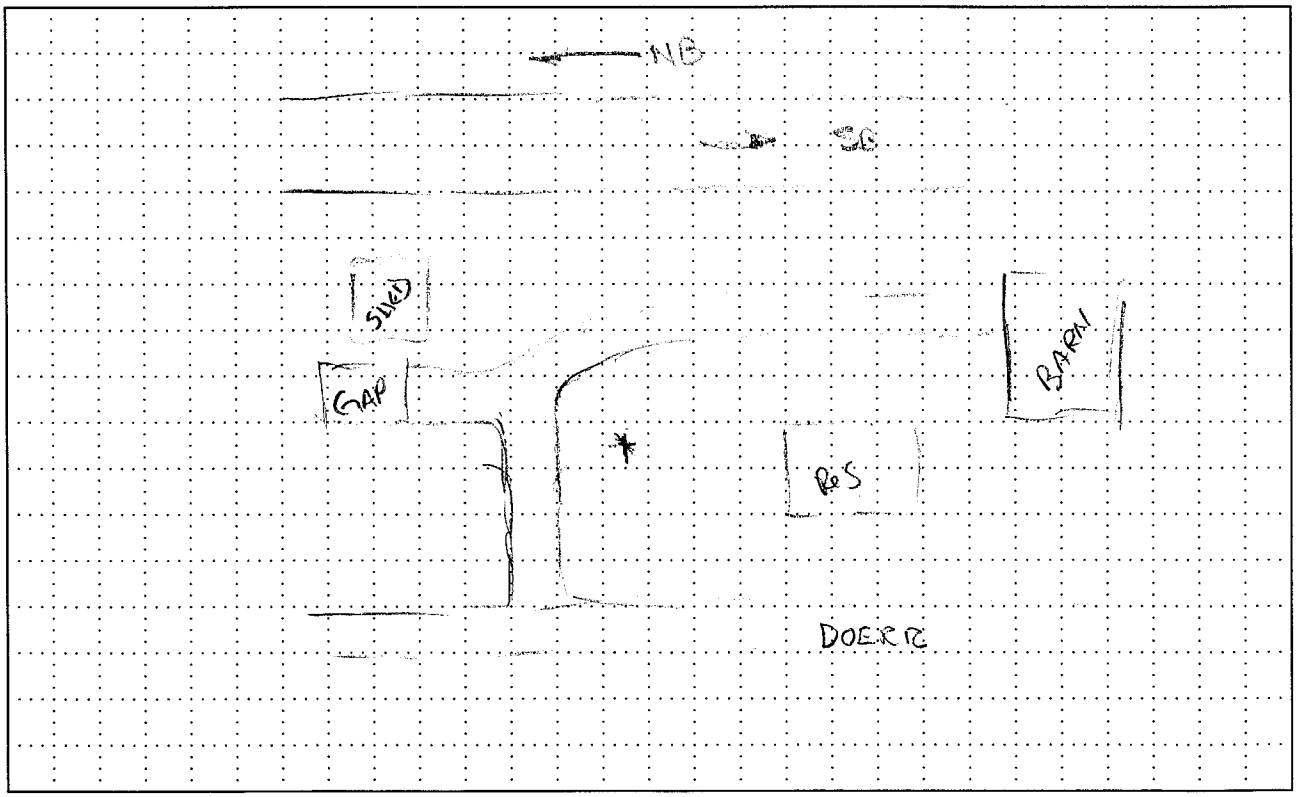
Roadway#2 I-476 SB →	1st	2nd
auto	642	1926
med. trk.	30	90
hvy trk.	67	201
bus	3	15
motorcycle	2	6

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

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

NOTES: Direct Line of site to Highway

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: 55398-102351

JOB # 55398-102351

SITE ID 9-1

Gannett Fleming, Inc.

ADDRESS: Rosenberger Rd

Meter Storage # 42

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 391-396 300-305

GPS PT 867

SLM Calibration before 114.0 after

Weather: temperature 85 wind speed cloud cover

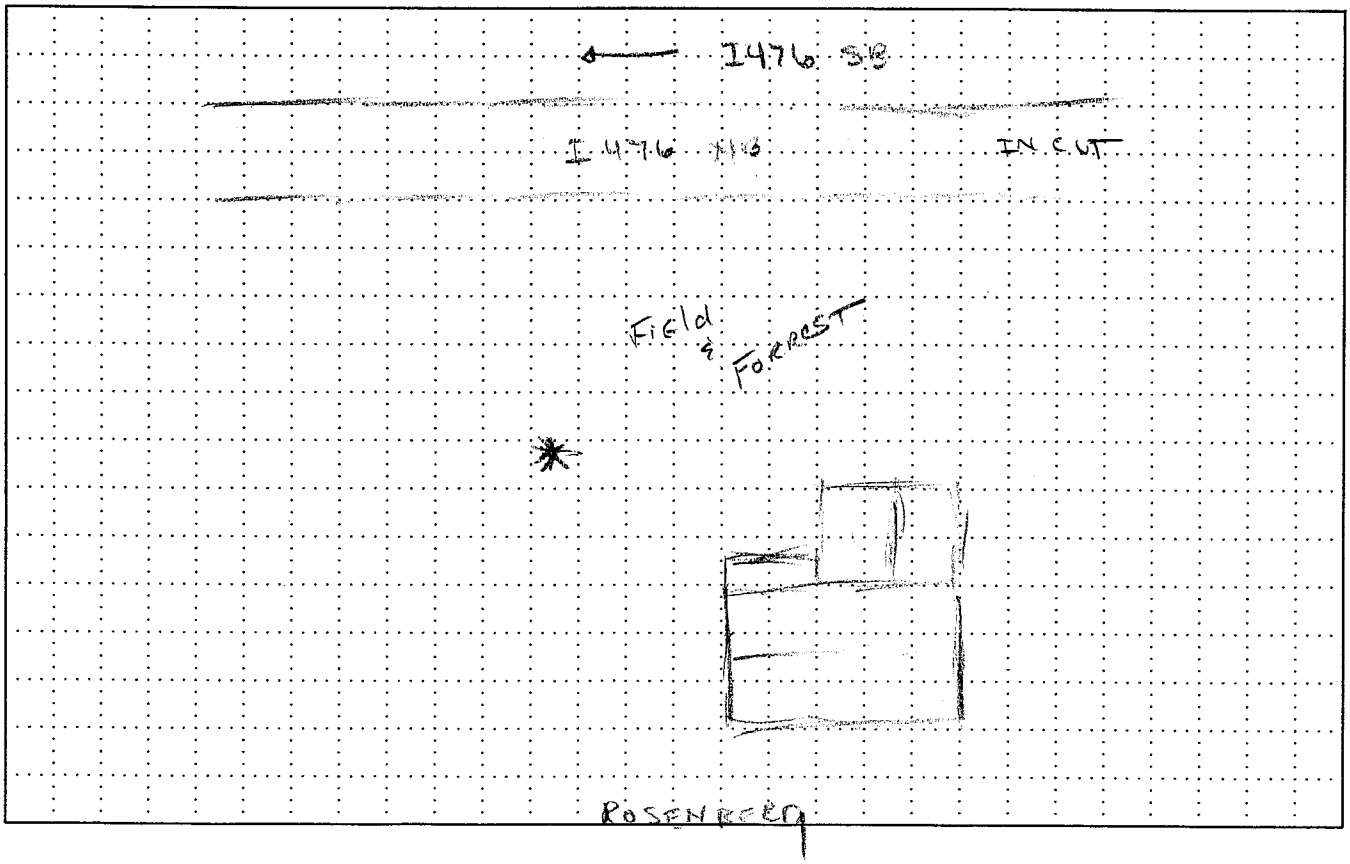
Time:	1st	start 1:51	stop 2:11	total 20					
	2nd	start	stop	total					
Data:	1st	Leq 56.9	Lmax 80.1	Lmin 46.4	SEL 87.6				
	2nd	Leq	Lmax	Lmin	SEL				

Traffic Data

Roadway#1 I-476		Roadway#2 I-476		Roadway#3		Roadway#4	
Direction → NB		Direction ← SB		Direction		Direction	
	1st / 2nd		1st / 2nd		1st / 2nd		1st / 2nd
auto	384 / 1152	auto	325 / 975	auto	/	auto	/
med. trk.	21 / 63	med. trk.	9 / 27	med. trk.	/	med. trk.	/
hvy trk.	93 / 279	hvy trk.	53 / 159	hvy trk.	/	hvy trk.	/
bus	0 / 0	bus	0 / 0	bus	/	bus	/
motorcycle	5 / 15	motorcycle	0 / 0	motorcycle	/	motorcycle	/

NOTES: Garbage TRK behind on Rosenberger Turning around

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55988-102351

SITE ID 9-2

Gannett Fleming, Inc.

ADDRESS: Rosenberger Rd

Dog TRAINER

Meter Storage # 41

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other 385-390 295-299

Measurement Data

Photograph #'s

GPS PT 865

SLM Calibration before 114.0 after

Weather: temperature 85 wind speed 0- cloud cover 50%

Time:	1st	start	1:21	stop	1:41	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	58.2	Lmax	84.2	Lmin	46.7	SEL	89.0	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476 NB	1st	2nd
Direction →		
auto	396	1188
med. trk.	20	60
hvy trk.	109	327
bus	1	3
motorcycle	0	0

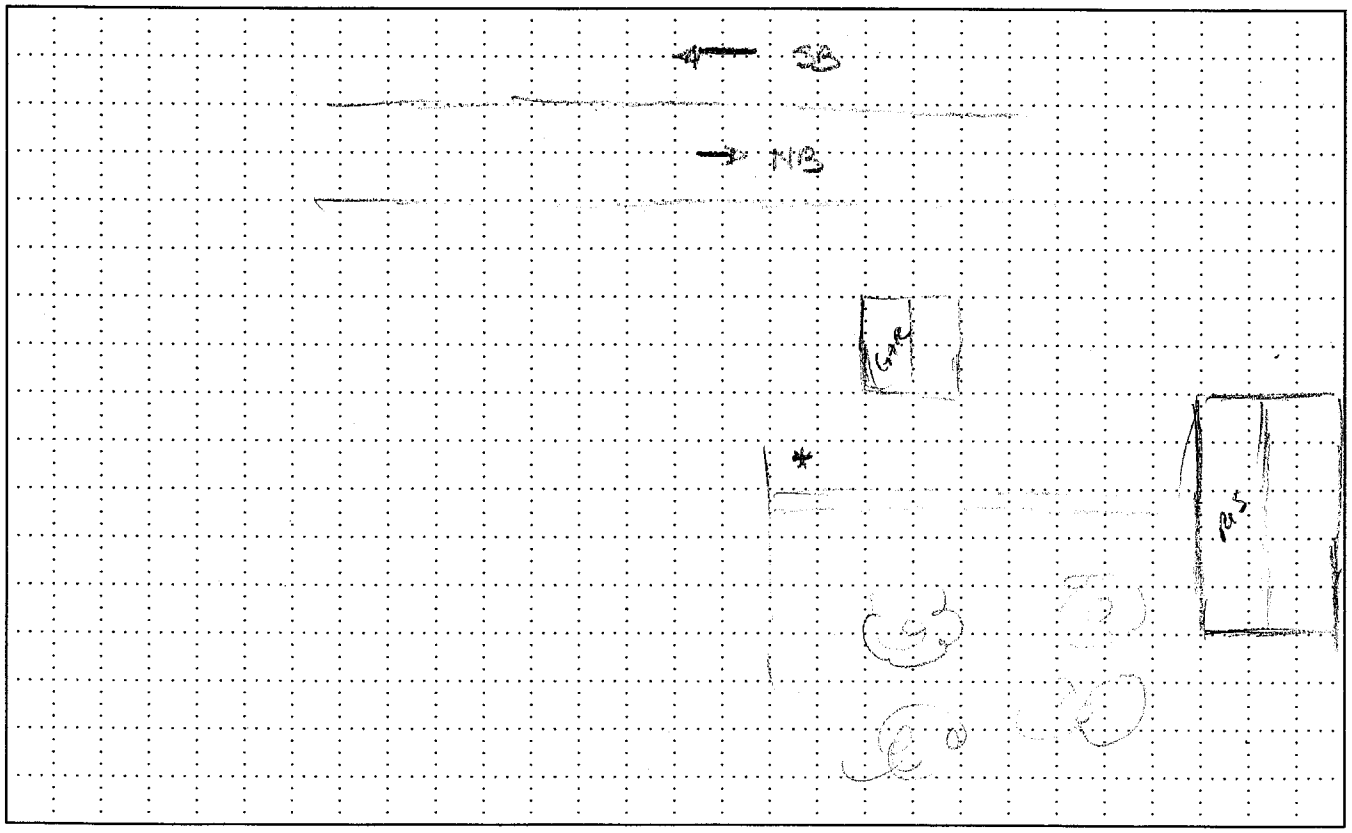
Roadway#2 I-476 SB	1st	2nd
Direction ←		
auto	308	924
med. trk.	16	48
hvy trk.	62	126
bus	0	0
motorcycle	0	0

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: Near when trucks hit expansion joints -

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-2013

PROJECT: I-476

JOB # 55398-102351

SITE ID 10-1

Gannett Fleming, Inc.

ADDRESS: Kumry Rd

Meter Storage # 43

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 403-411 312-320

GPS PT 868

SLM Calibration before 114.0 after

Weather: temperature 86 wind speed 0 cloud cover 0

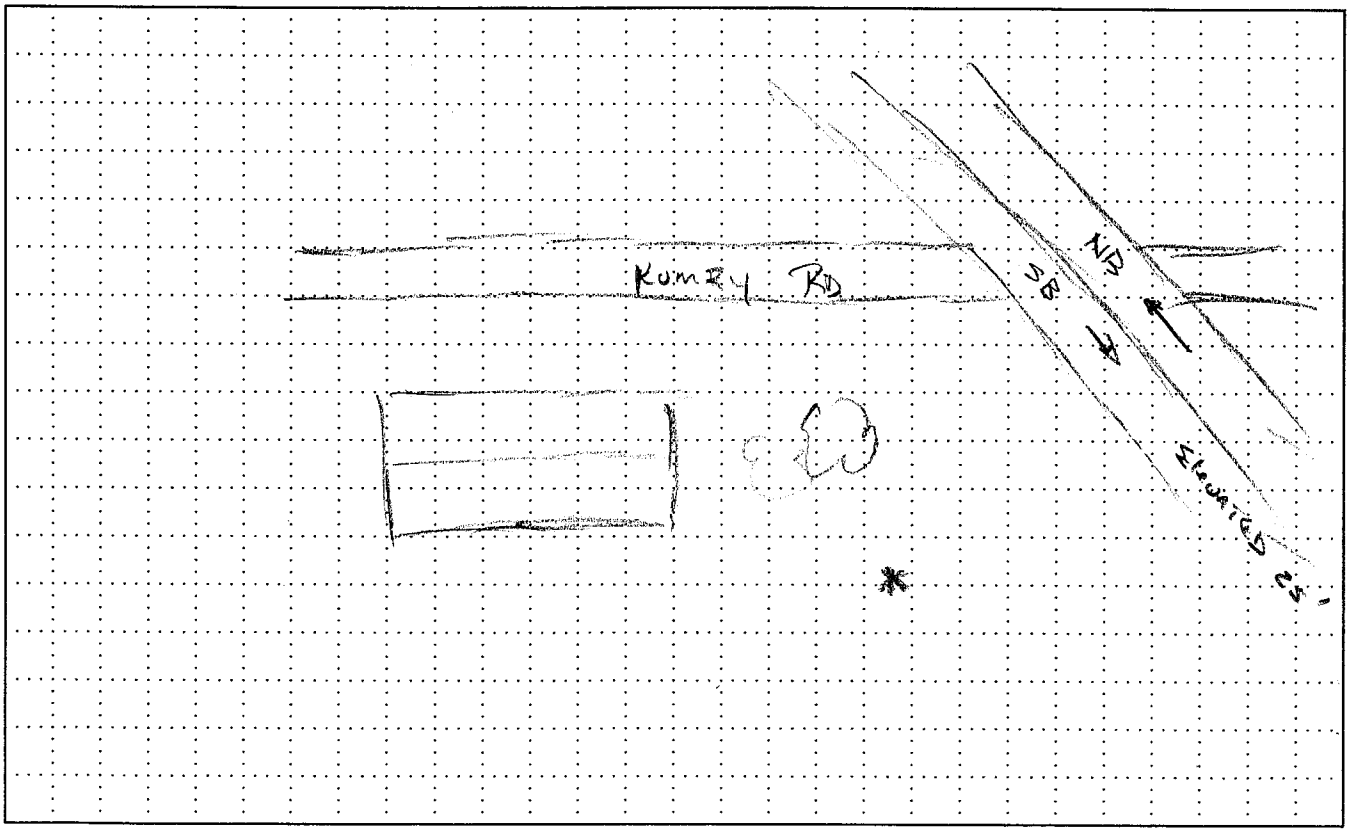
Time:	1st	start	3:03	stop	3:23	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	66.3	Lmax	85.4	Lmin	49.6	SEL	97.1
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 I-476		Roadway#2 I-476		Roadway#3		Roadway#4	
Direction ← N		Direction → SB		Direction		Direction	
	1st / 2nd		1st / 2nd		1st / 2nd		1st / 2nd
auto	417 / 1251	auto	398 / 1198	auto	/	auto	/
med. trk.	16 / 48	med. trk.	11 / 33	med. trk.	/	med. trk.	/
hvy trk.	76 / 228	hvy trk.	51 / 153	hvy trk.	/	hvy trk.	/
bus	0 / 0	bus	0 / 0	bus	/	bus	/
motorcycle	0 / 0	motorcycle	3 / 9	motorcycle	/	motorcycle	/

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-13

PROJECT: I-476

JOB # 55398-102351

SITE ID 10-2

Gannett Fleming, Inc.

ADDRESS: 1890 Kumry Rd

Meter Storage # 42

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 397-402 306-311

GPS PT 867

SLM Calibration before 114 after

Weather: temperature 86.1 wind speed 0 cloud cover 50%

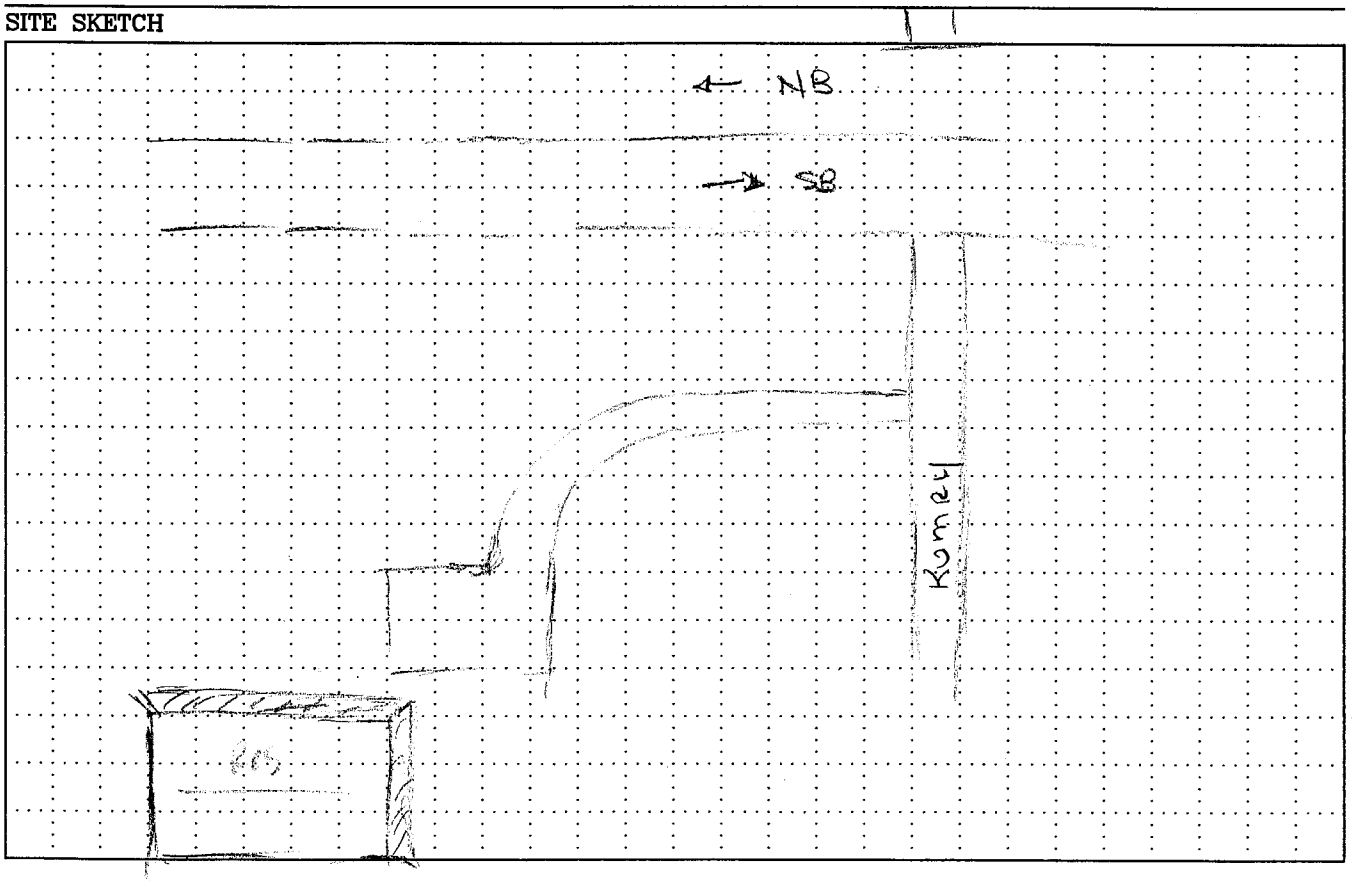
Time:	1st	start	2:27	stop	2:47	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	65.9	Lmax	78.4	Lmin	51.0	SEL	96.7
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4	Kumry SM	
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	403	1209	auto	347	1041	auto			auto	12	
med. trk.	18	54	med. trk.	9	27	med. trk.			med. trk.		
hvy trk.	86	258	hvy trk.	68	204	hvy trk.			hvy trk.		
bus	1	3	bus	0	0	bus			bus		
motorcycle	3	9	motorcycle	0	0	motorcycle			motorcycle	1	

NOTES: ROAD IS ELEVATED 20'

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-5-12

PROJECT: I-476

JOB # 55398-102351

SITE ID M10-3

Gannett Fleming, Inc.

ADDRESS: Kumry

Meter Storage # 44

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 412-416 321-325

GPS PT 869

SLM Calibration before 114 after

Weather: temperature 86 wind speed 0 cloud cover 0

Time:	1st	start	3:35	stop	3:55	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.1	Lmax	86.8	Lmin	50.3	SEL	909
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 I-476 NB	1st	2nd
Direction ←		
auto	561	1683
med. trk.	13	39
hvy trk.	66	198
bus	2	6
motorcycle	0	0

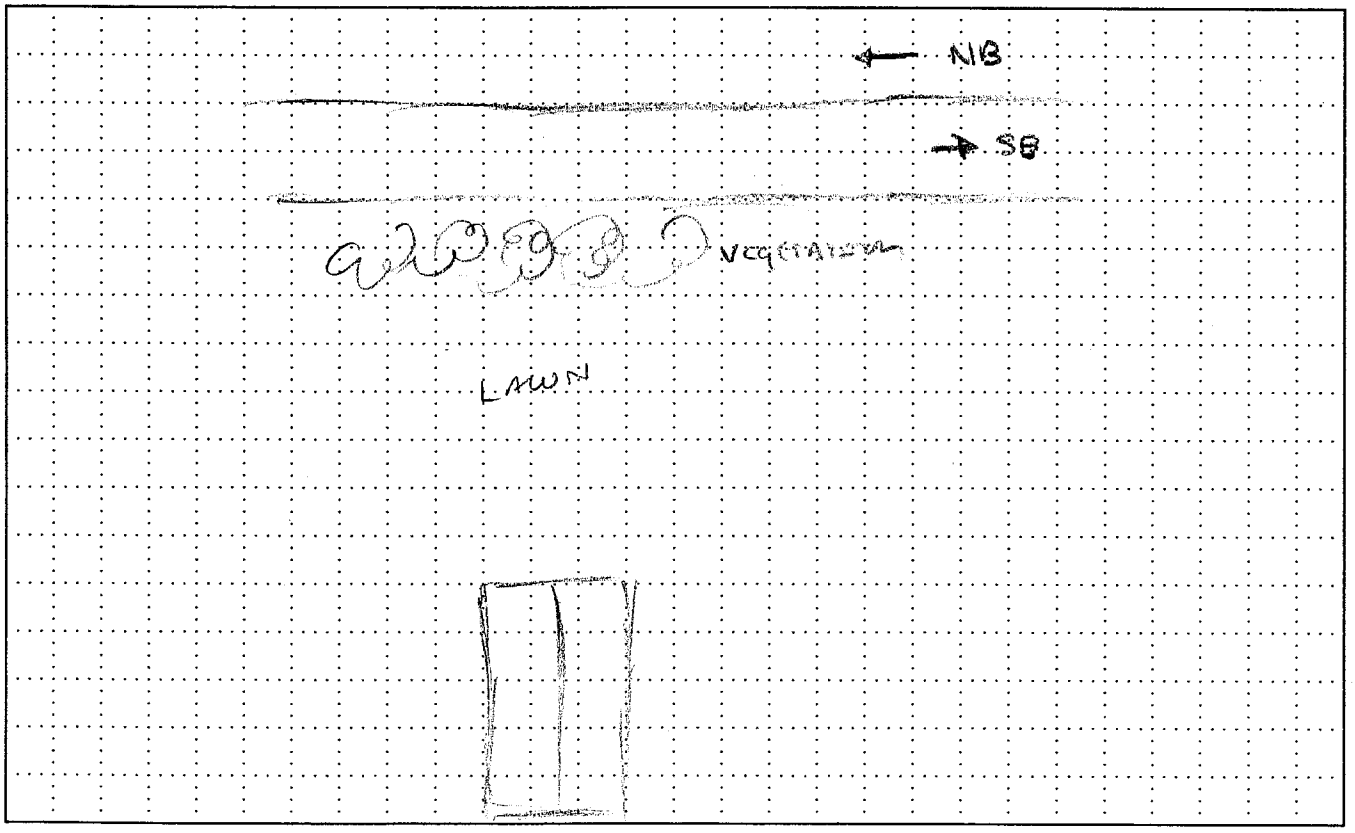
Roadway#2 I-476-SB	1st	2nd
Direction →		
auto	360	1080
med. trk.	14	42
hvy trk.	53	159
bus	2	6
motorcycle	2	6

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: 6-5-13

PROJECT: I-476

JOB # 55398-102357

SITE ID 10-4

Gannett Fleming, Inc.

ADDRESS: Krammes Rd

Meter Storage # 45

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 87

SLM Calibration before 114 after

Weather: temperature 86 wind speed cloud cover

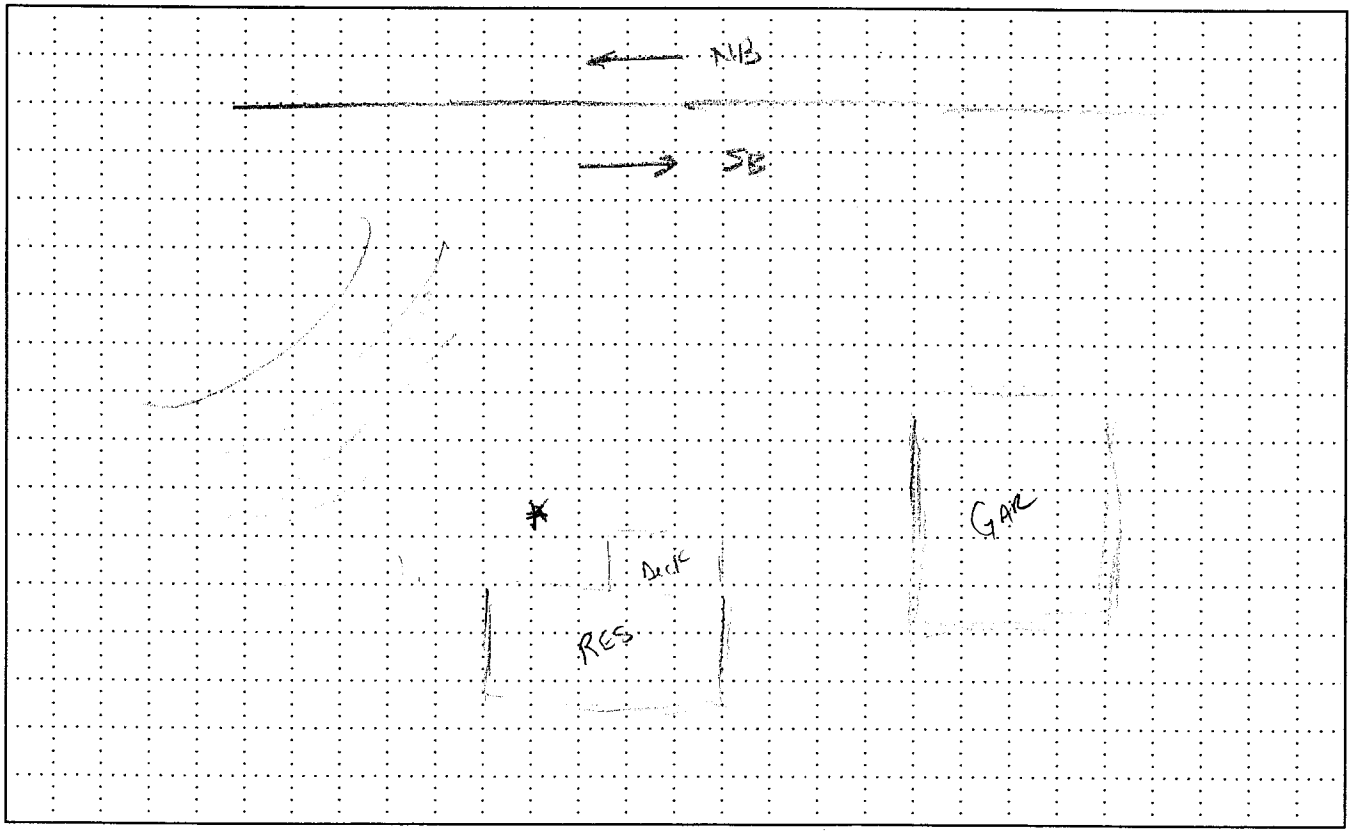
Time:	1st	start	4:14	stop	4:34	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	59.6	Lmax	70.9	Lmin	47.6	SEL	90.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	589	1767	auto	447	1341	auto			auto		
med. trk.	9	27	med. trk.	11	33	med. trk.			med. trk.		
hvy trk.	60	180	hvy trk.	42	126	hvy trk.			hvy trk.		
bus	2	6	bus	7	21	bus			bus		
motorcycle	2	6	motorcycle	2	6	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-71802

SITE ID 10-5

Gannett Fleming, Inc.

ADDRESS: Molasses Creek Park

Meter Storage # 28

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

Measurement Data

Photograph #'s 285-291 194-200

SLM Calibration before 113.9 after _____ GPS PT _____

Weather: temperature 61 wind speed 0-8 cloud cover 0

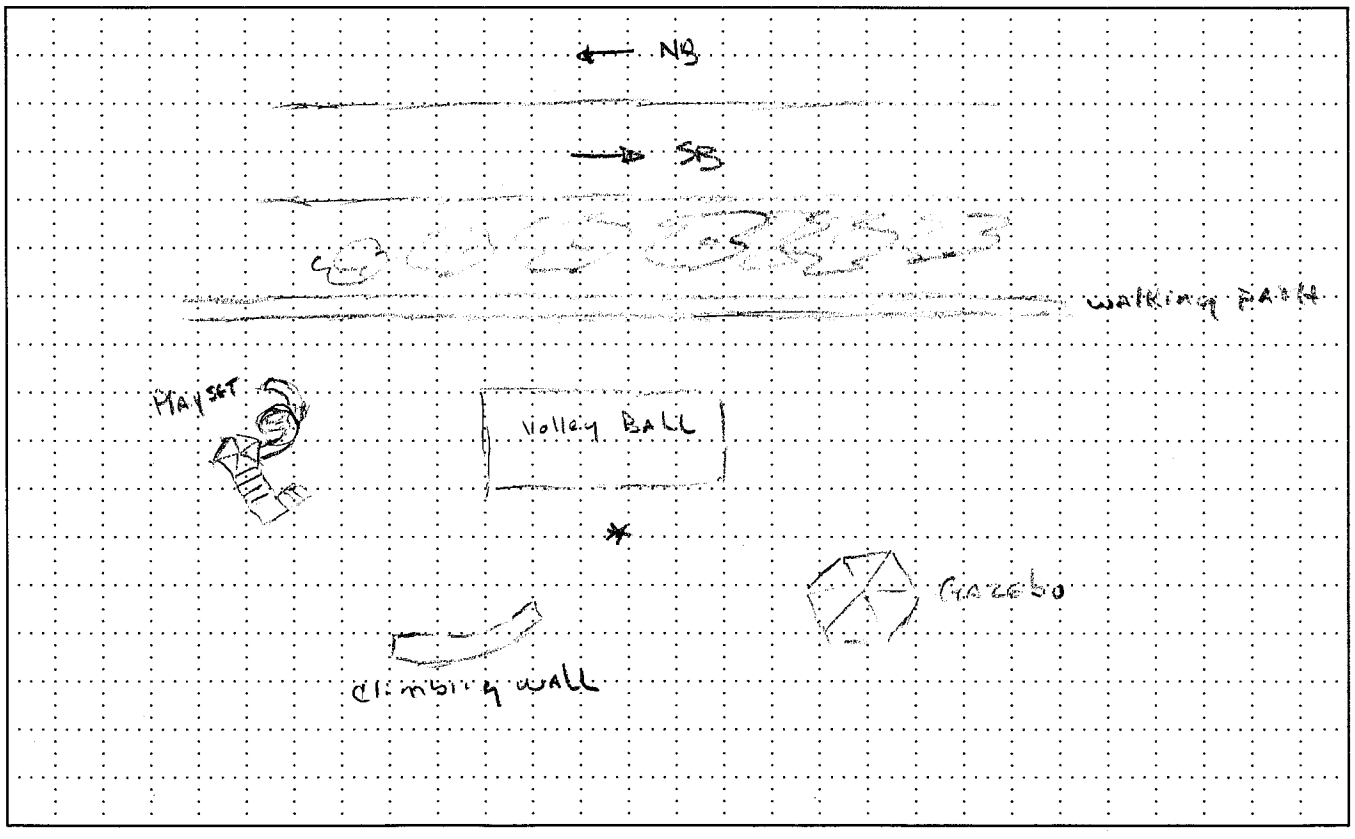
Time:	1st	start	9:44	stop	10:04	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	58.6	Lmax	69.7	Lmin	50.1	SEL	89.4
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I 476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	← NB		Direction	→ SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	291	873	auto	319	957	auto			auto		
med. trk.	21	63	med. trk.	21	63	med. trk.			med. trk.		
hvy trk.	80	240	hvy trk.	74	222	hvy trk.			hvy trk.		
bus	8	24	bus	4	12	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6.4.13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID MII-1

Gannett Fleming, Inc.

ADDRESS: Comfort Inn

Meter Storage # _____

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

Measurement Data

Photograph #'s 257-265 167-174

GPS PT 845

SLM Calibration before 113.9 after _____

Weather: temperature 58 wind speed _____ cloud cover 0

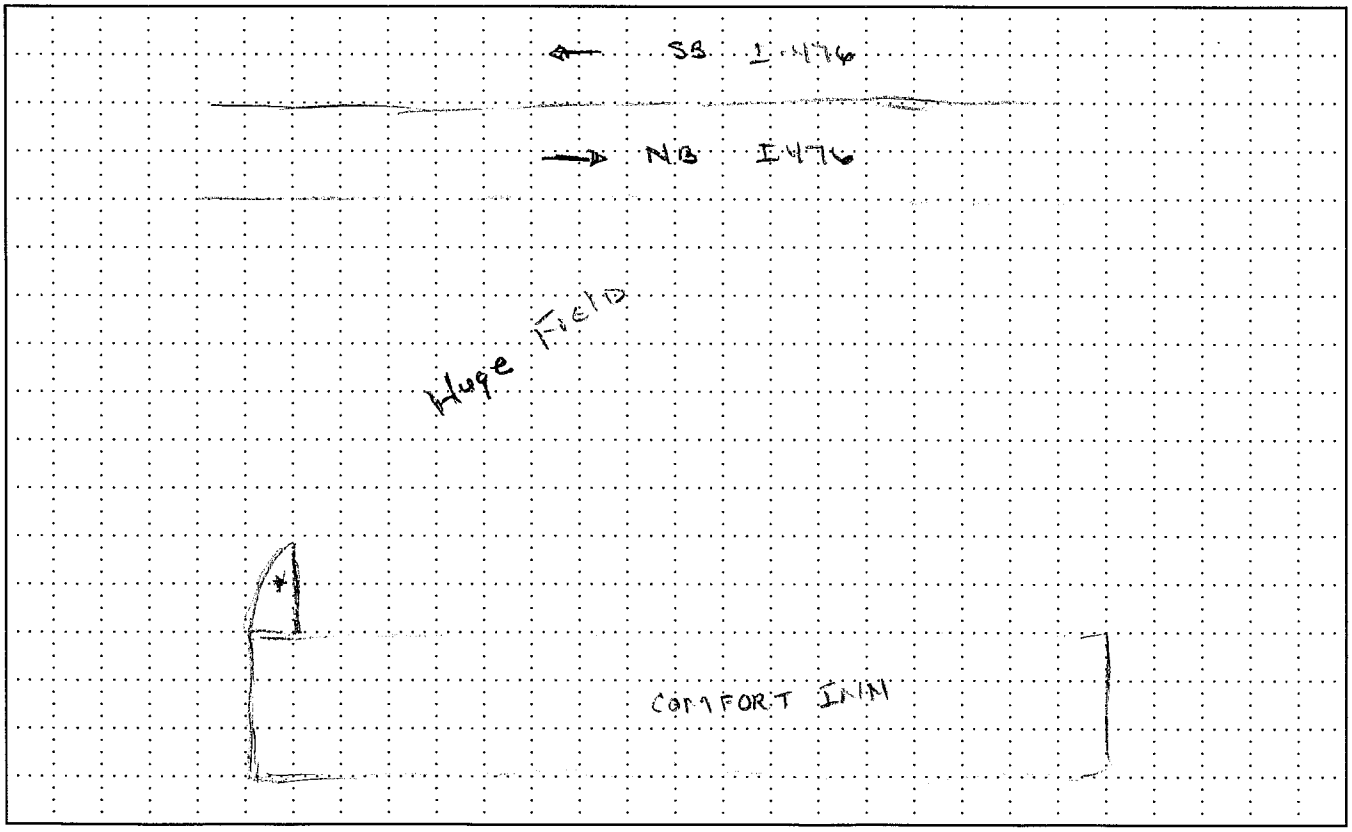
Time:	1st	start	7:49	stop	8:09	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	58.3	Lmax	74.6	Lmin	49.6	SEL	89.1	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I 476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	→ NB		Direction	← SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	317	951	auto	571	1713	auto			auto		
med. trk.	15	45	med. trk.	13	39	med. trk.			med. trk.		
hvy trk.	25	75	hvy trk.	65	195	hvy trk.			hvy trk.		
bus	0	0	bus	4	12	bus			bus		
motorcycle	1	3	motorcycle	1	3	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-71802

SITE ID 12-1

Gannett Fleming, Inc.

ADDRESS: 1782 Red Bud Rd

Meter Storage # 26

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 266-273 175-181

GPS PT 547

SLM Calibration before 113.9 after

Weather: temperature 60 wind speed 0-8 cloud cover 0

Time:	1st	start	8:32	stop	8:52	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.3	Lmax	74.3	Lmin	52.5	SEL	91.1
	2nd	Leq		Lmax		Lmin		SEL	

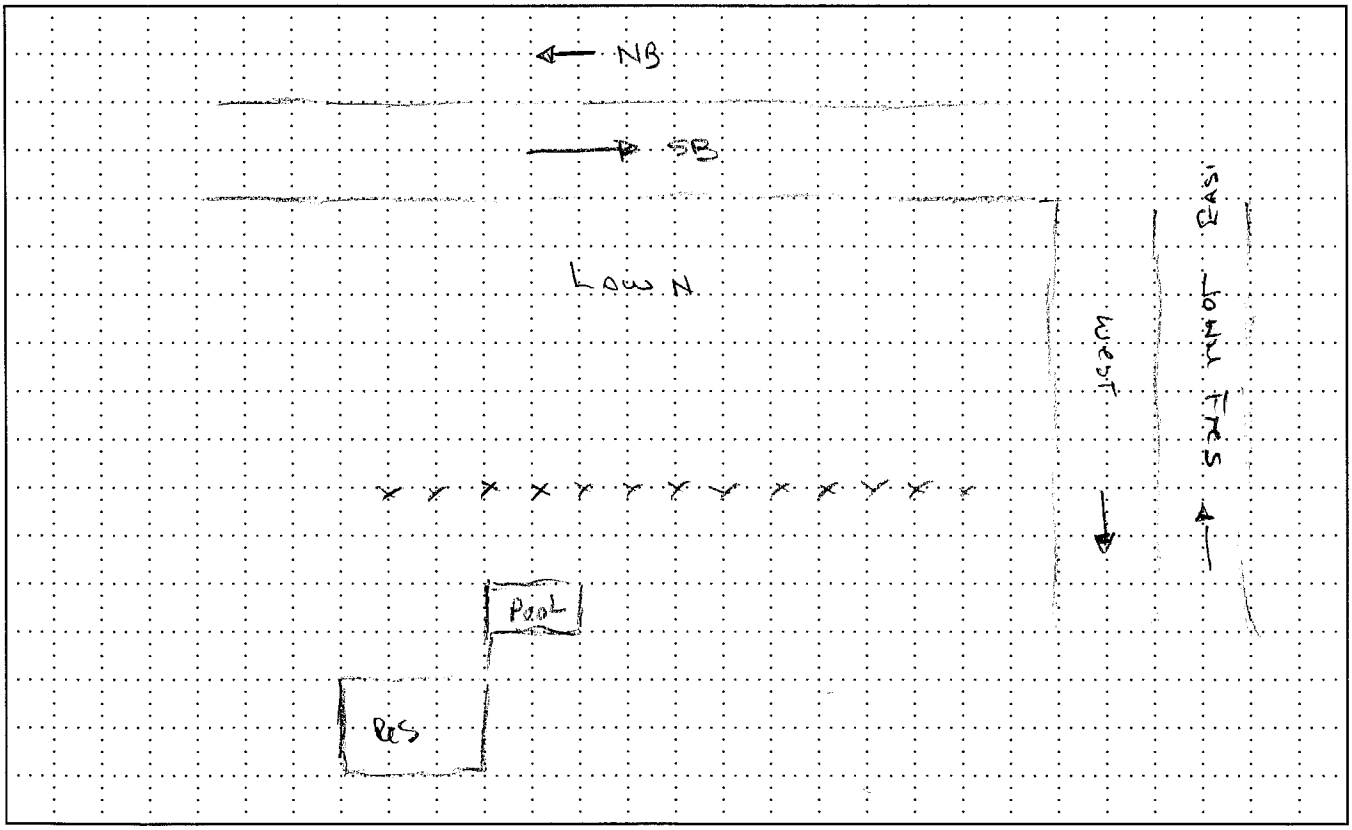
Traffic Data

10 min

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3	John Frie		Roadway#4	John Fries	
Direction	←		Direction	→		Direction	← EB		Direction	→ WB	
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	317	951	auto	544	1632	auto	126	756	auto	87	522
med. trk.	16	48	med. trk.	11	33	med. trk.	6	36	med. trk.	4	24
hvy trk.	72	216	hvy trk.	77	231	hvy trk.	0	0	hvy trk.	5	30
bus	0	0	bus	1	3	bus	1	6	bus	1	6
motorcycle	4	12	motorcycle	0	0	motorcycle	0	0	motorcycle	0	0

NOTES: Jake brake on John Fries

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID 12-2

Gannett Fleming, Inc.

ADDRESS: 1774 - 1770 Red Bud Rd

Meter Storage # 27

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 273-284 182-193

GPS PT 848

SLM Calibration before 113.1 after

Weather: temperature 60 wind speed 0.8 cloud cover 0

Time:	1st	start	9:01	stop	9:21	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	57.7	Lmax	72.5	Lmin	49.0	SEL	88.5	
	2nd	Leq		Lmax		Lmin		SEL		

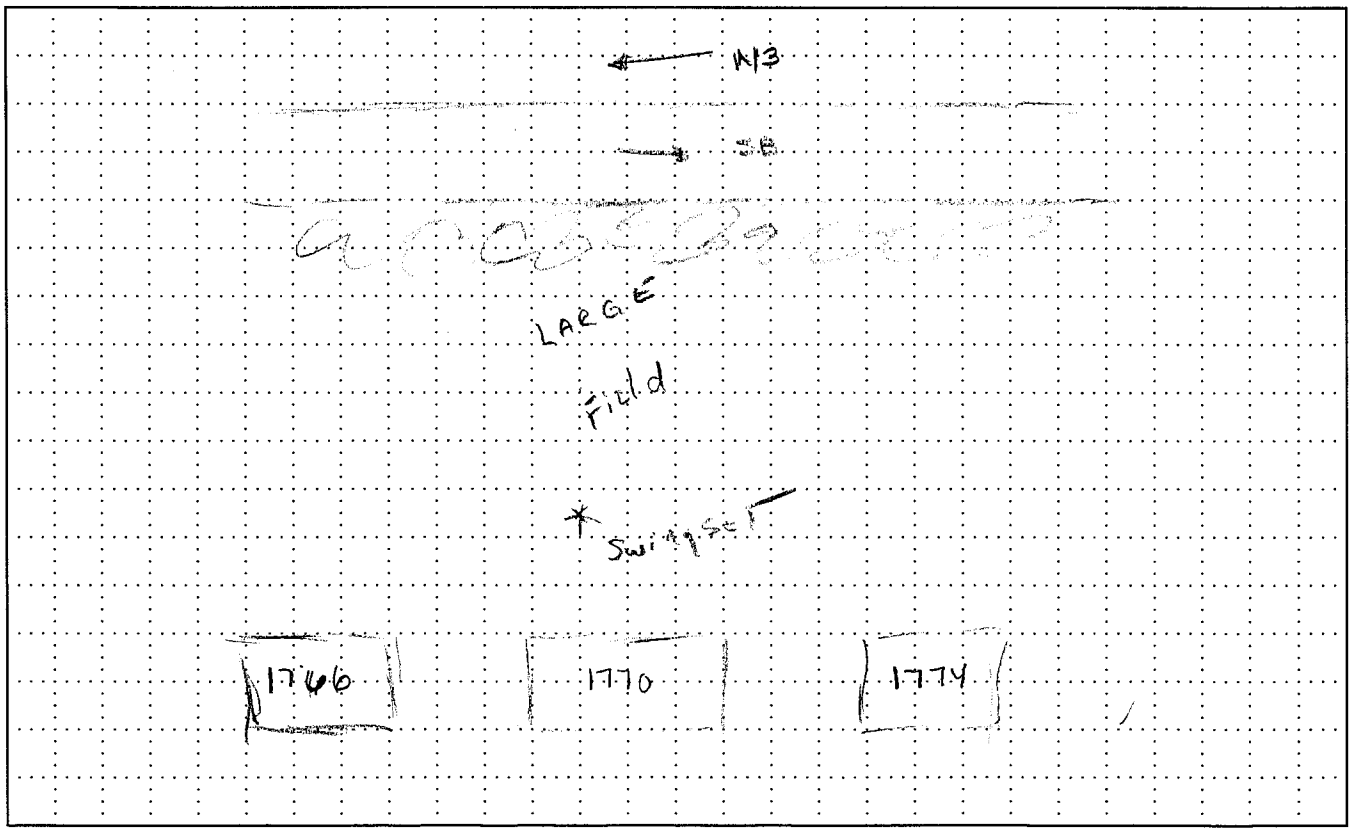
Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	← NB		Direction	→ SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	289	867	auto	381	1143	auto			auto		
med. trk.	16	48	med. trk.	7	21	med. trk.			med. trk.		
hvy trk.	60	180	hvy trk.	64	192	hvy trk.			hvy trk.		
bus	3	9	bus	4	12	bus			bus		
motorcycle	0	0	motorcycle	1	3	motorcycle			motorcycle		

NOTES: Turnpike slightly elevated

Johns Fries not audible @ bk of houses

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13
PROJECT: I-476-
JOB # 55398-102351
SITE ID 13-1

Gannett Fleming, Inc.

ADDRESS: Farmhouse
3 part of LAB facility
Wentz | Steinberg
Meter Storage # 24

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

Measurement Data

Photograph #'s ______
GPS PT ______

SLM Calibration before 114.1 after ______

Weather: temperature ______ wind speed ______ cloud cover ______

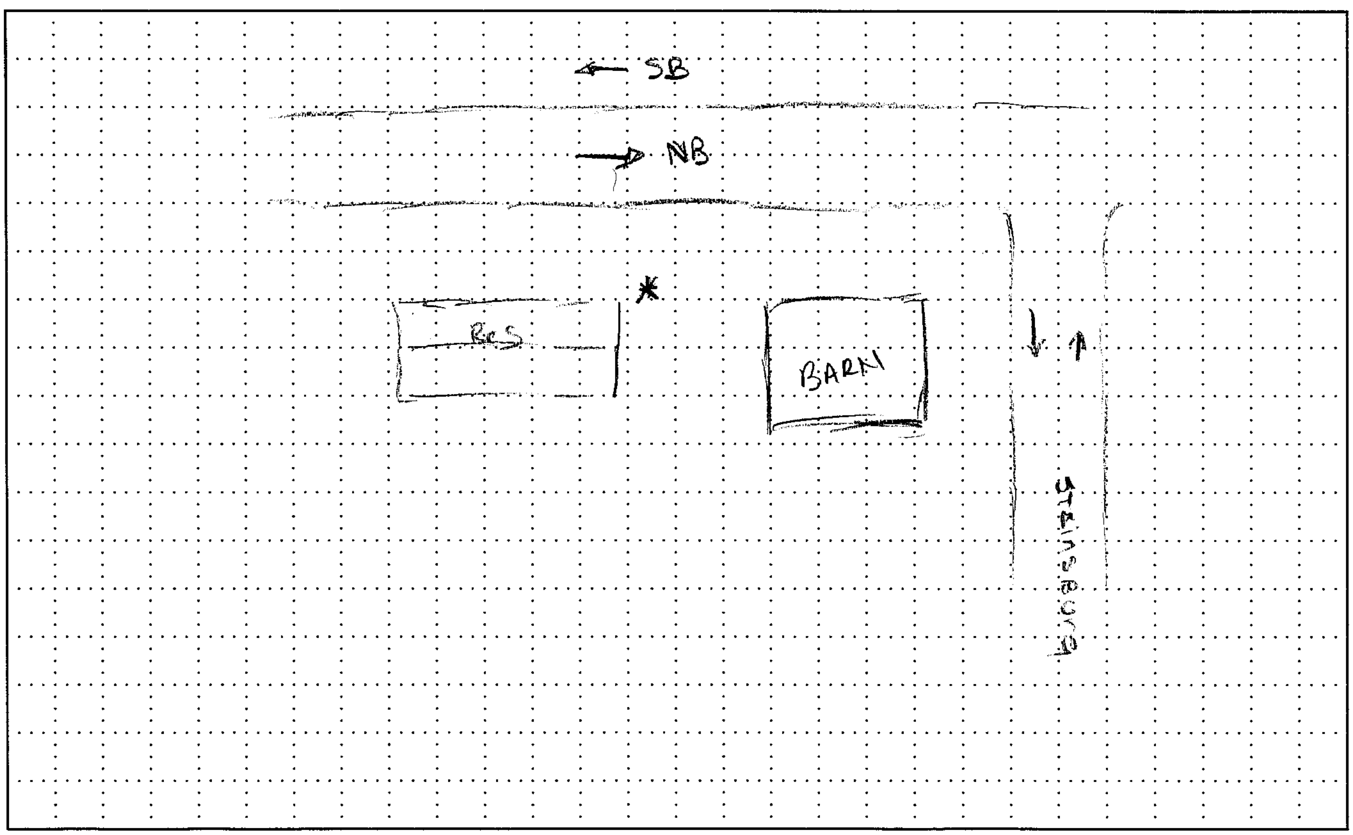
Time:	1st	start	4:45	stop	5:05	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	63.4	Lmax	74.5	Lmin	52.5	SEL	94.2
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

	Roadway#1		Roadway#2		Roadway#3		Roadway#4	
Roadway	I-476		I-476					
Direction	→ NB		← SB					
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
auto	497	1491	357	1071				
med. trk.	8	24	3	9				
hvy trk.	50	150	47	141				
bus	1	3	3	9				
motorcycle	0	0	2	6				

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID M14.1

Gannett Fleming, Inc.

ADDRESS: HEITER RD

Meter Storage # 30

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 850

SLM Calibration before 114.0 after

Weather: temperature wind speed cloud cover

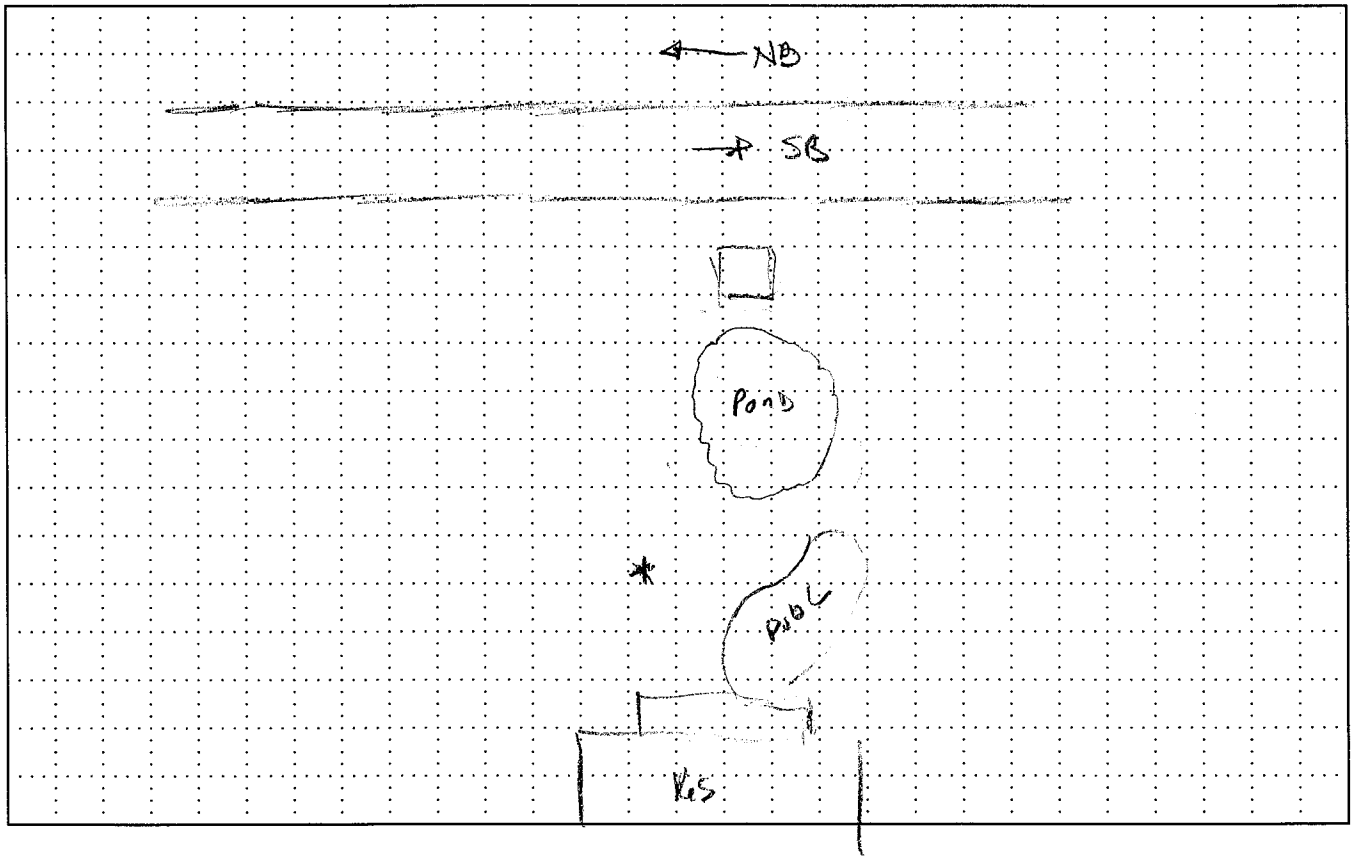
Time:	1st	start	11:26	stop		total				
	2nd	start		stop		total				
Data:	1st	Leq	61.8	Lmax	76.4	Lmin	47.8	SEL	92.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	268	804	auto	272	816	auto			auto		
med. trk.	26	78	med. trk.	12	36	med. trk.			med. trk.		
hvy trk.	94	282	hvy trk.	65	195	hvy trk.			hvy trk.		
bus	3	9	bus	0	0	bus			bus		
motorcycle	3	9	motorcycle	1	3	motorcycle			motorcycle		

NOTES: 2 TRACTOR PASSby's ON HEITER - JAKE BRAKES

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID 14-2

Gannett Fleming, Inc.

ADDRESS: 2465 Heiter Rd

Meter Storage # 29

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

Measurement Data

Photograph #'s _____

GPS PT _____

SLM Calibration before 114.0 after _____

Weather: temperature 65 wind speed _____ cloud cover 0

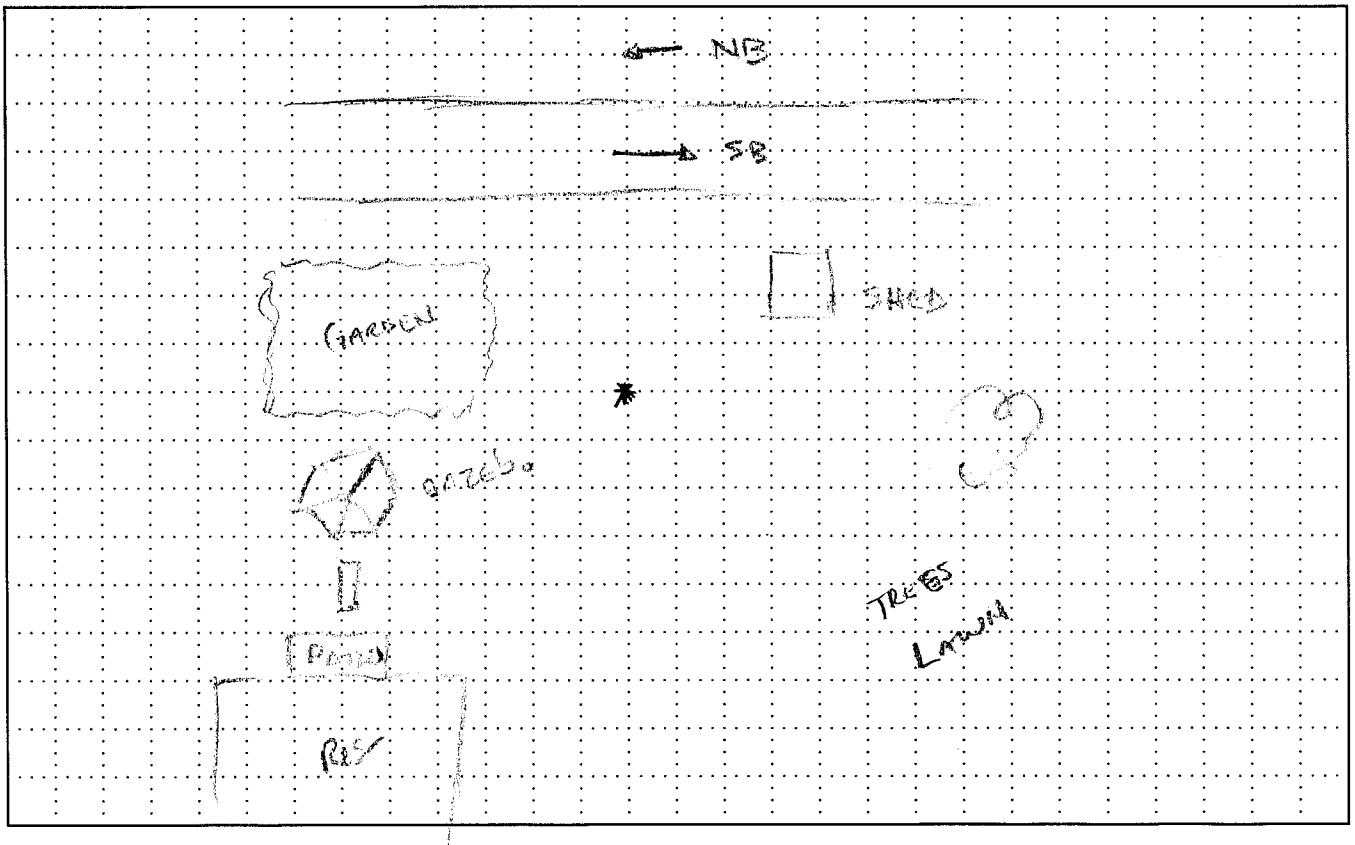
Time:	1st	start	10:55	stop	11:15	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	58.4	Lmax	69.6	Lmin	50.3	SEL	89.2	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476			Roadway#2 I-476			Roadway#3			Roadway#4		
Direction ← NB			Direction → SB			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	289	867	auto	252	756	auto			auto		
med. trk.	36	108	med. trk.	1	3	med. trk.			med. trk.		
hvy trk.	103	309	hvy trk.	73	219	hvy trk.			hvy trk.		
bus	0	0	bus	1	3	bus			bus		
motorcycle	1	3	motorcycle	2	6	motorcycle			motorcycle		

NOTES: Mowing in bkgrd – Jake Brakes – T-P in cut -

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 55398-102351

SITE ID 14-3

Gannett Fleming, Inc.

ADDRESS: Meier Rd

Meter Storage # 19

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 836

SLM Calibration before 114.1 after

Weather: temperature 83.3 wind speed cloud cover

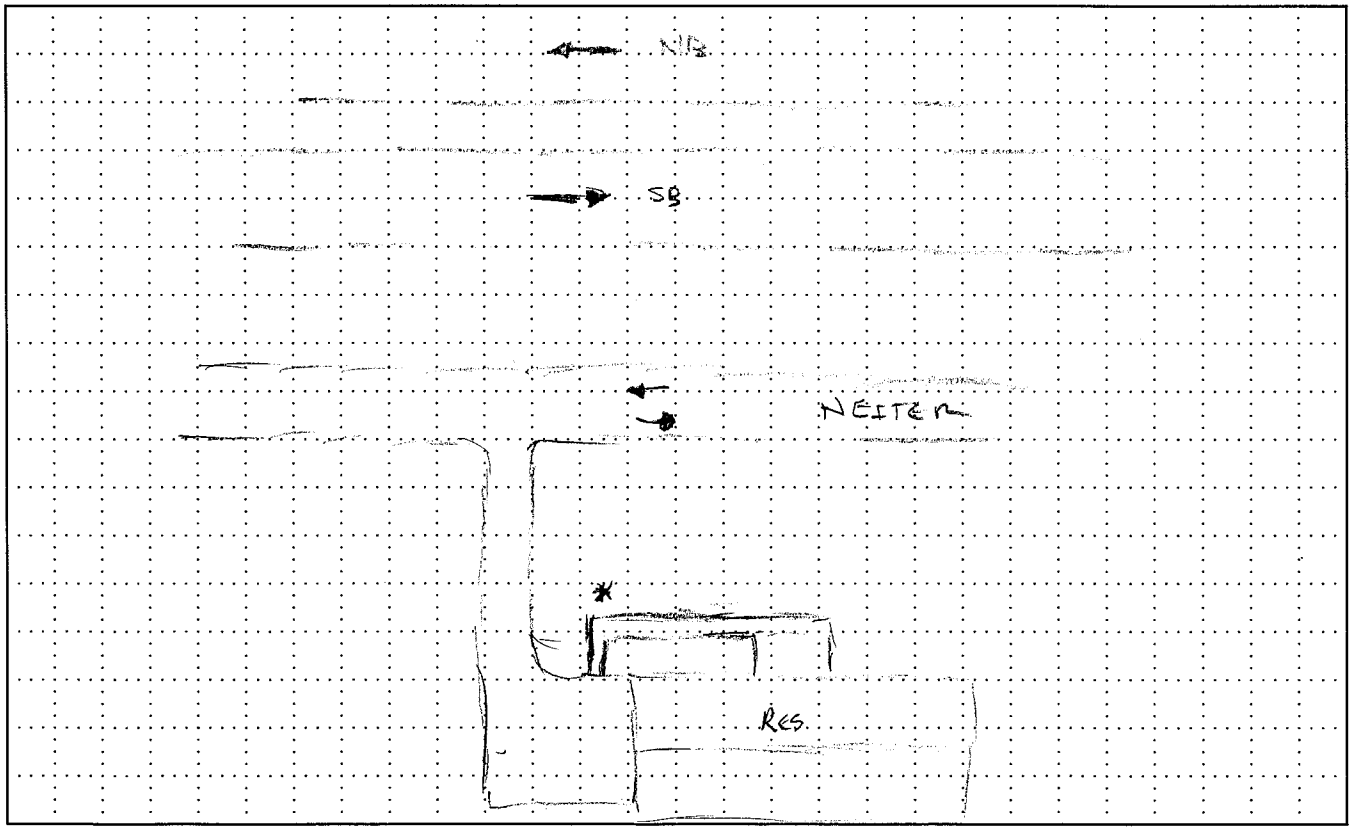
Time:	1st	start	2:19	stop	2:39	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	60.6	Lmax	72.7	Lmin	50.7	SEL	91.3	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	←		Direction	→		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	341	1023	auto	314	942	auto			auto		
med. trk.	19	57	med. trk.	12	36	med. trk.			med. trk.		
hvy trk.	84	252	hvy trk.	62	186	hvy trk.			hvy trk.		
bus	0	0	bus	2	6	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES: Plane Flyover @ 2:36

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID M14-4

Gannett Fleming, Inc.

ADDRESS: 2485 Weitzel Rd

Meter Storage # 18

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 111-124 202-215

GPS PT 834

SLM Calibration before 114.1 after

Weather: temperature 77 wind speed 0-5 cloud cover 50%

Time:	1st	start	1:49	stop	2:09	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	69.3	Lmax	92.9	Lmin	52.2	SEL	100.0
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1 I-476	1st	2nd
Direction ← NB		
auto	328	984
med. trk.	16	48
hvy trk.	84	252
bus	1	3
motorcycle	1	3

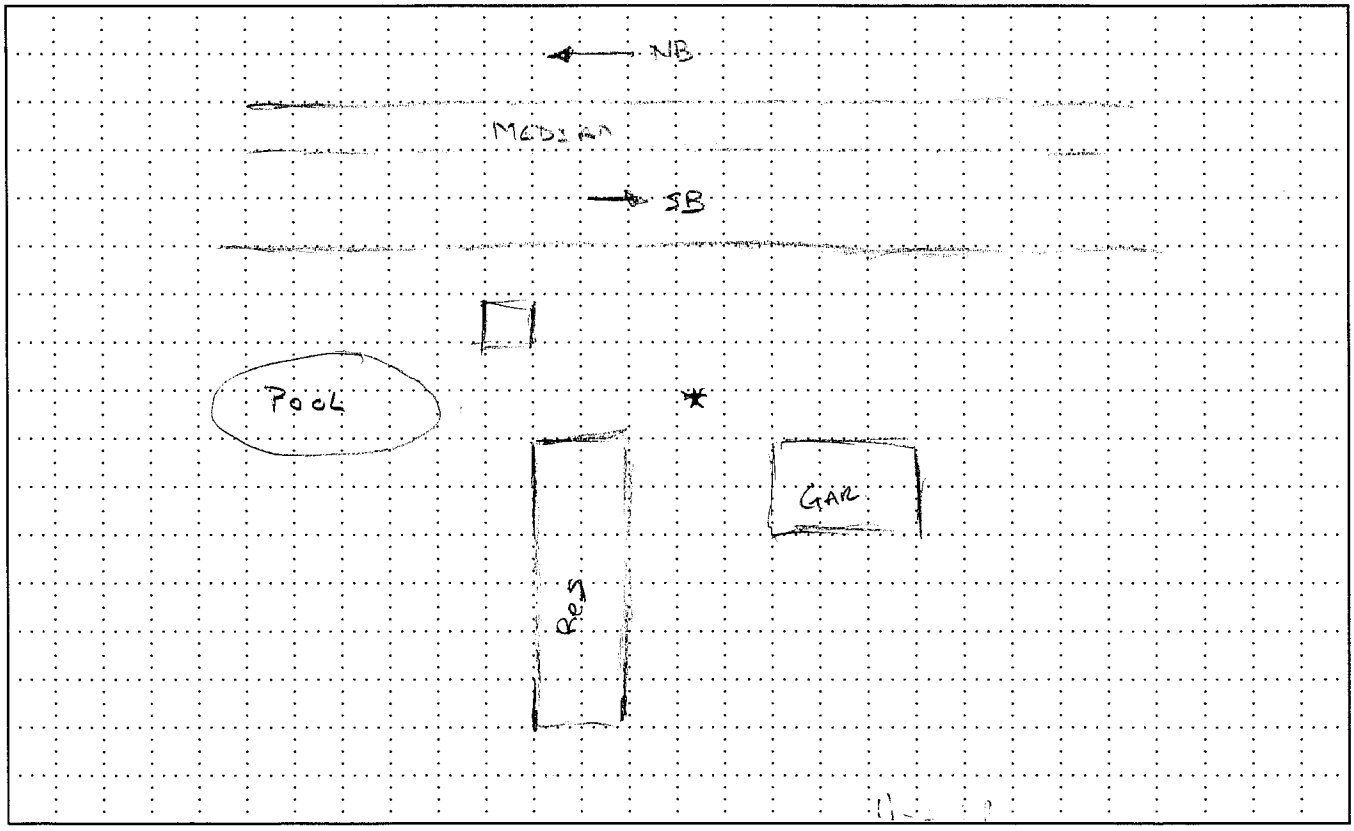
Roadway#2 I-476	1st	2nd
Direction → SB		
auto	294	882
med. trk.	8	24
hvy trk.	55	165
bus	0	0
motorcycle	1	3

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: very loud Jake brake.

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 55398-102351

SITE ID 14-5

Gannett Fleming, Inc.

ADDRESS: EBERHARD RD

Meter Storage # 22

TYPE ☐ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 838

SLM Calibration before 114.1 after

Weather: temperature wind speed 0-5 cloud cover 100%

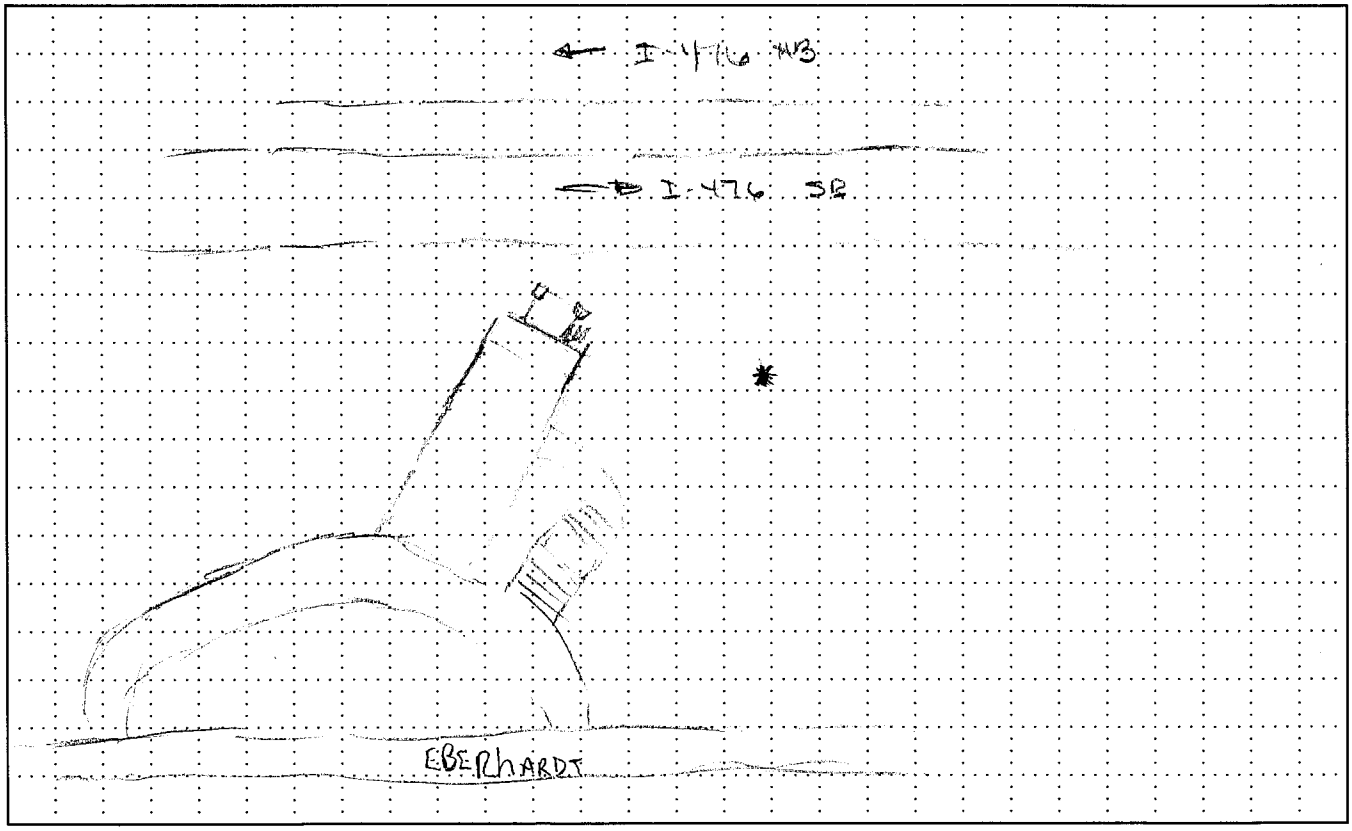
Time:	1st	start	3:22	stop	3:42	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	65.4	Lmax	72.1	Lmin	55.3	SEL	961	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	← NB		Direction	→ SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	416	1248	auto	356	1068	auto			auto		
med. trk.	17	51	med. trk.	8	24	med. trk.			med. trk.		
hvy trk.	69	207	hvy trk.	58	174	hvy trk.			hvy trk.		
bus	0	0	bus	4	12	bus			bus		
motorcycle	1	3	motorcycle	1	3	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 055398-102351-T1802

SITE ID 14-6

Gannett Fleming, Inc.

ADDRESS: Eberhard Rd

Meter Storage # 23

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 839-840

SLM Calibration before 114 after

Weather: temperature wind speed 0-5 cloud cover 100%

Time:	1st	start	3:52	stop	4:12	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	62.9	Lmax	80.1	Lmin	52.5	SEL	93.7
	2nd	Leq		Lmax		Lmin		SEL	

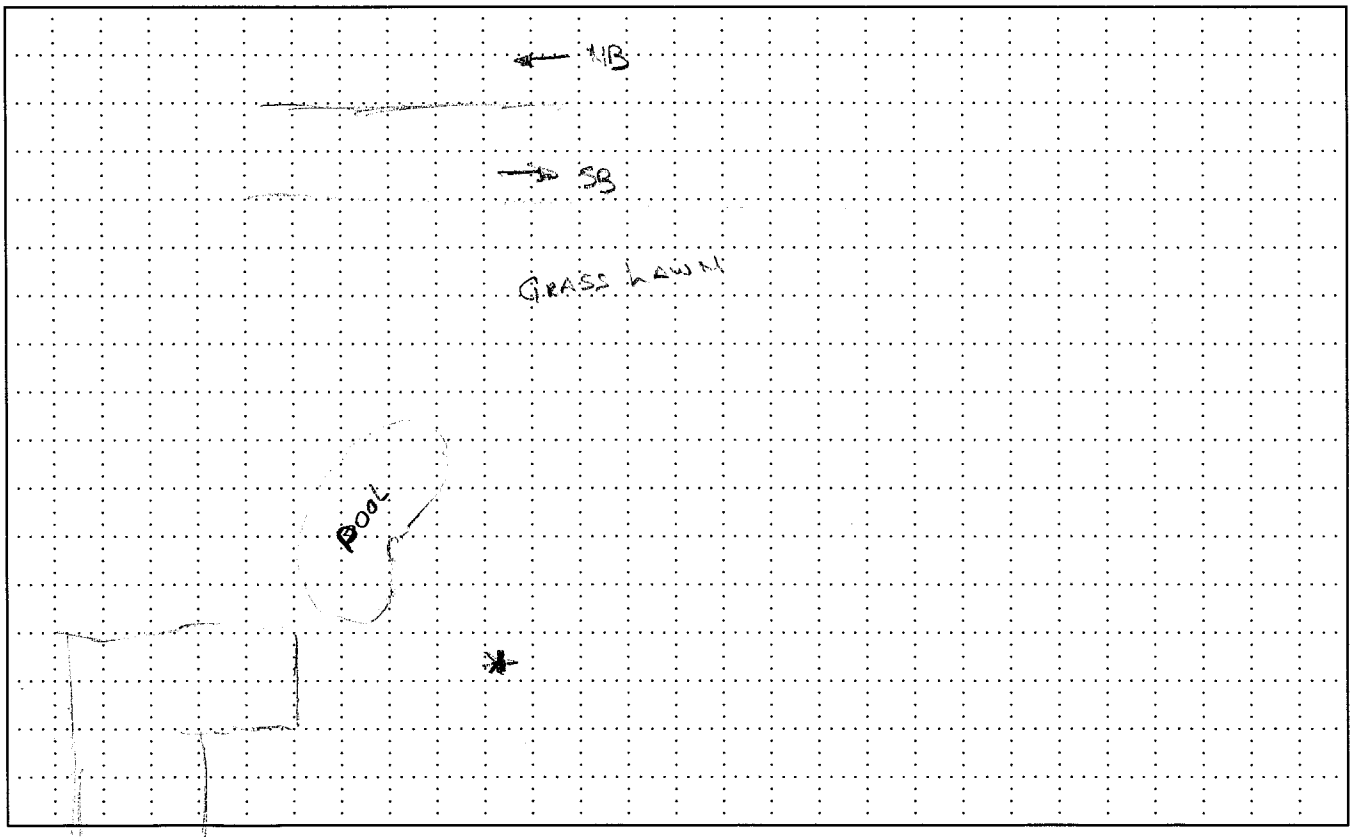
Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	← NB		Direction	→ SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	415	1245	auto	313	939	auto			auto		
med. trk.	11	33	med. trk.	11	33	med. trk.			med. trk.		
hvy trk.	78	234	hvy trk.	52	156	hvy trk.			hvy trk.		
bus	8	24	bus	1	3	bus			bus		
motorcycle	0	0	motorcycle	0	0	motorcycle			motorcycle		

NOTES: N-TRUCK ACCELERATING UPGRADE -

RESIDENT COMPLAINT OF JAKE BRAKES - WOULD LOVE A WALL

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 55398.102351

SITE ID 14-7

Gannett Fleming, Inc.

ADDRESS: Eberhardt

Meter Storage # 20-21

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

GPS PT 837

SLM Calibration before 114.1 after

Weather: temperature 79 wind speed 0-5 cloud cover 100%

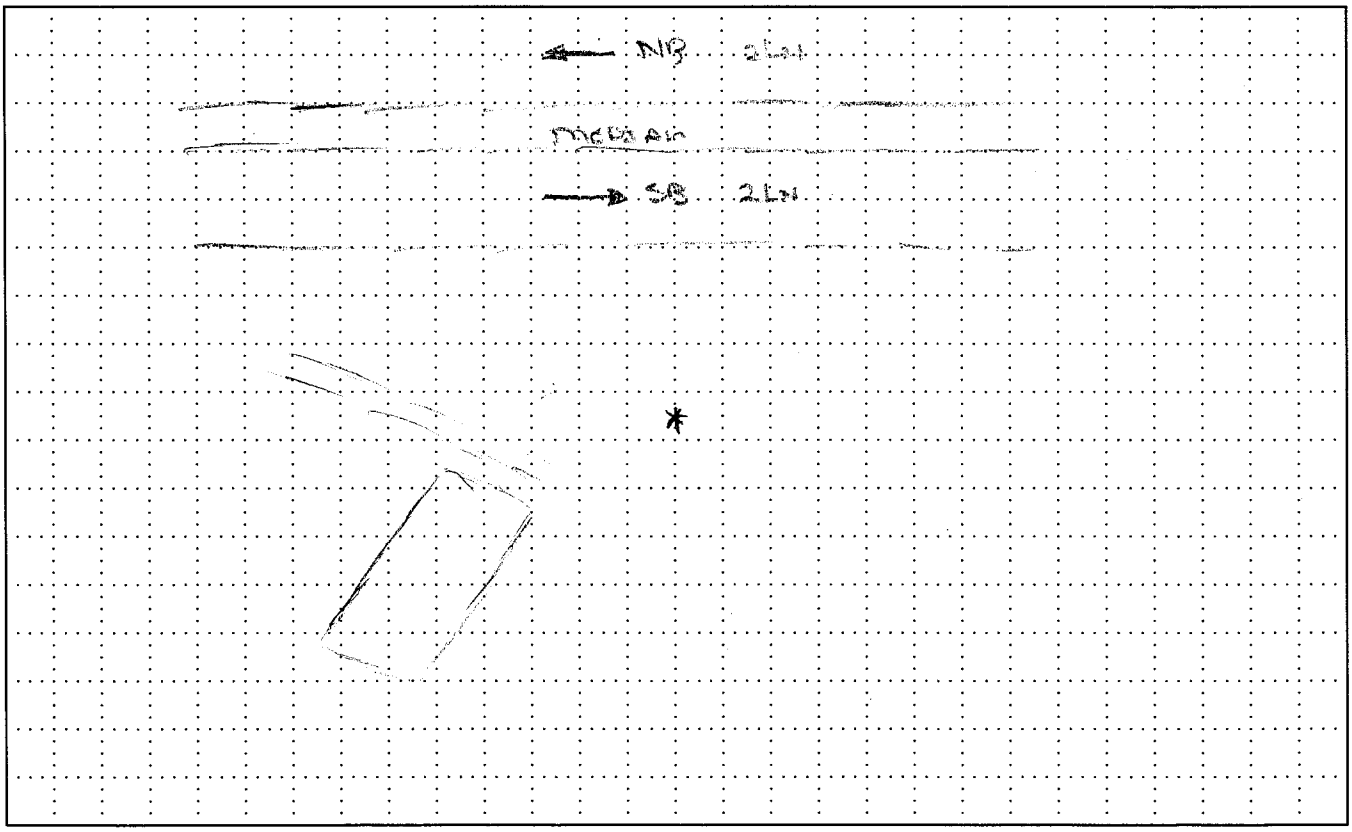
Time:	1st	start	2:53	stop	3:13	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	69.6	Lmax	81.4	Lmin	55.3	SEL	100.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1 I-476			Roadway#2 I-476			Roadway#3			Roadway#4		
Direction ← NB			Direction → SB			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	351	1053	auto	367	1101	auto			auto		
med. trk.	16	48	med. trk.	12	36	med. trk.			med. trk.		
hvy trk.	81	243	hvy trk.	57	171	hvy trk.			hvy trk.		
bus	2	6	bus	1	3	bus			bus		
motorcycle	2	6	motorcycle	1	3	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID 1S-1

Gannett Fleming, Inc.

ADDRESS: 2300 STEINSBORG

Meter Storage # 31

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

Measurement Data

Photograph #'s _____

GPS PT _____

SLM Calibration before _____ after _____

Weather: temperature 72 wind speed 0-8 cloud cover 0

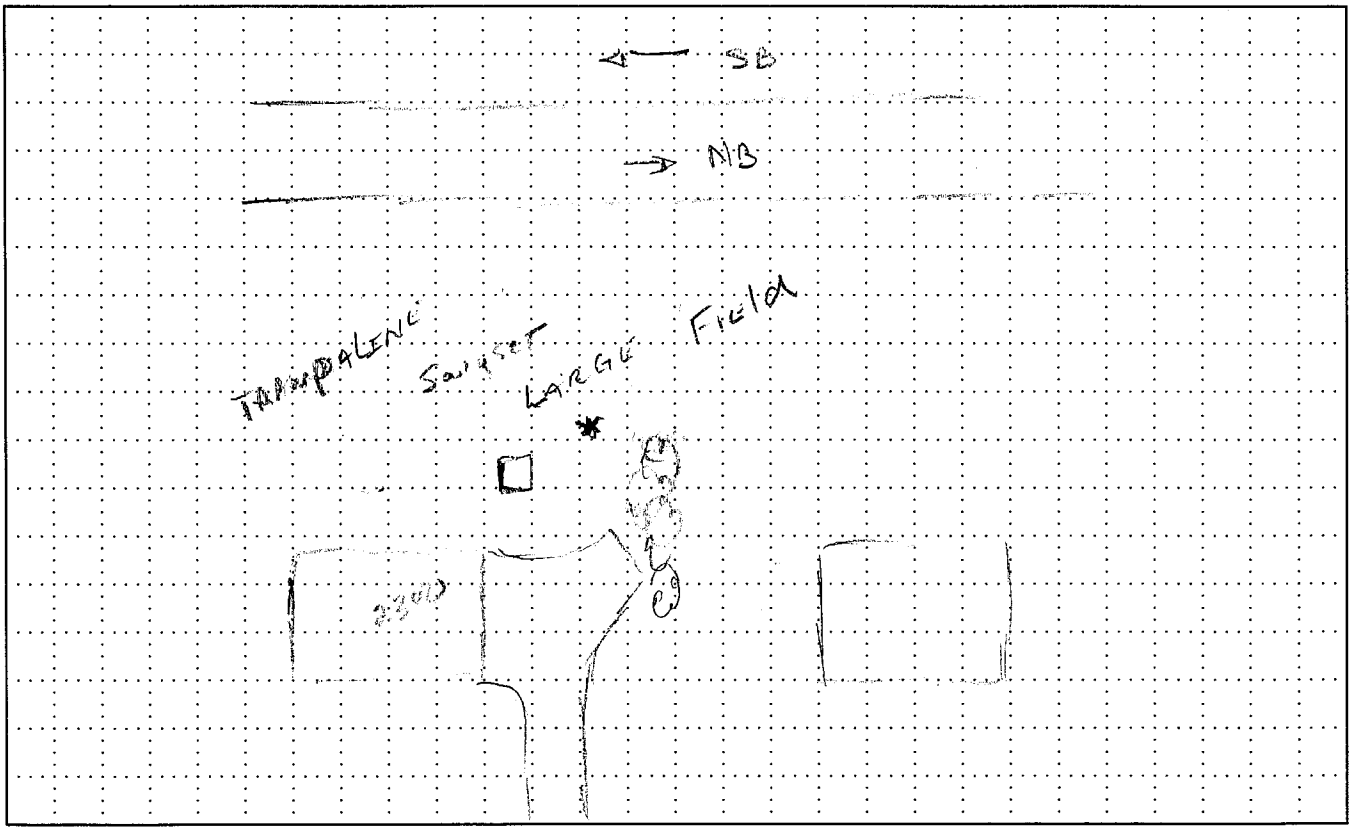
Time:	1st	start	12:16	stop	12:30	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	66.8	Lmax	78.1	Lmin	54.5	SEL	97.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	→ NB		Direction	SB ←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	275	825	auto	259	777	auto			auto		
med. trk.	20	60	med. trk.	8	24	med. trk.			med. trk.		
hvy trk.	76	228	hvy trk.	63	189	hvy trk.			hvy trk.		
bus	3	9	bus	0	0	bus			bus		
motorcycle	4	12	motorcycle	1	3	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-4-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID 15-2

Gannett Fleming, Inc.

ADDRESS: STEINSBURG RD

Meter Storage # 30

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s

SLM Calibration before 114.0 after

GPS PT

Weather: temperature wind speed 0-8 cloud cover 0

Time:	1st	start	12139	stop	12:59	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	67.1	Lmax	78.9	Lmin	55.2	SEL	97.9	
	2nd	Leq		Lmax		Lmin		SEL		

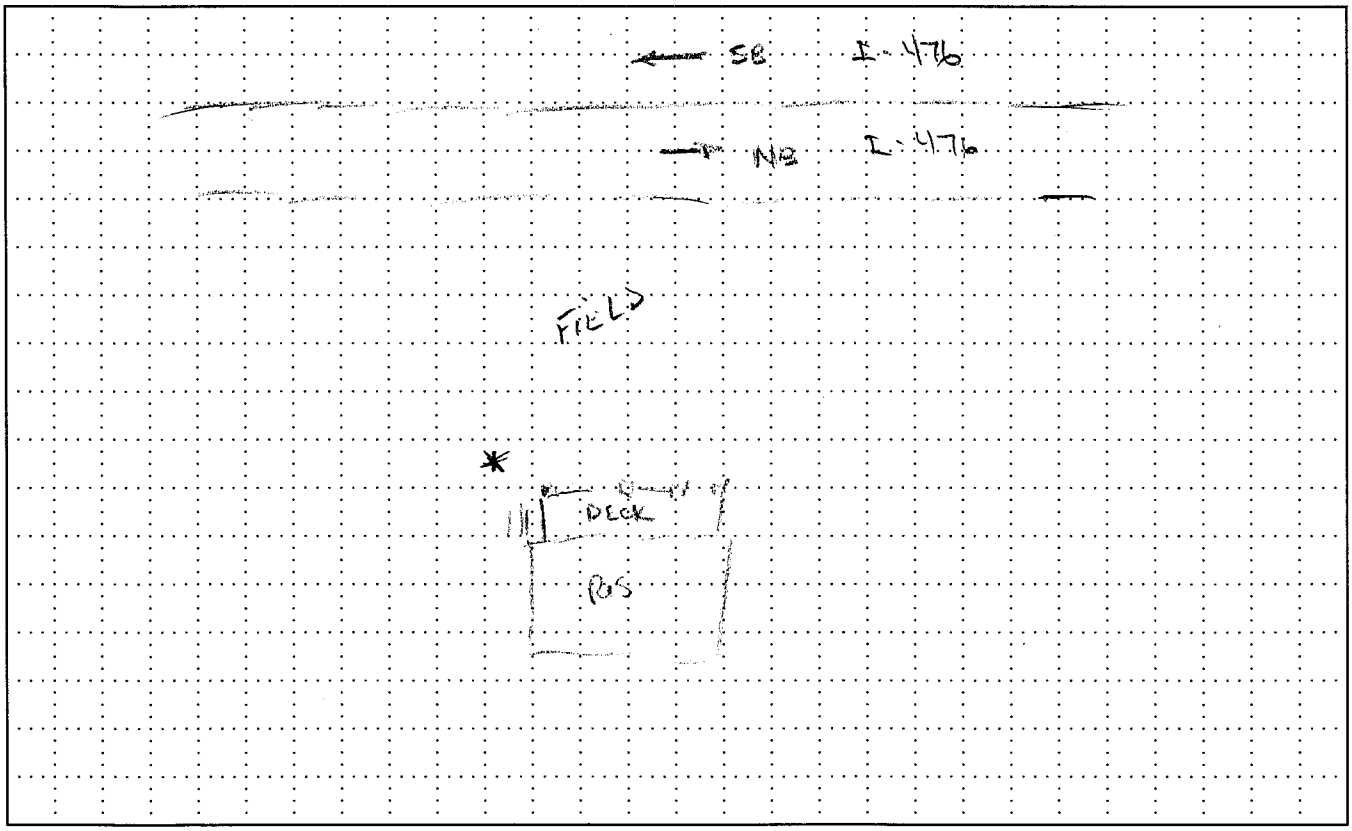
Traffic Data

Roadway#1	I-476		Roadway#2	I-476		Roadway#3			Roadway#4		
Direction	→ NB		Direction	← SB		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	254	762	auto	247	741	auto			auto		
med. trk.	16	48	med. trk.	11	33	med. trk.			med. trk.		
hvy trk.	105	315	hvy trk.	67	201	hvy trk.			hvy trk.		
bus	0	0	bus	0	0	bus			bus		
motorcycle	0	0	motorcycle	0	0	motorcycle			motorcycle		

NOTES: MEN unloading TRAILER - occassional bang

had to pause meter for Bobcat moving dirt -

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-6-13

PROJECT: I-476

JOB # 55398-102351

SITE ID 1S-3

Gannett Fleming, Inc.

ADDRESS: 2324 STEINSBURG RD

Meter Storage # 46

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 423-430 332-339

GPS PT 872

SLM Calibration before 114 after

Weather: temperature 60 wind speed 0- cloud cover 50%

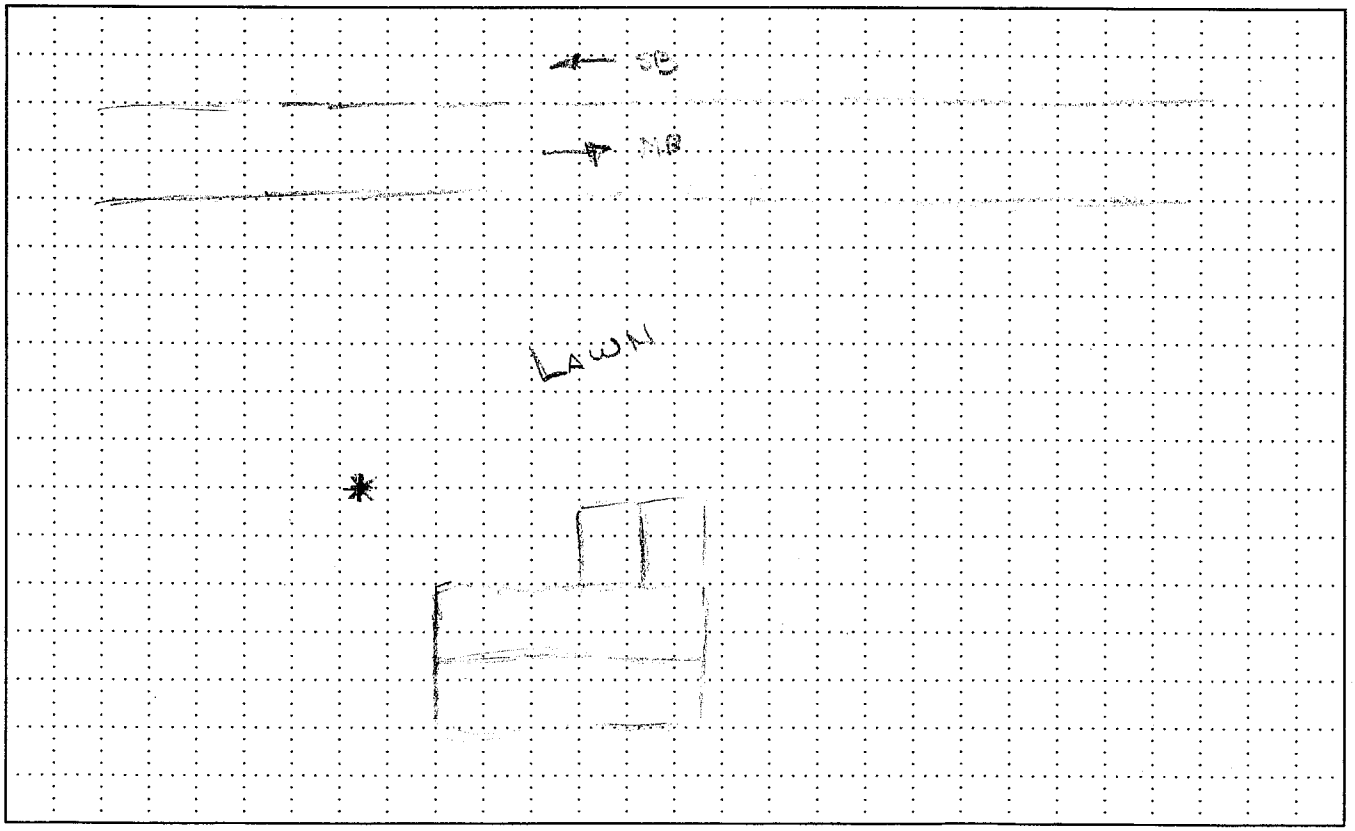
Time:	1st	start	7:52	stop	8:12	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	55.5	Lmax	65.5	Lmin	46.7	SEL	86.3
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I-476 NB		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	→		Direction	←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	335	1005	auto	302	906	auto			auto		
med. trk.	16	48	med. trk.	12	36	med. trk.			med. trk.		
hvy trk.	44	132	hvy trk.	22	66	hvy trk.			hvy trk.		
bus	0	0	bus	2	6	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 055398-102351-T1502

SITE ID 16-1

Gannett Fleming, Inc.

ADDRESS: 2400 STOUDT RD

Meter Storage # 16

TYPE ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

Photograph #'s 179-185 OR 88-94

GPS PT 832

SLM Calibration before 114 after

Weather: temperature 75.5 wind speed 0-5 cloud cover

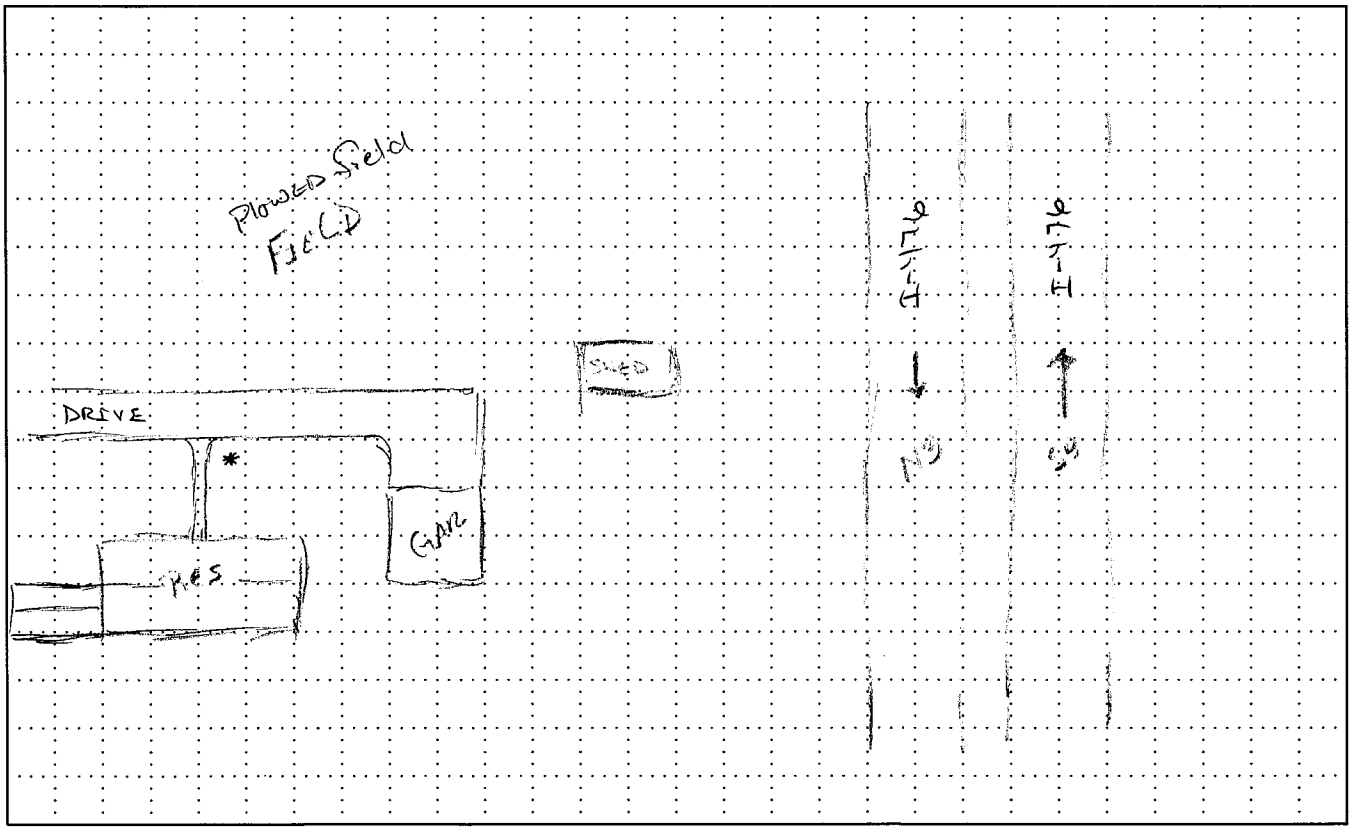
Time:	1st	start	11:16	stop	11:36	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	53.6	Lmax	67.6	Lmin	23.5	SEL	84.4	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I-476		Roadway#2	I-476 SB		Roadway#3			Roadway#4		
Direction	NB →		Direction	←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	340	1020	auto	267	801	auto			auto		
med. trk.	25	75	med. trk.	9	27	med. trk.			med. trk.		
hvy trk.	89	267	hvy trk.	65	195	hvy trk.			hvy trk.		
bus	8	24	bus	0	0	bus			bus		
motorcycle	0	0	motorcycle	0	0	motorcycle			motorcycle		

NOTES:

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476-

JOB # 055398-102351-T1802

SITE ID 16-2

Gannett Fleming, Inc.

ADDRESS: 2455 STOUDT RD

Meter Storage # 17

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

Measurement Data

Photograph #'s _____

GPS PT 833

SLM Calibration before 114.0 after 114.0

Weather: temperature 78.6 wind speed _____ cloud cover _____

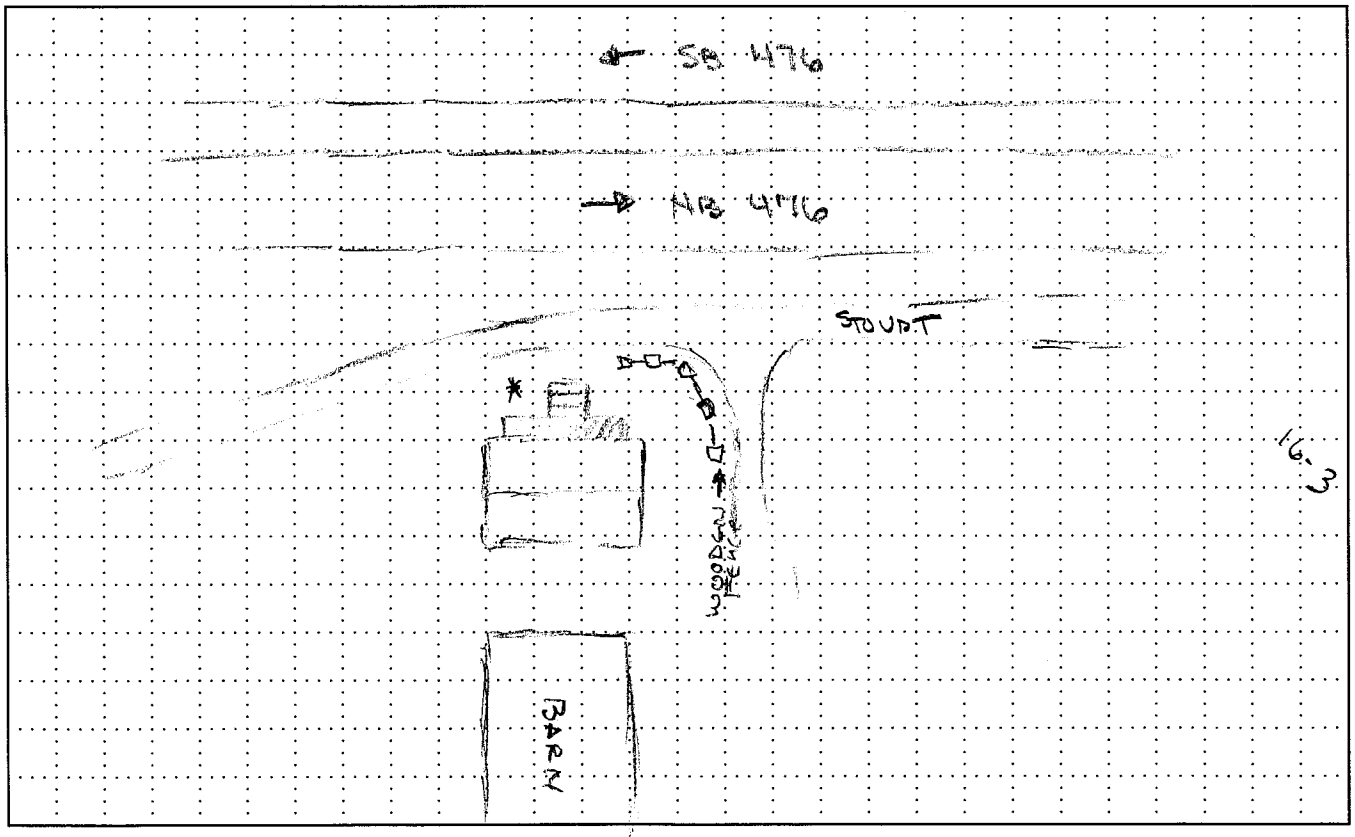
Time:	1st	start	11:50	stop	12:10	total	20			
	2nd	start		stop		total				
Data:	1st	Leq	63.8	Lmax	76.6	Lmin	49.9	SEL	94.5	
	2nd	Leq		Lmax		Lmin		SEL		

Traffic Data

Roadway#1	I476		Roadway#2	I476		Roadway#3			Roadway#4		
Direction			Direction			Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	282	846	auto	281	843	auto			auto		
med. trk.	14	42	med. trk.	9	27	med. trk.			med. trk.		
hvy trk.	85	255	hvy trk.	69	207	hvy trk.			hvy trk.		
bus	2	6	bus	0	0	bus			bus		
motorcycle	1	3	motorcycle	0	0	motorcycle			motorcycle		

NOTES: STACKS VISIBLE - TRUCKS DOMINANT NOISE / FAR LANE

SITE SKETCH



Highway Noise Monitoring Sheet

DATE: 6-3-13

PROJECT: I-476

JOB # 55398-102351-T1802

SITE ID 16-3

Gannett Fleming, Inc.

ADDRESS: 2525 STOUDT RD

Meter Storage # 15

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

Measurement Data

Photograph #'s 172-178 / 81-87

GPS PT 331

SLM Calibration before 114.0 after _____

Weather: temperature _____ wind speed 0-5 cloud cover 50%

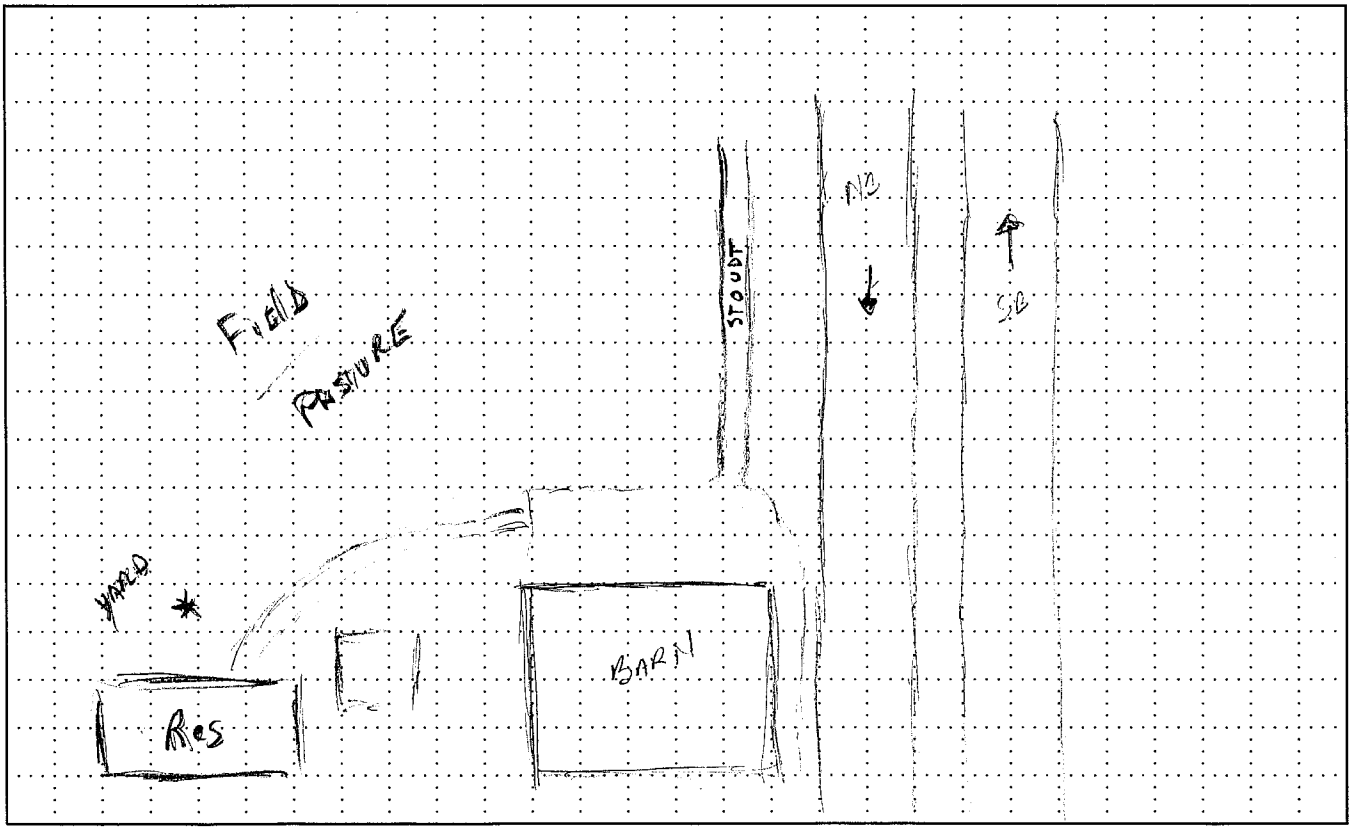
Time:	1st	start	10:40	stop	11:00	total	20		
	2nd	start		stop		total			
Data:	1st	Leq	60.1	Lmax	73.2	Lmin	43.9	SEL	90.9
	2nd	Leq		Lmax		Lmin		SEL	

Traffic Data

Roadway#1	I476 NB		Roadway#2	I-476-SB		Roadway#3			Roadway#4		
Direction	→		Direction	←		Direction			Direction		
	1st	2nd		1st	2nd		1st	2nd		1st	2nd
auto	412	1236	auto	191	573	auto			auto		
med. trk.	19	57	med. trk.	10	30	med. trk.			med. trk.		
hvy trk.	127	381	hvy trk.	41	123	hvy trk.			hvy trk.		
bus	4	12	bus	0	0	bus			bus		
motorcycle	1	3	motorcycle	4	12	motorcycle			motorcycle		

NOTES: _____

SITE SKETCH



APPENDIX B

Noise Meters
Certification of Calibration

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.28008

Instrument: **Microphone**
Model: **UC-59**
Manufacturer: **Rion**
Serial number: **00591**
Composed of:

Date Calibrated: **2/5/2013** *Cal Due:*

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

Contains non-accredited tests: **__Yes _X_ No**

Customer: **Environmental Acoustics, Inc.**
Tel/Fax: **717-737-4751 / -4754**
Address: **1400 Hummel Avenue**
Lemoyne, PA 17043

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

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	25747	Jul 2, 2012	Scantek, Inc./ NVLAP	Jul 2, 2013
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 20, 2012	ACR Env. / A2LA	Nov 20, 2013
DPI 141-Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Sep 6, 2012	ACR Env / A2LA	Mar 6, 2014
PC Program 1017 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Dec 14, 2012	Scantek, Inc./ NVLAP	Dec 14, 2013
1203-Norsonic	Preamplifier	14059	Jan 4, 2013	Scantek, Inc./ NVLAP	Jan 4, 2014
4180-Bruel&Kjaer	Microphone	2246115	Nov 21, 2011	NPL-UK / UKAS	Nov 21, 2013

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

Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature		Signature	
Date	2/05/2013	Date	2/6/2013

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.28011

Instrument: **Microphone**
Model: **UC-59**
Manufacturer: **Rion**
Serial number: **00699**
Composed of:

Date Calibrated: **2/5/2013** *Cal Due:*

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

Contains non-accredited tests: __Yes _X_ No

Customer: **Environmental Acoustics, Inc.**
Tel/Fax: **717-737-4751 / -4754**
Address: **1400 Hummel Avenue**
Lemoyne, PA 17043

Tested in accordance with the following procedures and standards:
Calibration of Measurement Microphones, Scantek, Inc., Rev. 11/30/2010

Instrumentation used for calibration: N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
4838-Norsonic	SME Cal Unit	25747	Jul 2, 2012	Scantek, Inc./ NVLAP	Jul 2, 2013
DS-360-SRS	Function Generator	61646	Nov 20, 2012	ACR Env./ A2LA	Nov 20, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY41022043	Nov 20, 2012	ACR Env. / A2LA	Nov 20, 2013
DPI 141 Druck	Pressure Indicator	790/00-04	Nov 21, 2012	ACR Env./ A2LA	Nov 21, 2014
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Sep 6, 2012	ACR Env./ A2LA	Mar 6, 2014
PC Program 1017 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1253-Norsonic	Calibrator	28326	Dec 14, 2012	Scantek, Inc./ NVLAP	Dec 14, 2013
1203-Norsonic	Preamplifier	14059	Jan 4, 2013	Scantek, Inc./ NVLAP	Jan 4, 2014
4180-Brüel&Kjaer	Microphone	2246115	Nov 21, 2011	NPL-UK / UKAS	Nov 21, 2013

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

Calibrated by:	Valentin Buzduga	Authorized signatory:	Mariana Buzduga
Signature		Signature	
Date	2/05/2013	Date	2/6/2013

Document stored as: Z:\Calibration Lab\Mic 2013\Rion59_00699_M1.doc

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.28007

Instrument:	**Sound Level Meter**	*Date Calibrated:* **2/5/2013**	*Cal Due:*
Model:	**NA28**	*Status:*	**Received** / **Sent**
Manufacturer:	**Rion**	*In tolerance:*	X / X
Serial number:	**00870496_80430.000**	*Out of tolerance:*	
Tested with:	**Microphone UC-59 s/n 00591**	*See comments:*	
	Preamplifier NH23 s/n 70511	*Contains non-accredited tests:*	**__Yes X No**
Type (class):	**1**	*Calibration service:*	**__ Basic X Standard**
Customer:	**Environmental Acoustics, Inc.**	*Address:*	**1400 Hummel Avenue,**
Tel/Fax:	**717-737-4751 / 717-737-4754**		**Lemoyne, PA 17043**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
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	Sep 14, 2012	Scantek, Inc./ NVLAP	Sep 14, 2013
DS-360 SRS	Function Generator	33584	Sep 9, 2011	ACR Env./ A2LA	Sep 9, 2013
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 12, 2012	ACR Env. / A2LA	Sep 12, 2013
HM30-Thommen	Meteo Station	1040170/39633	Dec 6, 2012	ACR Env./ A2LA	Dec 6, 2013
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Dec 14, 2012	Scantek, Inc./ NVLAP	Dec 14, 2013

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 (%)
24.1 °C	99.790 kPa	30.4 %RH

Calibrated by:	Preston Mackin	**Authorized signatory:**	Mariana Buzduga
Signature	Preston Mackin	Signature	
Date	2/5/2013	Date	2/6/2013

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.28010

Instrument:	**Sound Level Meter**	*Date Calibrated:*	**2/5/2013** *Cal Due:*
Model:	**NA28**	*Status:*	**Received** / **Sent**
Manufacturer:	**Rion**	*In tolerance:*	X / X
Serial number:	**01170630_80427.000**	*Out of tolerance:*	
Tested with:	**Microphone UC-59 s/n 00699**	*See comments:*	
	Preamplifier NH23 s/n 70648	*Contains non-accredited tests:*	__Yes X No
Type (class):	**1**	*Calibration service:*	__ Basic X Standard
Customer:	**Environmental Acoustics, Inc.**	*Address:*	**1400 Hummel Avenue,**
Tel/Fax:	**717-737-4751 / 717-737-4754**		**Lemoyne, PA 17043**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
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	Sep 14, 2012	Scantek, Inc./ NVLAP	Sep 14, 2013
DS-360-SRS	Function Generator	33584	Sep 9, 2011	ACR Env./ A2LA	Sep 9, 2013
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 12, 2012	ACR Env. / A2LA	Sep 12, 2013
HM30 Thommen	Meteo Station	1040170/39633	Dec 6, 2012	ACR Env./ A2LA	Dec 6, 2013
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	
1251 Norsonic	Calibrator	30878	Dec 14, 2012	Scantek, Inc./ NVLAP	Dec 14, 2013

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 °C	99.570 kPa	30.7 %RH

Calibrated by:	Preston Mackin	Authorized signatory:	Mariana Buzduga
Signature	Preston Mackin	Signature	
Date	2/5/2013	Date	2/6/2013

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.28009

Instrument:	**Acoustical Calibrator**
Model:	**NC-74**
Manufacturer:	**Rion**
Serial number:	**01200033_80289.000**
Class (IEC 60942):	**1**
Barometer type:	
Barometer s/n:	

Date Calibrated: **2/5/2013** *Cal Due:*

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

Contains non-accredited tests: __Yes _X_ No

Customer:	**Environmental Acoustics, Inc.**	*Address:*	**1400 Hummel Avenue,**
Tel/Fax:	**717-737-4751 / 717-737-4754**		**Lemoyne, PA 17043**

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. Lab / Accreditation	Cal. Due
4838-Norsonic	SME Cal Unit	31052	Sep 14, 2012	Scantek, Inc./ NVLAP	Sep 14, 2013
DS-360-SRS	Function Generator	33584	Sep 9, 2011	ACR Env./ A2LA	Sep 9, 2013
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 12, 2012	ACR Env. / A2LA	Sep 12, 2013
HM30-Thommen	Meteo Station	1040170/39633	Dec 6, 2012	ACR Env./ A2LA	Dec 6, 2013
8903-HP	Audio Analyzer	2514A05691	Dec 1, 2010	ACR Env. / A2LA	Dec 1, 2013
PC Program 1018 Norsonic	Calibration software	v.5.2	Validated March 2011	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	950698	Dec 14, 2012	Scantek, Inc. / NVLAP	Dec 14, 2013
1203-Norsonic	Preamplifier	14052	Nov 19, 2012	Scantek, Inc./ NVLAP	Nov 19, 2013

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

Calibrated by:	Preston Mackin	Authorized signatory:	Mariana Buzduga
Signature	Preston Mackin	Signature	
Date	2/5/2013	Date	2/6/2013

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2013-168235

Instrument Model 706, Serial Number 01595, was calibrated on 02JAN2013. The instrument meets factory specifications per Procedure D0001.8035, ANSI S1.4-Type 2 1983, ANSI S1.25-Type 2 1991, IEC 60651-Type 2 1979, IEC 60804-Type 2 1985 and IEC 61252-am1-2000.

Instrument found to be in calibration as received: NO
Date Calibrated: 02JAN2013
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigCn/2209	0589 / 0103	12 Months	12DEC2013	2012-167424

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 19 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data unavailable due to unit failure.

Signed: Nick Rasmussen
Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2013-168236

Instrument Model MPR002, Serial Number B0565, was calibrated on 02JAN2013. The instrument meets factory specifications per Procedure D0001.8159.

Instrument found to be in calibration as received: NO
Date Calibrated: 02JAN2013
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0612 / 0102	12 Months	06JAN2013	2012-163446
PCB	377A13	126869	12 Months	09MAR2013	2012-156214
PCB	426B03	1603	12 Months	18APR2013	2012-157947

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 19 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

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Signed: Nick Rasmussen

Technician: Nick Rasmussen

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

APPENDIX C

Traffic Data

PA Turnpike NB Lanes					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	24728	ADT	Existing Count Year
Build ADT	2019	=	29064	ADT	Build Year
Projected ADT	2039	=	43527	ADT	Design Year

PA Turnpike SB Lanes					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	24719	ADT	Existing Count Year
Build ADT	2019	=	29053	ADT	Build Year
Projected ADT	2039	=	43511	ADT	Design Year

NB Acceleration Ramp (On Ramp C)					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	3319	ADT	Existing Count Year
Build ADT	2019	=	3901	ADT	Build Year
Projected ADT	2039	=	5842	ADT	Design Year

SB Acceleration Ramp (On Ramp A)					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	5644	ADT	Existing Count Year
Build ADT	2019	=	6634	ADT	Build Year
Projected ADT	2039	=	9935	ADT	Design Year

NB Deceleration Ramp (Off Ramp D)					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	5778	ADT	Existing Count Year
Build ADT	2019	=	6791	ADT	Build Year
Projected ADT	2039	=	10171	ADT	Design Year

SB Deceleration Ramp (Off Ramp B)					
County	BUCKS				
Growth Rate	2.04				
Count Year	2011	=	3161	ADT	Existing Count Year
Build ADT	2019	=	3715	ADT	Build Year
Projected ADT	2039	=	5564	ADT	Design Year

Mainline 2011 AADT

	A-31 to A-44		A-44 to A-56	
	NB	SB	NB	SB
Total	24,728	24,719	22,269	22,236
Class 1	20,948	20,874	18,557	18,466
Class 2	764	836	733	801
Class 3	219	243	209	233
Class 4	867	673	856	660
Class 5	931	878	934	853
Class 6	400	534	402	537
Class 7	587	657	568	665
Class 8	11	23	10	22
Class 9	1	1	0	1

Design Hourly Volumes (DHV) and corresponding daily traffic

	A-31 to A-44		A-44 to A-56	
	NB	SB	NB	SB
9% **DHV**	3,057	2,642	2,768	2,710
6.5% **Trucks**	6.6%	6.3%	8.0%	5.5%
Daily Volume	31,988	28,630	36,118	30,913

Based on Field Observation, our spilt between Heavy Truck and Medium Truck is 81% and 19%.

Heavy Truck is three axles and above. Medium Truck is similar to local truck delivery "Fedex/ UPS"

Quakertown Interchange AADT

	Quakertown I/C	
	Entry	Exit
Total	9,098	9,100
Class 1	8,146	8,157
Classes 2-9	952	943

Growth Rate

2.04% per year for all segments as well as the interchange

SR 0663					
County	**BUCKS**				
Growth Rate	1.43				
Count Year	2014	=	24182	**ADT**	**Existing Count Year**
Build ADT	2019	=	25961	**ADT**	**Build Year**
Projected ADT	2039	=	34487	**ADT**	**Design Year**

Approach	2039 Peak Hour Volumes	
	AM	PM
NB On-Ramp	323	382
NB Off-Ramp	461	1480
SB On-Ramp (from WB SR 0663)	1006	403
SB On-Ramp (from EB SR 0663)	485	129
SB Off-Ramp	379	495
EB SR 0663 @ SB Ramps	1196	891
WB SR 0663 @ SB Ramps	635	1653

SITE NO: 24895	
County	BUCKS (09)
Route	0663
Segment	0050
Dir	N
Current Avg Daily Traffic	12694
Current Avg Daily Truck Volume	901
K Factor	9
D Factor	65
T Factor	4
Truck Percent	7
Base Traffic Year	2013
Traffic Pattern Group	URBAN - OTHER PRINCIPAL ARTERIALS

SITE NO: 24895	
County	BUCKS (09)
Route	0663
Segment	0051
Dir	S
Current Avg Daily Traffic	11488
Current Avg Daily Truck Volume	837
K Factor	9
D Factor	65
T Factor	4
Truck Percent	7
Base Traffic Year	2013
Traffic Pattern Group	URBAN - OTHER PRINCIPAL ARTERIALS