Final Noise Impact Analysis Report

S.R. 0015, Section 088

Central Susquehanna Valley Transportation Project Northern Section

Northumberland and Union Counties, Pennsylvania

Prepared for:

PennDOT District 3-0

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December 2017
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pennsylvania
DEPARTMENT OF TRANSPORTATION

March 26, 2018

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

Dear Ms. Sigel:

Attached for your review is the Final Design Noise Analysis Report for the S.R. 0015, Section 088 Central Susquehanna Valley Transportation Project Northern Section, Northumberland and Union Counties, Pennsylvania. As no noise walls are recommended, no public outreach needs to be documented.

The Bureau of Project Delivery concurs with the findings of the report in accordance with *Publication 24, Project Level Highway Traffic Noise Handbook.* Please sign below to approve the report. You may provide comments to Kathryn McKelvey at kmckelvey@pa.gov. She can be reached at 717-346-7674 with any questions regarding this request.

Sincerely,

/s/ Mark D. Lombard

Mark D. Lombard, Chief
Environmental Policy and Development Section
Bureau of Project Delivery

Aproval KEITH LYNCH Digitally signed by KEITH LYNCH DN: c=US, o=U.S. Government, ou=FHWA FHWAHarrisburgPA, ou=DOT FHWAHarrisburgPA, cn=KEITH LYNCH Date: 2018.04.04 09:54:30 -04'00' Date_____
FHWA Division Office

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S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Northumberland and Union Counties, PA
PennDOT District 3-0

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EXECUTIVE SUMMARY

The Pennsylvania Department of Transportation (PennDOT) Engineering District 3-0 has initiated the final design for the construction of the Central Susquehanna Valley Transportation Project (CSVT). The CSVT Project is proposed as an approximate 13-mile, four-lane, limited access highway from the existing Selinsgrove Bypass (U.S. Routes 11/S.R. 0015) in Monroe Township, Snyder County, just north of Selinsgrove, to S.R. 0147 in West Chillisquaque Township, Northumberland County, just south of the interchange between S.R. 0147 and S.R. 0045. The CSVT Project will reduce congestion on study area roadways, improve safety and accessibility, and support the expected population and economic growth in the Central Susquehanna Valley area of Snyder, Union, and Northumberland Counties, Pennsylvania.

This analysis includes Section 2, the northern section, of the project comprised of the River Crossing 5 (RC5) Preferred Alternative located in Union and Northumberland Counties. The RC5 alternative extends from just south of the proposed interchange at S.R. 0015 near Winfield to S.R. 0147, south of the S.R. 0147/Route 45 interchange (northern terminus). Noise abatement in the form of a noise barrier was proposed for one location during the Alternatives Analysis Phase of the project in February 2003. Due to the significant length of time that has passed, changes in Federal Highway Administration (FHWA) and PennDOT noise regulations, and the advancements in prediction software over what was used during that analysis (STAMINA 2.0/OPTIMA vs. TNM 2.5), a complete re-analysis of the RC5 corridor has been conducted.

This report addresses the potential for noise impacts based on the noise analysis performed during the final design engineering phase of this project. Traffic noise impact analysis and abatement measures were evaluated according to the methodology and procedures set forth by the FHWA in Federal-Aid Policy Guide Title 23 Code of Federal Regulations, Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise" (July 2010); and the Pennsylvania Department of Transportation (PennDOT) in the *Project Level Highway Traffic Noise Handbook, Publication No. 24* (November 2015).

This effort has focused on all noise sensitive land uses in proximity to the proposed roadway alignment. During field reconnaissance it was observed that property acquisitions had taken place within two Noise Study Areas (NSAs) identified in the Noise Monitoring Work Plan (NSA 15 and NSA 16); therefore, these NSAs were removed from further analysis. In addition, due to the location of NSA 1 to the proposed alignment, it has been removed from this analysis and will be included in its entirety during the final design analysis for the southern section of the CSVT project. A total of 20 NSAs were retained for this analysis, and noise monitoring was conducted at 46 representative sites within the project study area in August 2014. The monitoring data were used to develop computer models capable of predicting the Worst-Case noise levels for existing and future roadway conditions. When Existing Worst-Case traffic is applied, noise levels were predicted to range from 34 decibels (dB[A]) to 72 dB(A), with levels at or above the requisite Noise Abatement Criteria (NAC) for the specific land use at 16 receptors involving six of the 20 NSAs retained for this analysis.

Travel volumes are expected to increase by 1.5 percent for cars and 3 percent for heavy vehicles annually from 2014 to the design year 2044; traffic data is found in Appendix B. The 2044 No-

Build traffic noise levels throughout the project area range from 37 dB(A) to 76 dB(A), with an average increase of 3 dB(A) over TNM-calculated existing conditions. The geographic concentration of elevated noise levels is consistent with those identified in the Existing Worst-Case scenario.

The existing conditions noise model was then modified to incorporate the proposed alternative design as well as changes to the existing roadways and the surrounding topography. This revised model was used to predict design year (2044) Build traffic noise levels at all of the monitored and modeled-only receptor locations. With the proposed improvements, 2044 Build traffic noise levels through the corridor range from 36 dB(A) to 77 dB(A), with an average increase of 8 dB(A) over the predicted existing conditions.

Design year traffic noise impacts were identified within 14 of the 20 NSAs. Therefore, abatement consideration is warranted for NSAs 2, 3, 5, 6, 7, 8, 9, 12, 14, 17, 18, 19, 20, and 22 within the project corridor. No traffic noise impacts were identified for NSAs 4, 10, 11, 13, 21, and 23. NSAs where no impacts were identified do not warrant abatement consideration; therefore, no further analysis was performed for those NSAs.

Since noise impacts have been identified, this study included an evaluation of noise abatement. Alternative forms of abatement can be effective under certain circumstances. These include acquisition of additional right-of-way (ROW) for installing barriers or earthen berms, inclusion of traffic control measures, and modification of the alignment. Given the nature of the proposed roadway through the project area, restrictions on travel speeds or truck traffic utilization to control noise would not serve the roadway's intended function and would be difficult to enforce. Therefore, this study focused on vertical noise barriers as the only abatement consideration.

Abatement in the form of noise barriers was investigated for each NSA that was identified to contain an impacted receptor. Noise barriers were found to provide feasible mitigation to receptors within six of the 14 impacted NSAs, with average noise reductions ranging from 5 dB(A) to 11 dB(A). Table 1 provides a summary of optimized noise barriers that were considered for each of the impacted NSAs. None of the barriers investigated for this analysis were determined to meet all of the criteria for reasonableness according to the guidance established within PennDOT's Publication No. 24. Therefore, no barriers are recommended for any of the impacted NSAs within the northern section of the CSVT project. Details for all of the investigated noise barriers can be found in Section 5.0 and the appendices of this document.

All impacts to NSA 12 have been determined to originate from the existing S.R. 0147 roadway. The proposed CSVT roadway and the relocated Ridge Road provide no traffic noise influence to these receptors. As such, no feasible noise barrier could be designed for NSA 12 without restricting direct driveway access to the four residential properties identified as being impacted. Therefore, no barrier is presented in Table 1 for this NSA.

Table 1. Summary of Noise Abatement Analysis.

Feasible and Reasonable Criteria:	NSA 2 Optimized Barrier	NSA 3 Optimized Barrier	NSA 5 Optimized Barrier	NSA 6 Optimized Barrier	NSA 7 Optimized Barrier	NSA 8 Optimized Barrier	NSA 9 Optimized Barrier
Barrier Area (ft^2)	15,001	84,005	33,072	29,280	19,152	14,316	44,256
Total Number of Impacted Receptors	2	10	24	6	6	1	6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0	9	1	4	1	0	4
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0%	90%	4%	67%	17%	0%	67%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	*No*	*Yes*	*No*	*Yes*	*No*	*No*	*Yes*
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	0	9	1	4	1	0	4
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	15,001	9,334	33,072	7,320	19,152	14,316	11,064
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Average Noise Reduction for Benefited Receptors (dB[A])	0	5	6	5	5	0	6
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	*No*	*No*	*No*	*No*	*No*	*No*	*Yes*
Total Barrier Length (ft)	1,400	3,400	3,216	3,024	1,344	1,081	2,688
Barrier Height Range (ft)	7 to 12	21 to 25	4 to 10	6 to 10	11 to 19	8 to 14	10 to 20
Average Barrier Height (ft)	10.7	24.7	10.3	9.7	14.3	13.2	16.4

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Feasible and Reasonable Criteria:	NSA 14 Optimized Barrier	NSA 17 Optimized Barrier	NSA 18 Optimized Barrier	NSA 19 Optimized Barrier	NSA 20 Optimized Barrier	NSA 22 Optimized Barrier
Barrier Area (ft^2)	31,679	32,833	19,392	41,519	27,552	24,672
Total Number of Impacted Receptors	2	4	1	4	3	6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0	0	1	3	1	5
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0%	0%	100%	75%	33%	83%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	*No*	*No*	*Yes*	*Yes*	*No*	*Yes*
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	0	0	2	4	1	6
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	31,679	32,833	9,696	10,380	27,552	4,112
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	*No*	*No*	*No*	*No*	*No*	*No*
Average Noise Reduction for Benefited Receptors (dB[A])	0	0	6	8	6	11
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	*No*	*No*	*Yes*	*Yes*	*No*	*Yes*
Total Barrier Length (ft)	1,776	2,736	1,008	1,920	1,248	1,824
Barrier Height Range (ft)	14 to 21	9 to 14	15 to 20	14 to 25	15 to 25	8 to 15
Average Barrier Height (ft)	17.8	12.0	19.2	21.6	22.1	13.5

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

TABLE OF CONTENTS

Executive Summary ..... *i*
Table of Contents ..... *iv*
List of Illustrations ..... *vi*

1.0 INTRODUCTION 1

2.0 METHODOLOGY 2
2.1 Analytical Procedures 2
2.2 Evaluation Criteria 4
2.2.1 Warranted Criteria 4
2.2.2 Feasibility Criteria 5
2.2.3 Reasonableness Criteria 6
2.3 Noise Abatement Measures 6

3.0 EXISTING HIGHWAY TRAFFIC NOISE ENVIRONMENT (MONITORED DATA) 7
3.1 Identification of Noise Study Areas 7
3.1.1 Noise Study Area 2 (see Figure 2A) 8
3.1.2 Noise Study Area 3 (see Figure 2A) 8
3.1.3 Noise Study Area 4 (see Figure 2A) 8
3.1.4 Noise Study Area 5 (see Figure 2B) 8
3.1.5 Noise Study Area 6 (see Figure 2B) 8
3.1.6 Noise Study Area 7 (see Figures 2B and 2C) 9
3.1.7 Noise Study Area 8 (see Figures 2B and 2C) 9
3.1.8 Noise Study Area 9 (see Figure 2C) 9
3.1.9 Noise Study Area 10 (see Figure 2C) 9
3.1.10 Noise Study Area 11 (see Figure 2C) 9
3.1.11 Noise Study Area 12 (see Figure 2C) 9
3.1.12 Noise Study Area 13 (see Figure 2D) 10
3.1.13 Noise Study Area 14 (see Figure 2D) 10
3.1.14 Noise Study Area 17 (see Figure 2E) 10
3.1.15 Noise Study Area 18 (see Figure 2E) 10
3.1.16 Noise Study Area 19 (see Figures 2E and 2F) 10
3.1.17 Noise Study Area 20 (see Figures 2E and 2F) 11
3.1.18 Noise Study Area 21 (see Figure 2F) 11
3.1.19 Noise Study Area 22 (see Figure 2F) 11
3.1.20 Noise Study Area 23 (see Figure 2A) 11
3.2 Short-Term Noise Monitoring 11

4.0 FUTURE HIGHWAY TRAFFIC NOISE ENVIRONMENT (EXISTING AND FUTURE MODELED) 15
4.1 Validation of Noise Modeling 15
4.2 Loudest-Hour TNM Calculations 16
4.2.1 Existing TNM-Calculated Sound Levels 18
4.2.2 Future (2044) No-Build Condition TNM-Calculated Sound Levels 23
4.2.3 Future (2044) Build Condition TNM-Calculated Sound Levels 23

5.0 HIGHWAY TRAFFIC NOISE CONSIDERATION AND MITIGATION ALTERNATIVES 29
5.1 Mitigation Alternatives 29
5.2 Noise Barrier Evaluation 30
5.2.1 Detailed Noise Barrier Descriptions 30
5.2.2 Summary of Results and Recommendations 69
6.0 CONSTRUCTION NOISE CONSIDERATION AND MITIGATION ALTERNATIVES 70
7.0 SUMMARY AND CONCLUSIONS 71

Bibliography

Appendices
Appendix A: 24-Hour and Short-Term Monitoring Data
Appendix B: Traffic Data
Appendix C: Figures
Appendix D: Warranted, Feasible, and Reasonable Worksheets
Appendix E: List of Preparers

LIST OF ILLUSTRATIONS

Figures

1. Project Location Map ..... Appendix C
2A to 2F. Noise Study Areas ..... Appendix C

Tables

Table 1. Summary of Noise Abatement Analysis..... *iii*
Table 2. FHWA Noise Abatement Criteria (NAC) Hourly A-Weighted Sound Level – Decibels (dB[A]).... 5
Table 3. Validation Results (Monitored vs. TNM-Calculated Sound Levels). 17
Table 4.TNM-Calculated Existing (2014) and Future (2044) Loudest-Hour Sound Levels..... 19
Table 5. NSA 2 – Barrier Analysis Results 33
Table 6. NSA 3 – Barrier Analysis Results 36
Table 7. NSA 5 – Barrier Analysis Results 39
Table 8. NSA 6 – Barrier Analysis Results 42
Table 9. NSA 7 – Barrier Analysis Results 45
Table 10. NSA 8 – Barrier Analysis Results 48
Table 11. NSA 9 – Barrier Analysis Results 51
Table 12. NSA 14 – Barrier Analysis Results 55
Table 13. NSA 17 – Barrier Analysis Results 56
Table 14. NSA 18 – Barrier Analysis Results 59
Table 15. NSA 19 – Barrier Analysis Results 62
Table 16. NSA 20 – Barrier Analysis Results 65
Table 17. NSA 22 – Barrier Analysis Results 68

1.0 Introduction

1.0 INTRODUCTION

The Pennsylvania Department of Transportation (PennDOT) Engineering District 3-0 has initiated the final design for the construction of the Central Susquehanna Valley Transportation Project (CSVT). The CSVT Project is proposed as an approximate 13-mile, four-lane, limited access highway from the existing Selinsgrove Bypass (U.S. Routes 11/S.R. 0015) in Monroe Township, Snyder County, just north of Selinsgrove, to S.R. 0147 in West Chillisquaque Township, Northumberland County, just south of the interchange between S.R. 0147 and S.R. 0045 (Figure 1, Appendix C). The CSVT Project will reduce congestion on study area roadways, improve safety and accessibility, and support the expected population and economic growth in the Central Susquehanna Valley area of Snyder, Union, and Northumberland Counties, Pennsylvania.

This analysis includes Section 2, the northern section, of the project comprised of the River Crossing 5 (RC5) Preferred Alternative located in Union and Northumberland Counties. The RC5 alternative extends from just south of the proposed interchange at S.R. 0015 near Winfield to S.R. 0147, south of the S.R. 0147/Route 45 interchange (northern terminus). Noise abatement in the form of a noise barrier was proposed for one location during the Alternatives Analysis Phase of the project in February 2003. Due to the significant length of time that has passed, changes in Federal Highway Administration (FHWA) and PennDOT noise regulations, and the advancements in prediction software over what was used during that analysis (STAMINA 2.0/OPTIMA vs. TNM 2.5), a complete re-analysis of the RC5 corridor has been conducted.

This report addresses the potential for noise impacts based on the noise analysis performed during the final design engineering phase of this project. The purpose of the traffic noise study is to 1) determine if project-related noise impacts will occur, and 2) determine whether noise abatement for affected areas in the form of noise barriers or other mitigation measures would be warranted, feasible, and reasonable, based upon FHWA and PennDOT criteria.

2.0 Methodology

2.0 METHODOLOGY

Traffic noise impact analysis and abatement measures were evaluated according to the methodology and procedures set forth by the FHWA in Federal-Aid Policy Guide Title 23 Code of Federal Regulations, Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 2010), and PennDOT in the *Project Level Highway Traffic Noise Handbook, Publication No. 24* (November 2015).

Per FHWA/PennDOT noise guidance, the construction of a highway on a new alignment qualifies as a Type I project. A Type I project, per PennDOT's *Publication No. 24* (November 2015), is a project considered for noise abatement that involves the construction of a highway on a new location or the physical alteration of an existing highway, which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.

2.1 Analytical Procedures

Noise studies involve monitoring and modeling components. Noise monitoring for this project was conducted at 46 representative receptor locations dispersed throughout the 20 NSAs located within the project corridor. The noise short-term monitoring was performed in August 2014 using four RION NL-22 sound level meters. To ensure accurate readings, the meters were field calibrated prior to each daily monitoring session with the RION sound level meters' internal calibrators. These monitors are laboratory calibrated annually to ensure accurate recordings of sound level data. The laboratory calibration certificates are included in Appendix A. To ensure a free-flowing traffic noise source capable of reproduction within the noise models, periods of peak traffic congestion were noted and avoided for use as monitoring sessions. "Typical" free-flow conditions were present during all monitoring periods. Short-term monitoring is described in Section 3.2 of this report.

Additionally, 24-hour monitoring was conducted at four locations between August 20 and August 22, 2014. On August 20, 2014, one meter was placed in NSA 2 on the southbound side of S.R. 0015; another was placed in NSA 3 on the northbound side of S.R. 0015. On August 21, 2014, one meter was placed in NSA 22 on the southbound side of S.R. 0147, and the other in NSA 21 on the northbound side of S.R. 0147 (refer to Figures 2A and 2F in Appendix C). The

24-hour data revealed that noise levels along the S.R. 0015 range from 61 dB(A) to 78 dB(A). The peak noise hour identified for S.R. 0015 was approximately between 3:00 PM and 4:00 PM. In addition, the data further revealed significant variations throughout the daytime hours (approximately 4 to 8 dB[A] between 4:00 AM to 10:00 PM).

The 24-hour data for S.R. 0147 revealed that noise levels along S.R. 0147 range from 70 dB(A) to 76 dB(A). The peak noise hour identified for S.R. 0147 was approximately between 3:00 PM and 5:00 PM. In addition, the data further revealed little variation in the noise levels throughout the daytime hours (approximately 3 dB[A] between 7:00 AM to 10:00 PM).

In order to accurately validate the traffic noise model, comprehensive traffic data were gathered concurrent to the short-term monitoring periods (Appendix A). Traffic speeds, number of vehicles, and compositions were noted during the monitoring periods, allowing for accurate computer model validation. See Section 4.1 for details regarding the noise model validation process. Once a model is validated, it allows for accurate prediction of Existing and Future No-Build and Build Worst-Case traffic noise impacts. Additionally, other significant localized factors affecting the recorded noise levels were noted, such as non-traffic noise sources (e.g., aircraft flyovers, train horns, barking dogs, etc.) and intervening terrain.

The FHWA, under the U.S. Department of Transportation (USDOT), has developed and refined the methodology employed to model and predict traffic noise levels in this study. The latest computer model, the FHWA Traffic Noise Model version 2.5 (TNM), predicts highway traffic noise levels at user-defined receptors and aids in the design of highway noise barriers. TNM includes a database of speed-related noise emission levels for a variety of vehicle types (automobiles, medium trucks, heavy trucks, buses, and motorcycles). In addition, TNM contains a database of emission levels that accounts for the effects of accelerating vehicles, such as those affected by traffic control devices (e.g., stop signs, signals, or on-ramps) as well as the effects of roadway gradients. Sound propagation is computed by accounting for the effects of ground and atmospheric absorption, divergence (i.e., geometric spreading of sound energy over distance), topography, man-made barriers, vegetation, and rows of buildings. To ensure a high level of

accuracy, all TNM databases and calculations are based on 1/3-octave band data, and the results are recombined to give noise levels in the A-weighted dB(A).

TNM enables the user to evaluate a variety of traffic conditions and to develop and analyze proposed abatement. TNM model validation was completed according to PennDOT procedures prior to modeling future conditions. Predicted noise levels initially generated in TNM from the traffic data collected during field monitoring are compared to the field measured noise levels to ensure that the model is reasonably validated (within ±3 dB[A]) to the observed site conditions. Predictions are then made using the "Worst-Case" assumptions, including peak-hour traffic data provided by PennDOT and The Burns Group (Appendix B). Based on existing peak-hour travel demand, roadway capacity data, and field observation, it was assumed that travel speeds are near the posted speed. Therefore, the traffic noise model used the posted speed plus 5 miles per hour (mph) for the Existing Worst-Case condition and the Future No-Build and Build conditions throughout the project corridor.

2.2 Evaluation Criteria

The evaluation criteria followed the methodologies and criteria specified in PennDOT's Publication No. 24 (November 2015). Under state and federal guidelines, noise abatement is considered if it is warranted (noise levels approaching or exceeding the abatement criteria). Determinations are evaluated following the identification of areas warranting abatement consideration, feasibility (constructability and effectiveness) of proposed abatement, and reasonableness (square feet/benefit). For this study, the existing year (2014) and the design year (2044) traffic noise levels were used to determine traffic noise impacts through the corridor.

2.2.1 Warranted Criteria

Noise abatement consideration is warranted if a noise impact is identified. A noise impact occurs when the existing or predicted level "approaches or exceeds" the FHWA's NAC (Table 2). The listed activity groups were established by the FHWA based on a variety of noise-sensitive land uses. Noise-sensitive land usage in this project area primarily consists of Activity Group B (Residential). PennDOT defines the approach criterion as 1 dB(A) less than the FHWA NAC. Therefore, there is a traffic noise impact if predicted exterior noise levels are 66 dB(A) or greater

for Activity Group B noise-sensitive land usage. Alternatively, the noise policy also considers properties as impacted if there is a 10 dB(A) or more increase over existing traffic noise levels even if the absolute level falls below the activity groups NAC. This type of impact is addressed under the policy's substantial increase criteria. For this project the impacts identified are a result of traffic noise levels approaching or exceeding the activity group's NAC as well as exceeding the substantial increase criterion.

Table 2. FHWA Noise Abatement Criteria (NAC) Hourly A-Weighted Sound Level – Decibels (dB[A]).

Activity Group	Activity Criteria[1] Leq(h)	Evaluation Location	Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purposes.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sports 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[2]	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.

Source: Title 23 Code of Federal Regulations, Part 772 "Procedures for Abatement of Highway Traffic Noise and Construction Noise," Final Rule.

1. The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
2. Includes undeveloped lands permitted for this activity category.

2.2.2 Feasibility Criteria

Feasibility deals primarily with acoustical and engineering considerations. Effective abatement is considered feasible if the predicted insertion loss (i.e., reduction in noise level as a result of the proposed abatement) is at least 5 dB(A) for the majority (50 percent or greater) of the impacted

sites. Additionally, a variety of engineering constraints must be considered when determining the feasibility of the proposed abatement. Engineering considerations include restrictions to vehicular or pedestrian traffic (including driveways); safety concerns (such as sight distances or recovery zones); barrier constructability and maintainability; utility and drainage impacts; and overall adverse social, economic, and environmental effects.

2.2.3 Reasonableness Criteria

Reasonableness determination primarily focuses on a maximum square foot per benefited receptor (Max SF/BR) measurement to determine the relative value of the proposed abatement solution. PennDOT's noise barrier cost reasonableness value is based on a Max SF/BR value of 2,000 square feet. The square footage of a barrier is based on its length multiplied by its height above the finished ground at its base to the top elevation. The benefited receptor values are determined by counting all receptors receiving a 5 dB(A) or greater insertion loss (IL). Although at least a 5 dB(A) IL for the majority of receptors is required to meet the feasibility criteria, the proposed barrier must reduce noise levels by at least 7 dB(A) for at least one benefited receptor. It is desirable to provide this IL for additional impacted receptors while conforming to the Max SF/BR criteria and, if justified, by a "point of diminishing returns" evaluation. While optimizing a proposed noise barrier, the desired abatement goals should be evaluated in terms of establishing noise reductions for impacted receptors only.

2.3 Noise Abatement Measures

A variety of measures can be considered to address an identified noise impact. Placement of vertical noise barriers within the right-of-way (ROW) are most commonly recommended and were considered in this analysis due to their minimal spatial requirements.

Alternative actions can be effective under certain circumstances. These include acquisition of additional ROW for installing barriers or earthen berms, inclusion of traffic control measures, and modification of the alignment.

3.0 Existing Highway Traffic Noise Environment (Monitored Data)

3.0 EXISTING HIGHWAY TRAFFIC NOISE ENVIRONMENT (MONITORED DATA)

3.1 Identification of Noise Study Areas

PennDOT Publication No. 24 (November 2015) states that NSAs

> should be delineated as areas of common highway traffic noise influence throughout the entire project limits of the proposed transportation improvement project. NSA boundaries typically do not traverse over any major and/or significant highway traffic noise influence sources (i.e., existing or proposed roadways). Grouping common areas into NSAs also assists in evaluating mitigation, organizing reports, and facilitating discussions.

Following this guidance, the project area was organized into 23 NSAs from south to north, with 13 NSAs located on the southbound side of the proposed roadway and 10 NSAs located on the northbound side. All NSAs were identified in a Noise Monitoring Work Plan that was reviewed and approved by PennDOT in August 2014 (A.D. Marble & Company 2014). As described in further detail below, during field reconnaissance, it was observed that property acquisitions had taken place within NSA 15 and NSA 16; therefore, these NSAs were removed from further analysis. Additionally, due to the location of NSA 1 at the southernmost portion of the proposed alignment, it was decided that it would be best that it be included in its entirety during the final design analysis for the southern section of the CSVT project. For this final design analysis, the 20 NSAs retained resulted in 11 NSAs located on the southbound side of the proposed roadway and 9 NSAs located on the northbound side. Figures 2A through 2F are located in Appendix C and present the limits of the 20 NSAs retained for this analysis; each NSA is described below.

For this analysis, NSA boundaries extended approximately 500 feet from the edge-of-shoulder of the proposed roadway alignment. The organization of land use into NSAs does not affect the mitigation screening process results, as it is common practice to evaluate mitigation alternatives across NSA boundaries if and when appropriate. This same rationale applies to the subdivision of distinct communities within NSAs where it may be appropriate to consider them independently from one another. In addition, monitoring locations beyond the 500-foot study area boundary were identified for several NSAs within the project area. Monitoring locations M-

07, M-09, M-11, M-30, M-33 and M-42 were included in the monitoring plan in order to ensure valid modeling results for identifying potential impacts and benefits beyond the standard 500-foot study area boundary.

3.1.1 Noise Study Area 2 (see Figure 2A)

NSA 2 is located on the northbound side of the proposed roadway between S.R. 0015 and the southern end of the RC5 alignment. NSA 2 includes two single-family residential homes fronting S.R. 0015. The NSA is bound by agricultural fields to the north and woodlands to the south. NSA 2 is classified as land use Category B.

3.1.2 Noise Study Area 3 (see Figure 2A)

NSA 3 is located on the northbound side of S.R. 0015 and adjacent to the proposed on/off ramps for the RC5 and S.R. 0015 interchange. NSA 3 includes nine single-family homes located along County Line Road (T519) and T362. The NSA is bound by Swartz Ultimate Collision Repair to the south and a large forested area to the north. NSA 3 is classified as land use Category B.

3.1.3 Noise Study Area 4 (see Figure 2A)

NSA 4 is located on the southbound side of S.R. 0015. This NSA includes three single-family residential homes at the end of the Ridge Road cul-de-sac. The NSA is bound by a forested area to the south and agricultural fields to the north. NSA 4 is classified as land use Category B.

3.1.4 Noise Study Area 5 (see Figure 2B)

NSA 5 is located on the southbound side of the proposed roadway. NSA 5 consists of two single-family residential properties situated along Silo Lane. The NSA is bound by agricultural fields to the southwest, the Susquehanna River to the northeast, and the River Edge RV Camp and Marina to the north. NSA 5 is classified as land use Category B.

3.1.5 Noise Study Area 6 (see Figure 2B)

NSA 6 is located northbound side of the proposed roadway. NSA 6 consists of two single-family residential properties situated along Lees Lane. The NSA is bound by agricultural fields to the southwest and Susquehanna River to the northeast. NSA 6 is classified as land use Category B.

3.1.6 Noise Study Area 7 (see Figures 2B and 2C)

NSA 7 is located adjacent to the northbound side of the proposed roadway. This NSA consists of four single-family properties situated along S.R. 0147 and Arts Way. The NSA is bound by S.R. 0147 to the southwest and agricultural fields to the north. NSA 7 is classified as land use Category B.

3.1.7 Noise Study Area 8 (see Figures 2B and 2C)

NSA 8 is located adjacent to the southbound side of the proposed roadway. This NSA consists of one single-family property situated along S.R. 0147. The NSA is bound by S.R. 0147 to the south and agricultural fields to the north. NSA 8 is classified as land use Category B.

3.1.8 Noise Study Area 9 (see Figure 2C)

NSA 9 is located adjacent to the southbound side of the proposed roadway near the proposed Ridge Road interchange. NSA 9 includes five single-family properties situated on Blossom Hill Road and Ridge Road. NSA 9 is classified as land use Category B.

3.1.9 Noise Study Area 10 (see Figure 2C)

NSA 10 is located adjacent to the southbound side of S.R. 0147 and the proposed relocation of Ridge Road. NSA 10 includes one single-family property and two commercial properties with no associated outdoor use activities situated on S.R. 0147. NSA 10 is classified as land use Category B.

3.1.10 Noise Study Area 11 (see Figure 2C)

NSA 11 is located adjacent to the northbound side of S.R. 0147 and the proposed relocation of Ridge Road. NSA 11 includes the Ridgeway Evangelical Church property. There is no outdoor use associated with NSA 11, and it is, therefore, classified as land use Category D.

3.1.11 Noise Study Area 12 (see Figure 2C)

NSA 12 is located adjacent to the northbound side of S.R. 0147 and to the north of the proposed relocation of Ridge Road. NSA 12 includes four single-family properties situated along S.R.

0147 and Libeck Road. The NSA is bound by Libeck Road to the north, agricultural fields to the south, and a forested area to the east. NSA 12 is classified as land use Category B.

3.1.12 Noise Study Area 13 (see Figure 2D)

NSA 13 is located adjacent to the northbound off-ramp of the proposed roadway at the proposed Ridge Road interchange. NSA 13 includes five single-family properties situated on the existing Ridge Road. The NSA is bound by the relocated Ridge Road to the north and agricultural fields to the south. NSA 13 is classified as land use Category B.

3.1.13 Noise Study Area 14 (see Figure 2D)

NSA 14 is located adjacent to the northbound on-ramp of the proposed roadway at the proposed Ridge Road interchange. NSA 14 includes seven single-family properties situated on the existing Ridge Road and Mirkwood Road. The NSA is bound by the relocated Ridge Road to the south and a forested area to the north. NSA 14 is classified as land use Category B.

3.1.14 Noise Study Area 17 (see Figure 2E)

NSA 17 is located adjacent to the southbound side of the proposed roadway. This NSA consists of five single-family properties situated along S.R. 0147 and Oak View Road. The NSA is bound by agricultural fields to the south and Oak View Road to the north. NSA 17 is classified as land use Category B.

3.1.15 Noise Study Area 18 (see Figure 2E)

NSA 18 is located adjacent to the northbound side of the proposed roadway. This NSA consists of two single-family properties situated along Acorn Drive. The NSA is bound by a forested area and agricultural fields to the south and the proposed relocation of Oak View Road to the north. NSA 18 is classified as land use Category B.

3.1.16 Noise Study Area 19 (see Figures 2E and 2F)

NSA 19 is located adjacent to the northbound side of the proposed roadway. This NSA consists of five single-family properties situated along Acorn Drive, Ryan Lane, and Hidden Paradise

Road. The NSA is bound by the proposed relocation of Oak View Road to the south and Hidden Paradise Road to the north. NSA 19 is classified as land use Category B.

3.1.17 Noise Study Area 20 (see Figures 2E and 2F)

NSA 20 is located adjacent to the southbound side of the proposed roadway. This NSA consists of two single-family properties situated along S.R. 0147 and Susquehanna Trail. The NSA is bound by the proposed relocation of Oak View Road to the south and agricultural fields to the north. NSA 20 is classified as land use Category B.

3.1.18 Noise Study Area 21 (see Figure 2F)

NSA 21 is located adjacent to the northbound side of the proposed roadway. This NSA consists of 13 single-family properties situated along Ridge Road (T568) and Chillisquaque Heights. The NSA is bound by Ridge Road (T568) to the south and a forested area to the north. NSA 21 is classified as land use Category B.

3.1.19 Noise Study Area 22 (see Figure 2F)

NSA 22 is located adjacent to the southbound side of the proposed roadway. This NSA consists of a place of worship with no area of outdoor use and 23 single-family properties situated along Keyser Road, Housels Run Road, and Sand Hill Road. The NSA is bound by Ridge Road (T568) to the south and a forested area to the north. NSA 22 is classified as land use Category B and D.

3.1.20 Noise Study Area 23 (see Figure 2A)

NSA 23 is located adjacent to County Line Road and Park Road. This NSA consists of three single-family properties situated along Park Road and one single-family property on County Line Road. NSA 23 is classified as land use Category B.

3.2 Short-Term Noise Monitoring

Short-term noise monitoring sessions, which are 15 minutes in duration, were conducted at 46 locations within the project study area from August 26, 2014 to August 28, 2014. The short-term monitoring locations are identified in the report tables and on the figures with an “M” followed

by a number. Figures 2A through 2F (Appendix C) show the locations of the noise monitoring sites and the defined limits for each NSA used for this analysis.

The objectives of the short-term noise measurements were to:

- Obtain noise measurement data used to "validate" the traffic-noise prediction modeling for each NSA, thereby increasing confidence in TNM-calculated noise levels;
- Obtain counted traffic data used as input for the TNM during validation of the noise modeling for each NSA; and
- Document existing ambient sound levels at noise study locations within each NSA.

The short-term measurement sites were selected according to their abilities to meet the following requirements:

- Represent noise-sensitive land uses within each NSA. Short-term measurement sites were selected to represent various categories or "clusters" of noise-sensitive receptors within each NSA. Distinguishing characteristics of various clusters included some or all of the following:
  - Distance to the proposed highway alignment;
  - Absence or presence of shielding (e.g., first-row vs. second-row receptors);
  - Roadway/receiver geometry (e.g., proposed roadway depressed or on-fill, receptors on hillside overlooking proposed roadway, presence of entrance/exit ramps, etc.); and
  - Influence of other traffic-noise sources, such as local streets.
- When possible, represent areas of frequent human use. Alternatively, measurement sites were selected in areas that did not have frequent human use but were acoustically equivalent to nearby locations with frequent human use (e.g., on the grass along a side street or set back the same distance from the proposed roadway as the yard of the adjacent house);
- Give primary consideration to first-row receivers. Typically, traffic noise levels will be highest at the closest receivers and noise barriers will provide the greatest benefit at these locations; and

- Second-row and third-row locations. Additional measurements were conducted at these locations to assist in the noise modeling validation and in determining the effects of shielding.

For each site, these procedures were followed:

- The short-term measurements were conducted with ANSI Type 2 instruments with calibrations traceable to the National Institute of Standards and Technology (NIST);
- The sound level meters were field calibrated before and after each short-term measurement;
- Measurements were conducted for a minimum of 15-minute periods. Individual one-minute average sound levels (L_{eqs}) were recorded so that periods including events not representative of the ambient noise environment or not traffic-related could be separated or excluded. Specifically, notes on the site sketches were included to indicate potential periods of non-traffic noise influence (i.e., barking dogs and aircraft over-flights). The data collected for these individual periods were further scrutinized following the field monitoring to identify outlier data and potentially exclude these periods from the calculation of the overall average sound level;
- A short-term field measurement data sheet (see Appendix A) was completed for each measurement site;
- If present, abnormal weather data, including wind speed and direction, temperature, and relative humidity, were recorded during each measurement period to ensure requisite meteorological conditions for noise model validation. For example, monitoring should not be performed during periods of excessive wind, as this will potentially cause mechanical interference (microphone and windscreens) or abnormal noise propagation patterns;
- During each short-term noise measurement, simultaneous traffic volume and classification counts were conducted for all roads on which traffic was judged to make a significant contribution to the measured sound level at an individual site. Traffic volumes and classes were noted for each Traffic Monitoring Session (TMS) and can be found in Appendix A;

- No short-term measurements were conducted during periods of abnormal stop-and-go traffic or if the average speed was judged to vary significantly during the measurement period;
- No short-term measurements were conducted during periods when the roadway pavement was wet; and
- Noise meter location sketches were drawn to indicate approximate distances to known landmarks to allow for duplication of monitoring sites, if necessary. Significant variations in propagation path elevation (significant cut/fill) were depicted as cross sections where necessary.

4.0 Future Highway Traffic Noise Environment (Existing and Future Modeled)

4.0 FUTURE HIGHWAY TRAFFIC NOISE ENVIRONMENT (EXISTING AND FUTURE MODELED)

4.1 Validation of Noise Modeling

The FHWA has developed a computer noise model that is used for traffic noise emissions prediction and abatement evaluation. As referenced in Section 2.1, the FHWA's TNM includes a database of speed-related noise emission levels for a variety of vehicle types (i.e., automobiles, medium trucks, and heavy trucks). TNM also includes a database of noise emission levels that accounts for acceleration noise on roadway facilities that would be associated with traffic control devices (stop lights, stop signs, tollbooths, and on-ramps) or gradient changes. TNM uses these emissions data to calculate sound energy propagation over distances and estimate noise levels at discrete locations. Ground and atmospheric absorption of sound energy, as well the spreading of energy over distance (divergence), are considered, as are the effects of man-made barriers, topography, vegetation, and rows of buildings. PennDOT Publication No. 24 stipulates the use of the most current version of TNM when assessing traffic noise levels for highway projects.

The TNM modeling for a specific project area is typically "validated" by comparison of TNM-calculated results with the field-measured noise data. PennDOT Publication No. 24 describes the purpose of modeling validation and describes the procedure. To help accomplish the modeling validation, simultaneous noise measurements and traffic counts were conducted during the 46 short-term measurements, as described in Section 3.2. The directional traffic counts included vehicle class identification broken down into cars, medium trucks, heavy trucks, buses, and motorcycles. Following the measurements, the short-term traffic counts were normalized to hourly volumes and used as input for the noise prediction model. Based on a comparison of measured and TNM-calculated sound levels, refinements were made to the TNM model to more accurately represent the acoustical landscape. Refinements included adjustments to variables within the propagation path, including but not limited to alterations of building row characteristics and adjustments to terrain lines and tree zones.

Table 3 presents the monitored and TNM-calculated noise levels for the 46 short-term measurement sites following refinement of the noise modeling. Note that the measured and

TNM-calculated sound levels do not represent the annual loudest-hour conditions. The prediction of the annual loudest-hour noise levels is discussed in Section 4.2 below.

PennDOT Publication No. 24, Section 2.5.3.3 states that "if the difference between the [monitored and TNM-calculated] values is less than +/- 3 dB(A), this is an indication that the model is within the accepted level of accuracy." Of the short-term monitoring locations, 42 of the 46 locations predicted noise levels within these prescribed parameters. This correlation between measured and TNM-calculated sound levels provides a high level of confidence in TNM's computations throughout the study area. In addition, the average difference between the calculated hourly L_{eq} and the measured L_{eq} results for the validated receptors was approximately 0.1 dB(A). This bias toward slight over-prediction implies that the noise model is appropriately conservative and would tend to slightly over-predict, rather than under-predict, noise impacts.

The four monitoring sites that were not able to be validated (M-07, M-29, M-32 and M-33) represent single-family residences located in NSA 3, NSA 17 and NSA 18, respectively. Despite best efforts, the receptors continued to under-predict by an average of 8 dB(A), 5 dB(A) under the accepted level for validation. Due to the remote location of these sites in comparison to contributing roadway noise sources, it was determined that the noise environment for these locations was not currently traffic noise influenced. With the exception of NSA 18, all of the other receptors located within the aforementioned NSAs did predict within +/- 3 dB(A); therefore, the model for NSA 3, NSA 17, and NSA 18 were determined to be valid. Monitoring data for receptor M-10, representing a single-family seasonal residence located within NSA 5 was corrupted during field monitoring. However, the predicted results for the monitoring location were consistent with the two closest representative sites also located within NSA 5; therefore, the model for NSA 5 was determined to be valid.

4.2 Loudest-Hour TNM Calculations

Following refinement and validation of the noise model, TNM was used to calculate loudest-hour noise levels at the 46 monitored receptor locations and distributed throughout the 20 NSAs retained for the analysis. All significant sound propagation and shielding assumptions used in the

Table 3. Validation Results (Monitored vs. TNM-Calculated Sound Levels).

Receiver I.D.	NSA	Traffic Monitoring Session (TMS)	Receptor Address	Monitored Level (Leq[h])	TNM-Calculated	
					Noise Level	Difference Over Monitored
M-02	2	3	Westbranch Hgwy (SR 0015) - SB	65	68	3
M-03	3	3	Westbranch Hgwy (SR 0015) - NB	57	60	3
M-04	3	1	2564 County Line Road	54	57	3
M-05	3	1	2506 County Line Road	52	53	1
M-06	3	1	1037 Mulls Hollow Road	48	45	-3
M-07	3	1	Gregory Drive	49	31	-18
M-08	4	3	Ridge Road	51	49	-3
M-09	5	4	Seven Kitchens Road	44	42	-2
M-10	5	4	Silo Lane	N/A	39	N/A
M-11	5	4	Rivers Edge R/V Park	43	40	-3
M-12	6	4	Lees Lane	42	39	-3
M-13	7	5	Susquehanna Trail (SR 0147)	65	68	3
M-14	7	5	Arts Way	59	58	0
M-15	7	5	Arts Way	48	51	3
M-16	8	5	1082 Susquehanna Trail (SR 0147)	58	61	2
M-17	9	6	145 Blossom Hill Road	42	45	3
M-18	9	6	Ridge Road	48	50	2
M-19	10	7	MCL Pool & Spa Services	60	60	0
M-20	11	6	Ridgeway Evangelical Church	57	57	0
M-21	12	6	Susquehanna Trail (SR 0147)	65	66	0
M-22	13	12	Ridge Road (Empty Lot)	54	53	-1
M-23	13	13	Ridge Road	48	53	1
M-24	14	12	Ridge Road (Empty Lot)	54	55	1
M-25	14	13	377 Ridge Road	53	55	2
M-26	14	13	155 Mirkwood Drive	47	47	0
M-29	17	7	Address Unknown	48	40	-8
M-30	17	7	Susquehanna Trail (SR 0147)	57	60	3
M-31	17	7	Susquehanna Trail (SR 0147)	54	55	1
M-32	18	11	Acorn Drive	50	45	-5
M-33	18	11	Acorn Drive	49	40	-9
M-34	19	11	Address Unknown	51	51	0
M-35	19	10	199 Ryan Lane	58	58	0
M-36	19	10	Ryan Lane	62	63	0
M-37	20	11	Address Unknown	58	58	-1
M-38	20	10	Susquehanna Trail (SR 0405)	60	62	2
M-39	21	8	Ridge Road (T568)	55	56	1
M-40	21	8	150 Chillisquequa Heights	55	57	2
M-41	21	8	70 Chillisquequa Heights	50	52	2
M-42	21	8	Ridge Road (T568)	41	43	2
M-43	22	10	Keyser Road	58	60	2
M-44	22	9	Sand Hill Road	53	55	2
M-45	22	9	231 Sand Hill Road	59	62	3
M-46	22	9	Housels Run Road	51	52	1
M-47	22	9	Housels Run Road	58	61	3
M-48	23	2	County Line Road	56	53	-3
M-49	23	2	3080 County Line Road	56	58	2

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

model "validation" phase were retained for the loudest-hour prediction modeling except where altered or otherwise rendered invalid due to proposed facility design changes. Section 2.2 of this report describes the TNM model, and Section 4.1 describes the validation procedure. For the purposes of screening the NSAs for impacts and the evaluation of abatement measures, 136 modeled-only receptor locations were added throughout the project area.

Table 4 provides the loudest-hour sound levels computed for existing (2014) and future (2044) conditions. The table is organized by NSA, starting at the southern end of the project area and proceeding northward. Traffic data for the loudest-hour computations for both existing and future conditions were developed through data made available by The Burns Group and provided by PennDOT. Appendix B of this report provides additional traffic details, including modeled traffic volumes, growth factors, and classification breakdown. Traffic volumes and speeds were developed in conjunction with the roadway design engineers to ensure consistent application for all design aspects of the project.

4.2.1 Existing TNM-Calculated Sound Levels

The validated noise models were used as the baseline for the calculation of existing (2014) loudest-hour noise levels. Field-observed traffic data were replaced in the models with the peak-hour data supplied by PennDOT. The 46 monitored receptor locations were incorporated as described above. In addition, 130 modeled-only receivers were added to the model representing each of the properties located within the study area.

TNM-calculated loudest-hour L_{eq} sound levels for the existing condition ranged from 34 to 72 dB(A) among all prediction sites. Typically, locations closest to the existing highway facilities had the highest TNM-calculated sound levels. In Table 4, receptor sites with loudest-hour sound levels approaching or exceeding the NAC as discussed in Section 2.2 are identified in red. L_{eq} sound levels of 66 dB(A) or higher approach or exceed the NAC for activity group B (residential) noise-sensitive outdoor land uses. Under the modeled existing conditions, 16 receptor locations are predicted to experience noise impacts during the loudest hour of the day. Noise impacts presently occur in six out of the 20 NSAs evaluated.

Table 4. TNM-Calculated Existing (2014) and Future (2044) Loudest-Hour Sound Levels.

Receiver I.D.	NSA	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)		Future Build (2044) (No Barrier)	
				Noise Level	Difference Over Existing	Noise Level	Difference Over Existing
M-02	2	1	***68***	***73***	5	***69***	1
2-01	2	1	***72***	***76***	5	***73***	1
M-03	3	1	60	65	5	63	2
M-04	3	1	57	62	5	63	5
M-05	3	1	54	58	5	62	8
M-06	3	1	46	50	5	52	6
M-07	3	1	49	49	0	53	5
3-01	3	1	63	***68***	5	65	2
3-02	3	1	55	60	5	60	5
3-03	3	1	47	52	5	56	***10***
3-04	3	1	48	53	5	59	***11***
3-05	3	1	44	49	5	54	***10***
3-06	3	1	45	50	5	57	***12***
3-07	3	1	40	45	5	52	***12***
3-08	3	1	41	46	5	55	***13***
3-09	3	1	40	44	5	52	***12***
3-10	3	1	39	44	5	51	***13***
3-11	3	1	40	44	5	54	***14***
3-12	3	1	48	53	5	52	4
3-13	3	1	41	46	5	51	***11***
3-14	3	1	50	50	0	53	4
3-15	3	1	49	50	1	53	5
3-16	3	1	49	50	1	53	4
3-17	3	1	49	49	0	54	5
3-18	3	1	49	49	0	53	5
3-19	3	1	49	50	1	54	5
3-20	3	1	49	50	1	53	5
M-08	4	3	50	55	5	56	6
M-09	5	1	43	44	1	55	***12***
M-10	5	0.57	42	44	2	58	***16***
M-11	5	0.57	43	45	2	57	***15***
5-01	5	0.57	41	43	2	55	***13***
5-02	5	0.57	42	44	2	57	***16***
5-03	5	0.57	40	42	2	56	***16***
5-04	5	0.57	40	42	2	56	***16***
5-05	5	0.57	40	42	2	56	***16***
5-06	5	0.57	40	42	2	56	***16***
5-07	5	0.57	40	42	2	56	***16***
5-08	5	0.57	40	42	2	56	***16***
5-09	5	0.57	40	42	2	56	***16***
5-10	5	0.57	40	42	2	56	***16***
5-11	5	0.57	40	42	2	56	***16***
5-12	5	0.57	40	43	2	57	***16***
5-13	5	0.57	40	42	2	56	***16***
5-14	5	0.57	40	43	2	56	***16***
5-15	5	0.57	41	43	2	56	***16***

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

† Denotes an interior traffic noise level derived from applying the FHWA building noise reduction factor to the TNM generated exterior noise level.

Table 4. TNM-Calculated Existing (2014) and Future (2044) Loudest-Hour Sound Levels.

Receiver I.D.	NSA	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)		Future Build (2044) (No Barrier)	
				Noise Level	Difference Over Existing	Noise Level	Difference Over Existing
5-16	5	0.57	41	43	2	56	***15***
5-17	5	0.57	41	43	2	56	***15***
5-18	5	0.57	41	43	2	56	***16***
5-19	5	0.57	41	43	2	56	***15***
5-20	5	0.57	41	43	2	57	***16***
5-21	5	0.57	41	43	2	56	***15***
5-22	5	0.57	41	43	2	56	***15***
5-23	5	0.57	42	44	2	56	***15***
5-24	5	0.57	42	44	2	56	***15***
5-25	5	0.57	42	44	2	56	***15***
5-26	5	0.57	42	44	2	56	***14***
5-27	5	0.57	42	44	2	56	***14***
5-28	5	0.57	42	44	2	56	***15***
5-29	5	0.57	42	44	2	57	***15***
5-30	5	0.57	42	44	2	57	***15***
5-31	5	0.57	42	44	2	57	***15***
5-32	5	0.57	42	44	2	57	***15***
5-33	5	0.57	42	44	2	57	***15***
5-34	5	0.57	42	44	2	57	***15***
5-35	5	0.57	42	45	2	57	***15***
5-36	5	0.57	42	44	2	57	***15***
5-37	5	0.57	43	45	2	57	***14***
5-38	5	0.57	43	45	2	57	***14***
5-39	5	0.57	43	45	2	57	***14***
M-12	6	1	42	44	2	55	***13***
6-01	6	1	41	43	2	53	***12***
6-02	6	1	40	43	2	58	***17***
6-03	6	1	40	42	2	57	***17***
6-04	6	1	40	42	2	57	***18***
6-05	6	1	40	42	2	57	***17***
M-13	7	1	***72***	***74***	2	***73***	1
M-14	7	1	62	64	2	***66***	4
M-15	7	1	54	56	2	***69***	***15***
7-01	7	1	65	***67***	2	***67***	2
7-02	7	1	***66***	***68***	2	***69***	2
7-03	7	1	54	56	2	64	***10***
7-04	7	1	51	54	2	60	8
M-16	8	1	64	***66***	2	***67***	3
M-17	9	1	45	47	2	***67***	***22***
M-18	9	1	49	51	2	63	***14***
9-01	9	1	44	46	2	63	***19***
9-02	9	1	47	49	2	60	***14***
9-03	9	1	51	53	2	61	***10***
9-04	9	1	52	54	2	60	8
9-05	9	1	53	56	2	58	5
9-06	9	1	52	54	2	60	8

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

† Denotes an interior traffic noise level derived from applying the FHWA building noise reduction factor to the TNM generated exterior noise level.

Table 4. TNM-Calculated Existing (2014) and Future (2044) Loudest-Hour Sound Levels.

Receiver I.D.	NSA	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)		Future Build (2044) (No Barrier)	
				Noise Level	Difference Over Existing	Noise Level	Difference Over Existing
9-07	9	1	55	58	2	59	4
9-08	9	1	58	60	2	60	2
9-09	9	1	62	64	2	63	1
9-10	9	1	63	65	2	65	2
9-11	9	1	63	65	2	64	1
9-12	9	1	***66***	***68***	2	***67***	1
M-19	10	1	64	***66***	2	65	1
M-20	11	1	34.4†	36.5†	2	35.6†	1
M-21	12	1	***69***	***71***	2	***70***	1
12-01	12	1	***66***	***68***	2	***67***	1
12-02	12	1	***67***	***69***	2	***68***	1
12-03	12	1	***67***	***69***	2	***68***	1
M-22	13	0	54	54	0	58	4
M-23	13	1	53	53	0	58	5
13-01	13	1	53	53	0	58	6
13-02	13	1	54	54	0	58	5
13-03	13	1	49	49	0	55	6
M-24	14	0	56	56	0	***N/A***	***N/A***
M-25	14	1	55	55	0	60	5
M-26	14	1	47	47	0	54	7
14-01	14	1	53	53	0	60	7
14-02	14	1	53	53	0	58	5
14-03	14	1	43	44	0	54	***11***
14-04	14	1	46	46	0	57	***11***
M-29	17	1	43	45	2	55	***12***
M-30	17	1	64	***66***	2	65	1
M-31	17	1	58	60	2	62	4
17-01	17	1	***68***	***70***	2	***69***	1
17-02	17	1	***66***	***68***	2	***67***	1
17-03	17	1	65	***67***	2	***66***	1
17-04	17	1	63	65	2	65	2
17-05	17	1	58	60	2	62	4
M-32	18	1	47	49	2	65	***18***
M-33	18	1	42	44	2	50	8
M-34	19	1	54	56	2	***67***	***13***
M-35	19	1	59	62	3	64	5
M-36	19	1	64	***67***	3	***69***	5
19-01	19	1	60	63	3	***71***	***11***
19-02	19	1	61	65	3	***68***	7
M-37	20	1	61	63	2	61	1
M-38	20	1	63	***66***	3	***67***	4
20-01	20	1	59	62	3	***77***	***18***
20-02	20	1	58	61	3	***70***	***12***
M-39	21	1	60	63	3	62	2
M-40	21	1	61	64	3	64	3
M-41	21	1	56	59	3	57	1

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

† Denotes an interior traffic noise level derived from applying the FHWA building noise reduction factor to the TNM generated exterior noise level.

Table 4. TNM-Calculated Existing (2014) and Future (2044) Loudest-Hour Sound Levels.

Receiver I.D.	NSA	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)		Future Build (2044) (No Barrier)	
				Noise Level	Difference Over Existing	Noise Level	Difference Over Existing
M-42	21	1	47	50	3	50	3
21-01	21	1	61	65	3	64	2
21-02	21	1	57	61	3	59	2
21-03	21	1	57	60	3	59	2
21-04	21	1	55	58	3	58	3
21-05	21	1	49	52	3	52	3
21-06	21	1	49	52	3	52	3
21-07	21	1	54	57	3	56	2
21-08	21	1	52	55	3	55	3
21-09	21	1	54	58	3	55	1
M-43	22	1	61	64	3	62	1
M-44	22	1	57	60	3	60	3
M-45	22	1	***66***	***69***	3	***69***	3
M-46	22	1	54	57	3	56	2
M-47	22	1	63	***67***	3	63	-1
22-01	22	1	63	***66***	3	64	2
22-02	22	1	65	***69***	3	***66***	1
22-03	22	1	41.1†	44.5†	3	44.2†	3
22-04	22	1	***68***	***72***	3	***72***	3
22-05	22	1	***68***	***71***	3	***70***	2
22-06	22	1	***68***	***71***	3	***70***	3
22-07	22	1	***67***	***71***	3	***70***	3
22-08	22	1	62	65	3	63	2
22-09	22	1	57	60	3	60	3
22-10	22	1	56	59	3	56	0
22-11	22	1	58	61	3	56	-2
22-12	22	1	57	60	3	56	-1
22-13	22	1	59	62	3	58	-1
22-14	22	1	54	57	3	58	4
22-15	22	1	54	57	3	57	3
22-16	22	1	54	57	3	55	1
22-17	22	1	56	59	3	55	0
22-18	22	1	55	58	3	54	-1
22-19	22	1	54	57	3	53	-1
M-48	23	1	53	53	0	57	4
M-49	23	1	58	58	0	58	0
23-01	23	1	53	53	0	53	0
23-02	23	1	58	58	0	58	0

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

† Denotes an interior traffic noise level derived from applying the FHWA building noise reduction factor to the TNM generated exterior noise level.

4.2.2 Future (2044) No-Build Condition TNM-Calculated Sound Levels

Loudest-hour conditions were also calculated for the Future (2044) No-Build condition. This scenario represents the future highway facilities incorporating no changes to the existing roadway geometry. This information is useful for evaluating the scope of the affect that the proposed facility will have on the overall noise environment. As is typical of most highway facilities, future noise levels are anticipated to increase regardless of the proposed design changes due to increased traffic demand. By evaluating differences in sound levels between the No-Build and Build conditions, the relative effect of the project on ambient noise levels can be better understood and considered in project planning.

The validated noise models were used as the baseline for the calculation of Future (2044) No-Build loudest-hour noise levels. Field-observed traffic data were replaced in the models with the peak-hour No-Build (2044) data supplied by PennDOT. The same 176 monitored and modeled-only sites used in the existing loudest-hour models were incorporated as previously described.

TNM-calculated loudest-hour L_{eq} sound levels for the Future (2044) No-Build condition ranged from 37 to 76 dB(A) among all prediction sites. Typically, locations closest to the existing highway facilities had the highest TNM-calculated sound levels. In Table 4, receptor sites with loudest-hour sound levels approaching or exceeding the NAC, as discussed in Section 2.2, are identified in red. L_{eq} sound levels of 66 dB(A) or higher approach or exceed the NAC for activity group B (residential) noise-sensitive outdoor land uses. No substantial increase over the existing noise levels are indicated for the Future No-Build condition. Under the modeled Future No-Build conditions, 27 receptor locations are anticipated to experience noise impacts during the loudest hour of the day. Noise impacts are anticipated to occur in 11 out of the 20 NSAs evaluated.

4.2.3 Future (2044) Build Condition TNM-Calculated Sound Levels

Loudest-hour conditions were also calculated for the Future (2044) Build condition. This scenario represents the proposed roadway facility incorporating the new highway design, as well as design changes to the existing roadway geometries and intervening terrain. This information is used to identify the number and location of NSAs that warrant mitigation consideration. As

referenced in Section 2.2, those areas warranting mitigation consideration are subject to further mitigation analysis in order to determine if sound walls are feasible and reasonable.

The validated noise models were modified to incorporate the proposed design changes and then used as the baseline for the calculation of Future Build (2044) loudest-hour noise levels. Field-observed traffic data were replaced in the models with the peak-hour Build (2044) traffic data supplied by the PennDOT. The same 46 representative monitoring sites and 130 modeled-only sites used in the Existing (2014) and Future (2044) No-Build loudest-hour models were incorporated as previously described.

TNM-calculated loudest-hour L_{eq} sound levels for the Future Build (2044) condition ranged from 36 to 77 dB(A) among all prediction sites. Typically, locations closest to the proposed roadway alignment had the highest TNM-calculated sound levels. In Table 4, receptor sites with loudest-hour sound levels approaching or exceeding the NAC, as discussed in Section 2.2, are identified in red. L_{eq} sound levels of 66 dB(A) or higher approach or exceed the NAC for activity group B (residential) noise-sensitive outdoor land uses. Additionally, impacts identified due to substantial increase over the existing noise levels in this analysis are also identified in red. Under the modeled Future Build conditions, 97 receptor locations are anticipated to experience noise impacts during the loudest hour of the day. Noise impacts are anticipated to occur in 14 out of the 20 NSAs evaluated.

The following sections discuss the results of the Future Build (2044) condition noise levels for each of the 20 NSAs retained for this analysis:

- ***NSA 2*** - Noise levels are predicted to be between 69 dB(A) and 73 dB(A) in this NSA. Increases from existing noise levels are predicted to be 1 dB(A) in this NSA. These noise levels represent a traffic noise impact to two noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 3*** - Noise levels are predicted to be between 51 dB(A) and 65 dB(A) in this NSA. Increases above existing noise levels are anticipated to range from 2 dB(A) to 14 dB(A)

in this NSA. These noise levels represent a traffic noise impact to 10 noise-sensitive receptors in the NSA as a result of the substantial increase criterion. *Mitigation analysis is warranted for this NSA.*

- ***NSA 4*** - Noise levels are predicted to be 56 dB(A) in this NSA. Increases above existing noise levels are anticipated to be 6 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

- ***NSA 5*** - Noise levels are predicted to be between 55 dB(A) and 58 dB(A) in this NSA. Increases above existing noise levels range between 12 dB(A) and 16 dB(A) in this NSA. These noise levels represent a traffic noise impact to one noise-sensitive receptor and the River Edge RV Camp and Marina in the NSA as a result of the substantial increase criterion. As a seasonal camp and recreation area, an equivalent residential unit (ERU) calculation was performed for River Edge following guidance from Appendix E of PennDOT's Publication 24, resulting in an ERU value of 23.37. The calculation table and resulting ERU can be found in Appendix D attached to the *Warranted, Feasible, and Reasonable Worksheet*. *Mitigation analysis is warranted for this NSA.*

- ***NSA 6*** - Noise levels are predicted to be between 53 dB(A) and 58 dB(A) in this NSA. Increases above existing noise levels range between 12 dB(A) and 18 dB(A) in this NSA. These noise levels represent a traffic noise impact to six noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 7*** - Noise levels are predicted to be between 60 dB(A) and 73 dB(A) in this NSA. Increases above existing noise levels range between 1 dB(A) and 15 dB(A) in this NSA. These noise levels represent a traffic noise impact to six noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 8*** - Noise levels are predicted to be 67 dB(A) in this NSA. Increases above existing noise levels are anticipated to be 3 dB(A) in this NSA. This noise level represents a

traffic noise impact to one noise-sensitive receptor in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 9*** - Noise levels are predicted to be between 58 dB(A) and 67 dB(A) in this NSA. Increases above existing noise levels range between 1 dB(A) and 22 dB(A) in this NSA. These noise levels represent a traffic noise impact to six noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 10*** - Noise levels are predicted to be 65 dB(A) in this NSA. Increases above existing noise levels are anticipated to be 1 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

- ***NSA 11*** - Interior traffic noise levels are predicted to be 36 dB(A) in this NSA. Increases above existing noise levels are anticipated to be 1 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

- ***NSA 12*** - Noise levels are predicted to be between 67 dB(A) and 70 dB(A) in this NSA. Increases above existing noise levels are anticipated to be 1 dB(A) in this NSA. These noise levels represent a traffic noise impact to four noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 13*** - Noise levels are predicted to be between 55 dB(A) and 58 dB(A) in this NSA. Increases above existing noise levels range between 4 dB(A) and 6 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

- ***NSA 14*** - Noise levels are predicted to be between 54 dB(A) and 60 dB(A) in this NSA. Increases above existing noise levels range between 5 dB(A) and 11 dB(A) in this NSA.

These noise levels represent a traffic noise impact to two noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 17*** - Noise levels are predicted to be between 55 dB(A) and 69 dB(A) in this NSA. Increases above existing noise levels range between 1 dB(A) and 12 dB(A) in this NSA. These noise levels represent a traffic noise impact to four noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 18*** - Noise levels are predicted to be between 50 dB(A) and 65 dB(A) in this NSA. Increases above existing noise levels range between 8 dB(A) and 18 dB(A) in this NSA. These noise levels represent a traffic noise impact to one noise-sensitive receptor in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 19*** - Noise levels are predicted to be between 64 dB(A) and 71 dB(A) in this NSA. Increases above existing noise levels range between 5 dB(A) and 13 dB(A) in this NSA. These noise levels represent a traffic noise impact to four noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 20*** - Noise levels are predicted to be between 61 dB(A) and 77 dB(A) in this NSA. Increases above existing noise levels range between 1 dB(A) and 18 dB(A) in this NSA. These noise levels represent a traffic noise impact to three noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 21*** - Noise levels are predicted to be between 50 dB(A) and 64 dB(A) in this NSA. Increases above existing noise levels range between 1 dB(A) and 3 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

- ***NSA 22*** - Noise levels are predicted to be between 44 dB(A) and 72 dB(A) in this NSA. Changes compared to existing noise levels are anticipated to range from -2 dB(A) to 4

dB(A) in this NSA. These noise levels represent a traffic noise impact to six noise-sensitive receptors in the NSA. *Mitigation analysis is warranted for this NSA.*

- ***NSA 23*** - Noise levels are predicted to be between 53 dB(A) and 58 dB(A) in this NSA. Changes compared to existing noise levels are anticipated to range from 0 dB(A) to 4 dB(A) in this NSA. Future noise levels are not predicted to approach or exceed the NAC, or substantially exceed existing noise levels. *Mitigation analysis is not warranted for this NSA.*

5.0 Highway Traffic Noise Consideration and Mitigation Alternatives

5.0 HIGHWAY TRAFFIC NOISE CONSIDERATION AND MITIGATION ALTERNATIVES

5.1 Mitigation Alternatives

FHWA has identified certain noise mitigation measures to reduce traffic noise impacts that may be incorporated into either new roadway projects or roadway improvement projects that increase traffic capacity. These include:

- Traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types and time-use restrictions for certain vehicle types);
- Alteration of horizontal and vertical alignments;
- Acquisition of property to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise;
- Sound insulation of public or nonprofit institutional structures; and
- Construction of noise barriers.

Possible traffic management measures include reducing speeds and truck restrictions. Speed restrictions provide only a slight reduction in noise levels without significant reductions in speed. For example, to achieve a 5 dB(A) reduction in noise from heavy trucks, average speeds would need to be reduced from 65 to 45 mph. Therefore, speed restrictions are not a feasible noise mitigation measure for this project. Truck restrictions would not be practical as this would negate the stated purpose for this project. Therefore, truck restrictions also are not a feasible noise mitigation measure for this project.

As a new highway, significant consideration was made during the alternative design and preliminary design stages of the project. Consideration for the effect of the proposed roadway impacts was made prior to choosing the preferred design alternative. Considerations for changes in grading and alignment shifts were also incorporated into the design of this roadway project. Additionally, property acquisitions were made prior to the final design stage to establish the proposed ROW.

Although sound insulation of public or nonprofit institutional structures may be considered, federal and state policies require that primary consideration in determining and abating highway traffic noise impacts must be given to exterior areas. The interior criterion (NAC activity group D, see Section 2.1) is intended to be used "in those situations where there are no outdoor activities to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities." No impacts that would be associated with activity group D land use have been identified through this analysis.

5.2 Noise Barrier Evaluation

Construction of noise barriers is the only remaining highway traffic noise abatement measure to be considered. A noise barrier evaluation was conducted for each NSA meeting the warranted criteria described in Section 2.2.1. The objective of each evaluation was to determine whether a noise barrier could meet the feasibility and reasonableness criteria described in Sections 2.2.2 and 2.2.3. The evaluations were conducted to determine the preferred alignment, approximate noise barrier end points, and the approximate average height of each proposed noise barrier.

The analysis of noise barriers presented represents the final design barrier optimization for this project. Specifically, ranges of barrier panel heights were evaluated in 1-foot increments with the individual noise barrier panel heights adjusted to determine the "point of diminishing return" as directed in PennDOT's Publication No. 24. In general, noise barriers were evaluated first for feasibility, and then if determined to be feasible, the barrier was further analyzed to determine whether a barrier could be designed to meet the reasonableness criteria. The optimized barrier configuration for each impacted NSA is presented below. A complete breakdown of the barrier analysis results can be found in Appendix D attached to the *Warranted, Feasible, and Reasonable Worksheet* for each NSA.

5.2.1 Detailed Noise Barrier Descriptions

This section of the report provides further information on the noise barrier evaluation for each of the impacted NSAs. Three barrier configurations were investigated for each of the NSAs warranting noise abatement consideration: a barrier providing a 5 dB(A) IL to at least 50 percent

of the impacted receptors to establish feasibility; a barrier that breaks the line-of-site between impacted receptors and the proposed roadway; and an optimized barrier that seeks to balance size and performance goals with a focus on finding the point of diminishing return as described in PennDOT's Publication No. 24. Tables 5 through 17 provide barrier-included sound levels and IL (noise reduction) values at all receptors screened for each of the noise barriers investigated.

- ***NSA 2:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (2-02) is approximately 450 feet from the roadway. Therefore, a wall 1,800 feet past the front row impacted receptors on both ends assumes a wall about 3,800 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 45,600 square feet. Assuming the feasibility criteria could be met and taking 45,600 SF/2 BR possible, we have a SF/BR value of 22,800, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 10.7 feet and total length of approximately 1,400 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 15,001 square feet.

Line-of-Site - A noise barrier with an average height of 9.9 feet and total length of approximately 800 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would provide no noise reduction to either impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 7,900 square feet.

Optimized - A noise barrier with an average height of 10.7 feet and total length of approximately 1,400 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 15,001 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

Table 5. NSA 2 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-02	1	*68*	*73*	*69*	1	*69*	1	*69*	0	*69*	1
2-01	1	*72*	*76*	*73*	1	*72*	0	*72*	0	*72*	0

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL	Case 2 Line-of-Site	Case 3 Optimized
Barrier Area (ft^2)	15,001	7,900	15,001
Total Number of Impacted Receptors	2	2	2
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0	0	0
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	0%	0%	0%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	*No*	*No*	*No*
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	0	0	0
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	15,001	7,900	15,001
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	*No*	*No*	*No*
Average Noise Reduction for Benefited Receptors (dB[A])	0	0	0
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	*No*	*No*	*No*
Total Barrier Length (ft)	1,400	800	1,400
Barrier Height Range (ft)	7 to 12	9 to 10	7 to 12
Average Barrier Height (ft)	10.7	9.9	10.7

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 3:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (3-01) is approximately 700 feet from the roadway. Therefore, a wall 2,800 feet past the front row impacted receptors on both ends assumes a wall about 5,600 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 67,200 square feet. Assuming the feasibility criteria could be met and taking 67,200 SF/10 BR possible, we have a SF/BR value of 6,720, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A dual noise barrier system (two noise barriers working together to provide the requisite abatement) with a combined average height of 20.5 feet and combined total length of approximately 3,400 feet would provide noise reductions of at least 5 dB(A) for 90 percent of the impacted receptors identified in this NSA. This dual barrier system would also satisfy each of the other feasibility criteria. This dual barrier system would provide a 5 dB(A) noise reduction to nine impacted receptors. The total square footage of the resulting barriers would be approximately 69,603 square feet with a Max SF/BR unit value of 7,734 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

  Line-of-Site - Due to intervening terrain and distance from the proposed roadway none of the impacted receptors will have a direct view of the proposed roadway. Therefore, no line-of-site barrier could be developed.

Optimized - A dual noise barrier system with a combined average height of 24.7 feet and combined total length of approximately 3,400 feet would provide noise reductions of at least 5 dB(A) for 90 percent of the impacted receptors identified in this NSA. This dual barrier system would also satisfy each of the other feasibility criteria. This dual barrier system would provide an average 5 dB(A) noise reduction to nine impacted receptors. This barrier system would not break the Line-of-Site between the impacted receptors and the proposed roadway, as explained above. The total square footage of the resulting barriers would be approximately 84,005 square feet with a Max SF/BR unit value of 9,334 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 6. NSA 3 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-03	1	60	65	63	2	61	1	63	0	61	1
M-04	1	57	62	63	5	60	3	63	0	60	3
M-05	1	54	58	62	8	58	4	62	0	58	4
M-06	1	46	50	52	6	51	1	52	0	51	1
M-07	1	49	49	53	5	53	0	53	0	53	0
3-01	1	63	***68***	65	2	64	1	65	0	64	1
3-02	1	55	60	60	5	58	2	60	0	57	2
3-03	1	47	52	56	***10***	52	***5***	56	0	51	***5***
3-04	1	48	53	59	***11***	55	***5***	59	0	54	***5***
3-05	1	44	49	54	***10***	50	***5***	54	0	49	***5***
3-06	1	45	50	57	***12***	53	***5***	57	0	52	***5***
3-07	1	40	45	52	***12***	47	***5***	52	0	47	***6***
3-08	1	41	46	55	***13***	50	***5***	55	0	50	***5***
3-09	1	40	44	52	***12***	47	***5***	52	0	46	***6***
3-10	1	39	44	51	***13***	46	***5***	51	0	46	***6***
3-11	1	40	44	54	***14***	49	***5***	54	0	48	***6***
3-12	1	48	53	52	4	51	1	52	0	51	1
3-13	1	41	46	51	***11***	50	1	51	0	50	1
3-14	1	50	50	53	4	53	0	53	0	53	1
3-15	1	49	50	53	5	52	1	53	0	52	1
3-16	1	49	50	53	4	52	1	53	0	52	1
3-17	1	49	49	54	5	54	0	54	0	54	0
3-18	1	49	49	53	5	53	0	53	0	53	0
3-19	1	49	50	54	5	53	1	54	0	53	1
3-20	1	49	50	53	5	52	2	53	0	52	2

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL	Case 2 Line-of-Site	Case 3 Optimized
Barrier Area (ft^2)	69,603	0	84,005
Total Number of Impacted Receptors	10	10	10
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	9	0	9
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	90%	0%	90%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	*Yes*	*No*	*Yes*
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	9	0	9
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	7,734	***0***	9,334
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	*No*	*No*	*No*
Average Noise Reduction for Benefited Receptors (dB[A])	5	0	5
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	*No*	*No*	*No*
Total Barrier Length (ft)	3,400	0	3,400
Barrier Height Range (ft)	16 to 23	0	21 to 25
Average Barrier Height (ft)	20.5	0.0	24.7

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 5:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (5-01) is approximately 300 feet from the roadway. Therefore, a wall 1,200 feet past the front row impacted receptors on both ends assumes a wall about 4,200 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 50,400 square feet. Assuming the feasibility criteria could be met and taking 50,4000 SF/24 BR possible, we have a SF/BR value of 2,100, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 10.0 feet and total length of approximately 3,264 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 35,904 square feet.

  Line-of-Site - A noise barrier with an average height of 5.0 feet and total length of approximately 528 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 1,056 square feet.

Optimized - A noise barrier with an average height of 10.3 feet and total length of approximately 3,216 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 5 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 33,072 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

Table 7. NSA 5 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-09	1	43	44	55	***12***	51	4	55	0	51	3
M-10	0.57	42	44	58	***16***	54	4	58	-1	54	4
M-11	0.57	43	45	57	***15***	54	3	58	-1	54	3
5-01	0.57	41	43	55	***13***	54	1	56	-1	54	1
5-02	0.57	42	44	57	***16***	51	***6***	57	0	52	***6***
5-03	0.57	40	42	56	***16***	52	3	56	0	53	3
5-04	0.57	40	42	56	***16***	52	3	56	0	53	3
5-05	0.57	40	42	56	***16***	53	3	56	0	53	3
5-06	0.57	40	42	56	***16***	51	4	56	0	52	4
5-07	0.57	40	42	56	***16***	53	3	56	0	53	3
5-08	0.57	40	42	56	***16***	53	4	57	0	53	4
5-09	0.57	40	42	56	***16***	53	3	56	0	53	3
5-10	0.57	40	42	56	***16***	52	4	56	0	52	4
5-11	0.57	40	42	56	***16***	53	3	56	0	53	3
5-12	0.57	40	43	57	***16***	53	4	57	0	53	4
5-13	0.57	40	42	56	***16***	53	3	56	0	53	3
5-14	0.57	40	43	56	***16***	53	3	56	0	53	3
5-15	0.57	41	43	56	***16***	53	3	57	0	53	3
5-16	0.57	41	43	56	***15***	53	3	57	0	53	3
5-17	0.57	41	43	56	***15***	54	3	57	-1	54	3
5-18	0.57	41	43	56	***16***	53	3	57	0	54	3
5-19	0.57	41	43	56	***15***	53	3	57	-1	53	3
5-20	0.57	41	43	57	***16***	53	4	57	0	53	4
5-21	0.57	41	43	56	***15***	54	3	57	-1	54	2
5-22	0.57	41	43	56	***15***	53	3	57	-1	53	3
5-23	0.57	42	44	56	***15***	54	2	57	-1	54	2
5-24	0.57	42	44	56	***15***	54	3	57	-1	54	3
5-25	0.57	42	44	56	***15***	54	3	57	-1	54	3
5-26	0.57	42	44	56	***14***	54	2	57	-1	54	2
5-27	0.57	42	44	56	***14***	54	2	57	-1	54	2
5-28	0.57	42	44	56	***15***	54	2	57	-1	54	2
5-29	0.57	42	44	57	***15***	54	3	58	-1	54	3
5-30	0.57	42	44	57	***15***	55	2	57	-1	55	2
5-31	0.57	42	44	57	***15***	55	2	58	-1	55	2
5-32	0.57	42	44	57	***15***	55	2	58	-1	55	2
5-33	0.57	42	44	57	***15***	55	2	58	-1	55	2
5-34	0.57	42	44	57	***15***	55	2	58	-1	55	2
5-35	0.57	42	45	57	***15***	55	2	58	-1	55	2
5-36	0.57	42	44	57	***15***	55	2	58	-1	55	2
5-37	0.57	43	45	57	***14***	55	2	58	-1	55	2
5-38	0.57	43	45	57	***14***	55	2	58	-1	55	2
5-39	0.57	43	45	57	***14***	55	2	58	-1	55	2

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL	Case 2 Line-of-Site	Case 3 Optimized
Barrier Area (ft^2)	35,904	1,056	33,072
Total Number of Impacted Receptors	24	24	24
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	1	0	1
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	4%	0%	4%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	***No***	***No***	***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	1	0	1
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	35,904	***1,056***	33,072
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	***No***	***No***	***No***
Average Noise Reduction for Benefited Receptors (dB[A])	6	0	6
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	***No***	***No***	***No***
Total Barrier Length (ft)	3,264	528	3,216
Barrier Height Range (ft)	10	5	4 to 10
Average Barrier Height (ft)	10.0	5.0	10.3

Note:

All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 6:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (6-01) is approximately 100 feet from the roadway. Therefore, a wall 400 feet past the front row impacted receptors on both ends assumes a wall about 1,200 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 14,400 square feet. Assuming the feasibility criteria could be met and taking 14,400 SF/6 BR possible, we have a SF/BR value of 2,400, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 11.0 feet and total length of approximately 3,264 feet would provide noise reductions of at least 5 dB(A) for 67 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least 5 dB(A) of noise reduction to a total of four benefited receptor units. The total square footage of the resulting barrier would be approximately 35,905 square feet with a Max SF/BR unit value of 8,976 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

  Line-of-Site - A noise barrier with an average height of 2.0 feet and total length of approximately 528 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all

of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 1,056 square feet.

Optimized - A noise barrier with an average height of 9.7 feet and total length of approximately 3,024 feet would provide noise reductions of at least 5 dB(A) for 67 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least 5 dB(A) of noise reduction to a total of four benefited receptor units. In addition, this barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 29,280 square feet with a Max SF/BR unit value of 7,320 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 8. NSA 6 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-12	1	42	44	55	***13***	52	3	55	0	52	3
6-01	1	41	43	53	***12***	53	1	54	0	53	1
6-02	1	40	43	58	***17***	53	***5***	57	1	53	***5***
6-03	1	40	42	57	***17***	52	***5***	57	0	53	***5***
6-04	1	40	42	57	***18***	52	***5***	57	0	53	***5***
6-05	1	40	42	57	***17***	52	***5***	57	0	52	***5***
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							35,905		1,056		29,280
Total Number of Impacted Receptors							6		6		6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							4		0		4
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							67%		0%		67%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***Yes***		***No***		***Yes***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							4		0		4
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							8,976		***1,056***		7,320
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							5		0		5
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							3,264		528		3,024
Barrier Height Range (ft)							11		2		6 to 10
Average Barrier Height (ft)							11.0		2.0		9.7

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 7:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (M-13) is approximately 100 feet from the roadway. Therefore, a wall 400 feet past the front row impacted receptors on both ends assumes a wall about 1,300 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 15,600 square feet. Assuming the feasibility criteria could be met and taking 15,600 SF/6 BR possible, we have a SF/BR value of 2,600, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 12.9 feet and total length of approximately 912 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 11,761 square feet.

  Line-of-Site - A noise barrier with an average height of 12.4 feet and total length of approximately 1,344 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 16,704 square feet.

Optimized - A noise barrier with an average height of 14.3 feet and total length of approximately 1,344 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 19,152 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

Table 9. NSA 7 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-13	1	***72***	***74***	***73***	1	***74***	-1	***74***	-1	***74***	-1
M-14	1	62	64	***66***	4	65	0	65	0	65	0
M-15	1	54	56	***69***	***15***	65	***5***	64	***5***	64	***5***
7-01	1	65	***67***	***67***	2	***68***	0	***68***	0	***68***	0
7-02	1	***66***	***68***	***69***	2	***69***	0	***69***	0	***69***	0
7-03	1	54	56	64	***10***	63	1	63	1	63	1
7-04	1	51	54	60	8	60	0	60	0	60	0
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							11,761		16,704		19,152
Total Number of Impacted Receptors							6		6		6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							1		1		1
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							17%		17%		17%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***No***		***No***		***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							1		1		1
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							11,761		16,704		19,152
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							5		5		5
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							912		1,344		1,344
Barrier Height Range (ft)							6 to 17		6 to 17		11 to 19
Average Barrier Height (ft)							12.9		12.4		14.3

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 8:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (M-16) is approximately 350 feet from the roadway. Therefore, a wall 1,400 feet past the front row impacted receptors on both ends assumes a wall about 2,800 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 33,600 square feet. Assuming the feasibility criteria could be met and taking 33,600 SF/1 BR possible, we have a SF/BR value of 33,600, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 13.2 feet and total length of approximately 1,081 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 14,316 square feet.

  Line-of-Site - A noise barrier with an average height of 8.9 feet and total length of approximately 745 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 1 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 6,633 square feet.

Optimized - A noise barrier with an average height of 13.2 feet and total length of approximately 1,081 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would provide a 1 dB(A) noise reduction to one impacted receptor unit. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 14,316 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

Table 10. NSA 8 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-16	1	64	***66***	***67***	3	***66***	1	***66***	1	***66***	1
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							14,316		6,633		14,316
Total Number of Impacted Receptors							1		1		1
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							0		0		0
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							0%		0%		0%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***No***		***No***		***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							0		0		0
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							14,316		6,633		14,316
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							0		0		0
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							1,081		745		1,081
Barrier Height Range (ft)							8 to 14		6 to 9		8 to 14
Average Barrier Height (ft)							13.2		8.9		13.2

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 9:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (M-17) is approximately 225 feet from the roadway. Therefore, a wall 900 feet past the front row impacted receptors on both ends assumes a wall about 2,600 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 31,200 square feet. Assuming the feasibility criteria could be met and taking 31,200 SF/6 BR possible, we have a SF/BR value of 5,200, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A dual noise barrier system with a combined average height of 14.1 feet and combined total length of approximately 2,688 feet would provide noise reductions of at least 5 dB(A) for 67 percent of the impacted receptors identified in this NSA. The barrier system would also satisfy each of the other feasibility criteria. This dual noise barrier system would provide at least a 5 dB(A) noise reduction to four impacted receptors. The total square footage of the resulting barriers would be approximately 37,632 square feet with a Max SF/BR unit value of 9,408 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

  Line-of-Site - A dual noise barrier system with a combined average height of 13.1 feet and combined total length of approximately 1,680 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier system satisfy any of the other feasibility criteria. This noise

barrier system would only provide a 5 dB(A) noise reduction to one impacted receptor. This dual barrier system would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier system would be approximately 22,128 square feet.

Optimized - A dual noise barrier system with a combined average height of 16.4 feet and combined total length of approximately 2,688 feet would provide noise reductions of at least 5 dB(A) for 67 percent of the impacted receptors identified in this NSA. The barrier system would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to four impacted receptor units. This dual barrier system would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barriers would be approximately 44,256 square feet with a Max SF/BR unit value of 11,064 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 11. NSA 9 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-17	1	45	47	***67***	***22***	60	***7***	62	***5***	59	***8***
M-18	1	49	51	63	***14***	57	***6***	60	2	57	***6***
9-01	1	44	46	63	***19***	58	***5***	61	2	58	***5***
9-02	1	47	49	60	***14***	56	***5***	58	2	56	***5***
9-03	1	51	53	61	***10***	58	3	59	2	58	3
9-04	1	52	54	60	8	58	2	58	1	58	2
9-05	1	53	56	58	5	57	2	57	1	56	2
9-06	1	52	54	60	8	58	1	59	1	58	2
9-07	1	55	58	59	4	59	1	59	0	58	1
9-08	1	58	60	60	2	60	0	60	0	60	1
9-09	1	62	64	63	1	63	0	63	0	63	0
9-10	1	63	65	65	2	65	0	65	0	65	0
9-11	1	63	65	64	1	64	0	64	0	64	0
9-12	1	***66***	***68***	***67***	1	***67***	0	***67***	0	***67***	0

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
Barrier Area (ft^2)		37,632		22,128		44,256
Total Number of Impacted Receptors		6		6		6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss		4		1		4
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss		67%		17%		67%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?		***Yes***		***No***		***Yes***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)		4		1		4
Barrier Square Footage per Benefited Receptor (S.F./B.R.)		9,408		22,128		11,064
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?		***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])		5		5		6
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?		***Yes***		***No***		***Yes***
Total Barrier Length (ft)		2,688		1,680		2,688
Barrier Height Range (ft)		10 to 16		11 to 20		10 to 20
Average Barrier Height (ft)		14.1		13.1		16.4

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- ***NSA 12:*** This NSA is situated adjacent to the existing S.R. 0147 just north of the proposed relocation of Ridge Road. Impacts associated with this NSA are attributed to traffic on S.R. 0147. Through a process of model isolation (all traffic was removed from all modeled roadways except S.R. 0147), it was confirmed that no other roadways are contributing to the impacted receptors. All four of the affected residential properties require direct driveway access to S.R. 0147. Therefore, no feasible abatement could be developed that would not restrict access between the impacted properties and S.R. 0147.

  No noise barriers could be developed that satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

- ***NSA 14:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (M-24) is approximately 400 feet from the roadway. Therefore, a wall 1,600 feet past the front row impacted receptors on both ends assumes a wall about 3,600 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 43,200 square feet. Assuming the feasibility criteria could be met and taking 43,200 SF/7 BR possible, we have a SF/BR value of 6,171, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 18.7 feet and total length of approximately 1,776 feet would not provide noise reductions of at least 5 dB(A) for 50

percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide an average 3 dB(A) noise reduction to the impacted receptors. The total square footage of the resulting barrier would be approximately 33,119 square feet.

Line-of-Site – Due to intervening terrain and distance from the proposed roadway none of the impacted receptors will have a direct view of the proposed roadway. Therefore, no line-of-site barrier could be developed.

Optimized - A noise barrier with an average height of 17.8 feet and total length of approximately 1,776 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide an average 3 dB(A) noise reduction to the impacted receptors. The total square footage of the resulting barrier would be approximately 31,679 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

- ***NSA 17:***

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (17-03) is approximately 650 feet from the roadway. Therefore, a wall 2,600 feet past the front row impacted receptors on both ends assumes a wall about 5,600 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust

height) results with a barrier approximately 67,200 square feet. Assuming the feasibility criteria could be met and taking 67,200 SF/4 BR possible, we have a SF/BR value of 16,800, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

5 dB(A) IL - A noise barrier with an average height of 20.0 feet and total length of approximately 2,880 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 5 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 57,602 square feet.

Line-of-Site – A noise barrier with an average height of 11.0 feet and total length of approximately 96 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 3 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 1,055 square feet.

Optimized - A noise barrier with an average height of 12.0 feet and total length of approximately 2,736 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 4 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 32,833 square feet.

This noise barrier does not satisfy the feasibility criteria and does not satisfy the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 12. NSA 14 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-25	1	55	55	60	5	59	1	60	0	59	1
M-26	1	47	47	54	7	51	3	54	0	51	3
14-01	1	53	53	60	7	59	1	60	0	59	1
14-02	1	53	53	58	5	57	1	58	0	57	1
14-03	1	43	44	54	***11***	51	3	54	0	51	3
14-04	1	46	46	57	***11***	53	3	57	0	53	3
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							33,119		0		31,679
Total Number of Impacted Receptors							2		2		2
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							0		0		0
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							0%		0%		0%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***No***		***No***		***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							0		0		0
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							33,119		***0***		31,679
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							0		0		0
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							1,776		0		1,776
Barrier Height Range (ft)							14 to 21		0		14 to 21
Average Barrier Height (ft)							18.7		0.0		17.8

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

Table 13. NSA 17 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-29	1	43	45	55	***12***	51	***5***	52	3	51	4
M-30	1	64	***66***	65	1	65	0	65	0	65	0
M-31	1	58	60	62	4	60	2	62	0	61	1
17-01	1	***68***	***70***	***69***	1	***69***	0	***69***	0	***69***	0
17-02	1	***66***	***68***	***67***	1	***67***	0	***67***	0	***67***	0
17-03	1	65	***67***	***66***	1	***66***	0	***66***	0	***66***	0
17-04	1	63	65	65	2	64	1	65	0	64	1
17-05	1	58	60	62	4	60	2	62	0	60	1
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							57,602		1,055		32,833
Total Number of Impacted Receptors							4		4		4
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							1		0		0
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							25%		0%		0%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***No***		***No***		***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							1		0		0
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							57,602		***1,055***		32,833
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							5		0		0
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							2,880		96		2,736
Barrier Height Range (ft)							20		11		9 to 14
Average Barrier Height (ft)							20.0		11.0		12.0

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- **NSA 18:**

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (M-32) is approximately 400 feet from the roadway. Therefore, a wall 1,600 feet past the front row impacted receptors on both ends assumes a wall about 3,200 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 38,400 square feet. Assuming the feasibility criteria could be met and taking 38,400 SF/1 BR possible, we have a SF/BR value of 38,400, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 14.6 feet and total length of approximately 960 feet would provide noise reductions of at least 5 dB(A) for 100 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 13,968 square feet.

  Line-of-Site - A noise barrier with an average height of 15.8 feet and total length of approximately 432 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 3 dB(A) noise reduction to the impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 6,816 square feet.

Optimized - A noise barrier with an average height of 19.2 feet and total length of approximately 1,008 feet would provide noise reductions of at least 5 dB(A) for 100 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to one non-impacted receptor, and a 7 dB(A) reduction to one impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 19,392 square feet with a Max SF/BR unit value of 9,696 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 14. NSA 18 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-32	1	47	49	65	***18***	60	***5***	62	3	58	***7***
M-33	1	42	44	50	8	46	4	50	1	45	***5***

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL	Case 2 Line-of-Site	Case 3 Optimized
Barrier Area (ft^2)	13,968	6,816	19,392
Total Number of Impacted Receptors	1	1	1
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	1	0	1
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	100%	0%	100%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	*Yes*	*No*	*Yes*
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	1	0	2
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	13,968	6,816	9,696
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	*No*	*No*	*No*
Average Noise Reduction for Benefited Receptors (dB[A])	5	0	6
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	*No*	*No*	*Yes*
Total Barrier Length (ft)	960	432	1,008
Barrier Height Range (ft)	12 to 15	15 to 16	15 to 20
Average Barrier Height (ft)	14.6	15.8	19.2

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- **NSA 19:**

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest impacted receptor (19-01) is approximately 150 feet from the roadway. Therefore, a wall 600 feet past the front row impacted receptors on both ends assumes a wall about 1,600 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 19,200 square feet. Assuming the feasibility criteria could be met and taking 19,200 SF/4 BR possible, we have a SF/BR value of 4,800, which is greater than the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 16.9 feet and total length of approximately 1,056 feet would provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to two impacted receptors. The total square footage of the resulting barrier would be approximately 17,855 square feet.

  Line-of-Site - A noise barrier with an average height of 21.6 feet and total length of approximately 2,112 feet would provide noise reductions of at least 5 dB(A) for 75 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 7 dB(A) noise reduction to three impacted receptors. This barrier would break the Line-of-Site between 75 percent of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 45,599 square feet.

Optimized - A noise barrier with an average height of 21.6 feet and total length of approximately 1,920 feet would provide noise reductions of at least 5 dB(A) for 75 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to one non-impacted receptor, and at least a 7dB(A) reduction to three impacted receptors. This barrier would break the Line-of-Site between 75 percent of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 41,519 square feet with a Max SF/BR unit value of 10,380 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 15. NSA 19 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-34	1	54	56	***67***	***13***	***67***	0	***67***	0	***67***	0
M-35	1	59	62	64	5	62	2	61	3	59	***5***
M-36	1	64	***67***	***69***	5	63	***6***	62	***7***	59	***10***
19-01	1	60	63	***71***	***11***	***69***	2	64	***7***	64	***7***
19-02	1	61	65	***68***	7	63	***5***	61	***8***	59	***10***
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							17,855		45,599		41,519
Total Number of Impacted Receptors							4		4		4
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							2		3		3
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							50%		75%		75%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***Yes***		***Yes***		***Yes***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							2		3		4
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							8,928		15,200		10,380
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							5		7		8
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***Yes***		***Yes***
Total Barrier Length (ft)							1,056		2,112		1,920
Barrier Height Range (ft)							11 to 19		14 to 25		14 to 25
Average Barrier Height (ft)							16.9		21.6		21.6

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- **NSA 20:**

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest receptor (20-01) is approximately 50 feet from the roadway. Therefore, a wall 200 feet past the front row impacted receptors on both ends assumes a wall about 2,100 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 25,200 square feet. Assuming the feasibility criteria could be met and taking 25,200 SF/4 BR possible, we have a SF/BR value of 6,300, which is > the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 22.4 feet and total length of approximately 672 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide at least a 5 dB(A) noise reduction to one impacted receptor. The total square footage of the resulting barrier would be approximately 15,072 square feet.

  Line-of-Site - A noise barrier with an average height of 16.2 feet and total length of approximately 1,824 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would only provide a 3 dB(A) average noise reduction to two receptors. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 29,473 square feet.

Optimized - A noise barrier with an average height of 22.1 feet and total length of approximately 1,248 feet would not provide noise reductions of at least 5 dB(A) for 50 percent of the impacted receptors identified in this NSA. Nor would the barrier satisfy any of the other feasibility criteria. This noise barrier would provide at least a 6 dB(A) noise reduction to one impacted receptor. This barrier would break the Line-of-Site between two of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 27,552 square feet.

None of the investigated noise barriers satisfy the feasibility criteria. Therefore, based on the results of the analysis completed for this project, a noise barrier is not recommended.

Table 16. NSA 20 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-37	1	61	63	61	1	60	1	58	3	58	3
M-38	1	63	***66***	***67***	4	***67***	0	***66***	1	***67***	0
20-01	1	59	62	***77***	***18***	***72***	***5***	***73***	4	***70***	***6***
20-02	1	58	61	***70***	***12***	***70***	0	***70***	0	***70***	0
Feasible and Reasonable Criteria:						**Case 1 5 dB(A) IL**		**Case 2 Line-of-Site**		**Case 3 Optimized**	
Barrier Area (ft^2)							15,072		29,473		27,552
Total Number of Impacted Receptors							3		3		3
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							1		0		1
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss							33%		0%		33%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?							***No***		***No***		***No***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)							1		0		1
Barrier Square Footage per Benefited Receptor (S.F./B.R.)							15,072		29,473		27,552
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?							***No***		***No***		***No***
Average Noise Reduction for Benefited Receptors (dB[A])							5		0		6
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?							***No***		***No***		***No***
Total Barrier Length (ft)							672		1,824		1,248
Barrier Height Range (ft)							17 to 25		10 to 22		15 to 25
Average Barrier Height (ft)							22.4		16.2		22.1

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

- **NSA 22:**

  Screening – As cited in the Project Level Highway Traffic Noise Handbook Publication 24 11-15 and the FHWA Title 23: Highways - Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, a screening "rule of thumb" was applied that "The wall dimensions can be estimated based on blocking the line of sight (height) to/from the receptor and extending the barrier 4X the distance measured from the roadway to the receptor."

  With this calculation, the closest receptor (22-07) is approximately 100 feet from the roadway. Therefore, a wall 400 feet past the front row impacted receptors on both ends assumes a wall about 2,000 feet long (including the distance between the end receptors) and with a typical line of sight height of 12 feet (for tractor trailer exhaust height) results with a barrier approximately 24,000 square feet. Assuming the feasibility criteria could be met and taking 24,000 SF/6 BR possible, we have a SF/BR value of 4,000, which is > the 2,000 Max SF/BR limit and therefore not reasonable to construct.

  5 dB(A) IL - A noise barrier with an average height of 9.7 feet and total length of approximately 1,632 feet would provide noise reductions of at least 5 dB(A) for 83 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to five impacted receptors, and one non-impacted receptor. The total square footage of the resulting barrier would be approximately 15,888 square feet with a Max SF/BR unit value of 2,648 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

  Line-of-Site - A noise barrier with an average height of 11.8 feet and total length of approximately 1,824 feet would provide noise reductions of at least 5 dB(A) for 83 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to five impacted receptors, and one non-impacted receptor. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 21,504

square feet with a Max SF/BR unit value of 3,584 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

Optimized - A noise barrier with an average height of 13.5 feet and total length of approximately 1,824 feet would provide noise reductions of at least 5 dB(A) for 83 percent of the impacted receptors identified in this NSA. The barrier would also satisfy each of the other feasibility criteria. This noise barrier would provide at least a 5 dB(A) noise reduction to one non-impacted receptor, and a 7 dB(A) reduction to five impacted receptors. This barrier would break the Line-of-Site between all of the impacted receptors and the proposed roadway. The total square footage of the resulting barrier would be approximately 24,672 square feet with a Max SF/BR unit value of 4,112 square feet, which is greater than the maximum 2,000 square feet per benefited unit allowed for the reasonableness criteria.

This noise barrier satisfies the feasibility criteria but not the reasonableness criteria. Therefore, based on the results of the analysis completed for this project, this noise barrier is not recommended.

Table 17. NSA 22 - Barrier Analysis Results.

Receiver I.D.	Equivalent Number of Dwelling Units	Existing Worst-Case (2014)	Future No-Build (2044)	Future Build (2044) (No Barrier)		Abatement Consideration					
						Case 1 5 dB(A) IL		Case 2 Line-of-Site		Case 3 Optimized	
				Noise Level	Difference Over Existing	Noise Level	Insertion Loss	Noise Level	Insertion Loss	Noise Level	Insertion Loss
M-43	1	61	64	62	1	60	2	60	2	60	2
M-44	1	57	60	60	3	59	1	59	1	58	2
M-45	1	***66***	***69***	***69***	3	62	***7***	62	***7***	58	***11***
M-46	1	54	57	56	2	55	1	55	1	53	3
M-47	1	63	***67***	63	-1	62	0	62	0	62	1
22-01	1	63	***66***	64	2	62	3	62	3	62	3
22-02	1	65	***69***	***66***	1	65	1	65	1	63	3
22-03	1	41	45	44	3	39	***5***	39	***5***	34	***10***
22-04	1	***68***	***72***	***72***	3	65	***7***	65	***7***	60	***12***
22-05	1	***68***	***71***	***70***	2	64	***7***	64	***7***	59	***12***
22-06	1	***68***	***71***	***70***	3	64	***6***	64	***6***	60	***11***
22-07	1	***67***	***71***	***70***	3	64	***6***	64	***6***	60	***10***
22-08	1	62	65	63	2	62	1	62	1	62	1
22-09	1	57	60	60	3	58	2	58	2	56	4
22-10	1	56	59	56	0	55	1	55	1	52	4
22-11	1	58	61	56	-2	56	0	56	0	56	0
22-12	1	57	60	56	-1	56	0	56	0	55	1
22-13	1	59	62	58	-1	58	0	58	0	58	0
22-14	1	54	57	58	4	57	1	57	1	55	2
22-15	1	54	57	57	3	55	1	55	1	54	3
22-16	1	54	57	55	1	54	0	54	0	53	2
22-17	1	56	59	55	0	55	0	55	0	55	1
22-18	1	55	58	54	-1	54	0	54	0	54	1
22-19	1	54	57	53	-1	53	0	53	0	53	1

Feasible and Reasonable Criteria:	Case 1 5 dB(A) IL	Case 2 Line-of-Site	Case 3 Optimized
Barrier Area (ft^2)	15,888	21,504	24,672
Total Number of Impacted Receptors	6	6	6
Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	5	5	5
Percent of Impacted Receptors Receiving ≥ 5 dB(A) Insertion Loss	83%	83%	83%
Is the Barrier Feasible Based upon 5 dB(A) Reduction Criteria (Yes/No)?	***Yes***	***Yes***	***Yes***
Total Number of Benefited Receptors (All Receptors Receiving ≥ 5 dB[A] Insertion Loss)	6	6	6
Barrier Square Footage per Benefited Receptor (S.F./B.R.)	2,648	3,584	4,112
Is the Barrier Reasonable from a S.F./B.R. standpoint (≤ 2,000 ft^2) (Yes/No)?	***No***	***No***	***No***
Average Noise Reduction for Benefited Receptors (dB[A])	6	6	11
Is 7 dB(A) Insertion Loss goal met for at least one Impacted Receptor (Yes/No)?	***Yes***	***Yes***	***Yes***
Total Barrier Length (ft)	1,632	1,824	1,824
Barrier Height Range (ft)	8 to 11	8 to 14	8 to 15
Average Barrier Height (ft)	9.7	11.8	13.5

Note: All noise levels, including calculated comparisons, averages, and insertion losses, are calculated to the tenth of a dB(A) and then rounded to the nearest whole number for presentation purposes.

Indicates Receptors receiving an Insertion Loss of 5 dB(A) or more.

Indicates Impacted Receptors receiving an Insertion Loss of 7 dB(A) or more.

5.2.2 Summary of Results and Recommendations

Based on studies conducted to date, noise barriers in six of the 14 NSAs retained for feasibility and reasonableness analysis were found to be warranted and feasible. However, none of the noise barriers investigated during this final design analysis were found to be reasonable. Therefore, no mitigation in the form of noise barriers is recommended for this project.

6.0 Construction Noise Consideration and Mitigation Alternatives

6.0 CONSTRUCTION NOISE CONSIDERATION AND MITIGATION ALTERNATIVES

As with any large-scale roadway project, there is a potential for short-term noise impacts during the construction phase of work. In order to lessen these effects, the contractor will be required to operate with the least possible noise and to conduct the work so that annoyance to occupants of nearby properties and the general public will be reduced to a practical minimum. That goal may be accomplished by a combination of strategies, including operating all equipment within appropriate noise controls, screening offensive operations, staging activities to minimize the duration of impacts, and restricting activity to times during the day that are considered to be less noise-sensitive.

7.0 Summary and Conclusions

7.0 SUMMARY AND CONCLUSIONS

As part of the environmental document being prepared for this transportation project, a noise impact analysis was completed to evaluate the warrants, feasibility, and reasonableness of providing noise abatement for impacted receptors.

Noise monitoring was performed at 46 representative sites within the project study area. Following model validation, worst-case existing traffic noise levels were calculated. Existing year (2014) traffic noise impacts were noted at six NSAs within the project study area. Under design year (2044) conditions, an increase in traffic noise levels was also predicted. With the constructed roadway improvements, future noise levels in the design year (2044) are predicted to generally increase by an average of 8 dB(A) throughout the project study area with impacts predicted at 14 NSAs. Since noise impacts were identified, noise abatement was evaluated for the Build Alternative in those locations that are predicted to approach or exceed the noise abatement criteria or experience a substantial increase of 10 dB(A) or more.

Based on this final design noise analysis, no abatement in the form of noise barriers is recommended for construction.

Bibliography

BIBLIOGRAPHY

A.D. Marble & Company. August 2014. Noise Monitoring Work Plan, S.R 0015, Section 088 Central Susquehanna Valley Transportation Project. A.D. Marble & Company, Conshohocken, Pennsylvania.

Pennsylvania Department of Transportation (PennDOT). November 2015. *Project Level Highway Traffic Noise Handbook, Publication No. 24.* PennDOT, Harrisburg, Pennsylvania.

The Federal Highway Administration (FHWA). Revised July 13, 2010. Federal-Aid Policy Guide Title 23 Code of Federal Regulations, Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," Final Rule. FHWA, Washington, D.C.

Appendix A

24-Hour and Short-Term Monitoring Data

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30225

Instrument: **Sound Level Meter**
Model: **NL22**
Manufacturer: **Rion**
Serial number: **00362590**
Tested with: **Microphone UC52 s/n 107422**
Preamplifier NH21 s/n 19071
Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/19/2013** *Cal Due:* **12/19/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.9 °C	100.570 kPa	33.0 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/19/2013	Date	12/20/2013

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES[1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
INPUT AMPLIFIER TEST: GAIN TEST / ATTENUATOR SETTING - ANSI S1.4-1983 CLAUSE 5.3	Passed	0.25
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Rion UC52 s/n 107422 for acoustical test
Preamplifier: Rion NH21 s/n 19071 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30225 of 9 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30226

Instrument: **Sound Level Meter**
Model: **NL22**
Manufacturer: **Rion**
Serial number: **00362592**
Tested with: **Microphone UC52 s/n 107533**
Preamplifier NH21 s/n 19073
Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/19/2013** *Cal Due:* **12/19/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.4 °C	100.530 kPa	37.5 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/19/2013	Date	12/26/2013

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
INPUT AMPLIFIER TEST: GAIN TEST / ATTENUATOR SETTING - ANSI S1.4-1983 CLAUSE 5.3	Passed	0.25
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Rion UC52 s/n 107533 for acoustical test
Preamplifier: Rion NH21 s/n 19073 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30226 of 9 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30227

Instrument: **Sound Level Meter**
Model: **NL22**
Manufacturer: **Rion**
Serial number: **00862938**
Tested with: **Microphone UC52 s/n 109852**
Preamplifier NH21 s/n 20958
Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/19/2013** *Cal Due:* **12/19/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.4 °C	100.530 kPa	37.5 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/19/2013	Date	12/26/2013

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
INPUT AMPLIFIER TEST: GAIN TEST / ATTENUATOR SETTING - ANSI S1.4-1983 CLAUSE 5.3	Passed	0.25
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Rion UC52 s/n 109852 for acoustical test
Preamplifier: Rion NH21 s/n 20958 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30227 of 9 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA

Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30228

Instrument: **Sound Level Meter**
Model: **NL22**
Manufacturer: **Rion**
Serial number: **00862937**
Tested with: **Microphone UC52 s/n 109851**
Preamplifier NH21 s/n 20957
Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/19/2013** *Cal Due:* **12/19/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.6 °C	100.290 kPa	38.4 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/19/2013	Date	12/26/2013

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
INPUT AMPLIFIER TEST: GAIN TEST / ATTENUATOR SETTING - ANSI S1.4-1983 CLAUSE 5.3	Passed	0.25
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Rion UC52 s/n 109851 for acoustical test
Preamplifier: Rion NH21 s/n 20957 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30228 of 9 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30229

Instrument: **Sound Level Meter**
Model: **dB-3100**
Manufacturer: **Metrosonics**
Serial number: **3840**
Tested with: **Microphone Microphone s/n 4664**

Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/20/2013** *Cal Due:* **12/20/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.3 °C	100.330 kPa	36.6 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/20/2013	Date	12/26/2013

Document stored Z:\Calibration Lab\SLM 2013\MdB-3100_3840_M1.doc

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES[1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5
DOSIMETER: EXPONENT CIRCUIT AND INTEGRATOR TEST (ANSI S1.25 #7.7)	Passed	0.2

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Metrosonics MK3100R s/n 4664 for acoustical test
Preamplifier: none
Other: Metrosonics input cable for db - 3100
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30229 of two sections with seven pages total.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30230

Instrument: **Sound Level Meter**
Model: **dB-3100**
Manufacturer: **Metrosonics**
Serial number: **4515**
Tested with: **Microphone Microphone s/n 3852**

Type (class): **2**
Customer: **A.D. Marble & Company**
Tel/Fax: **484-533-2500 / 484-533-2599**

Date Calibrated: **12/20/2013** *Cal Due:* **12/20/2014**

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

Contains non-accredited tests: __Yes X No
Calibration service: __ Basic X Standard
Address: **375 East Elm Street, Suite 200, Conshohocken, PA 19428-1908**

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	Oct 7, 2013	Scantek, Inc./ NVLAP	Oct 7, 2014
DS-360-SRS	Function Generator	33584	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2015
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 30, 2013	ACR Env. / A2LA	Sep 30, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30,2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
4226-Brüel&Kjær	Multifunction calibrator	2305103	Jul 26, 2013	Scantek, Inc./ NVLAP	Jul 26, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.3 °C	100.120 kPa	37.7 %RH

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/20/2013	Date	12/26/2013

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
CALIBRATION OF SOUND LEVEL METER - ANSI S1.4 CLAUSE 3.2	Passed	0.2
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
FAST-SLOW TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.15
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING MF CALIBRATOR	Passed	0.2-0.5
DOSIMETER: EXPONENT CIRCUIT AND INTEGRATOR TEST (ANSI S1.25 #7.7)	Passed	0.2

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] Parameters are certified at actual environmental conditions.

[3] The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:

Microphone: Metrosonics MK3100R s/n 3852 for acoustical test
Preamplifier: none
Other: Metrosonics input cable for db - 3100
Accompanying acoustical calibrator: Metrosonics CL304 s/n 4129
Windscreen: none

Measured Data: in Test Report # 30230 of two sections with seven pages total.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA

Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.30231

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **12/19/2013**	*Cal Due:* **12/19/2014**
Model:	**CL304**	*Status:*	**Received** / **Sent**
Manufacturer:	**Metrosonics**	*In tolerance:*	X / X
Serial number:	**4129**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	__Yes _X_ No
Barometer s/n:			
Customer:	**A.D. Marble & Company**	*Address:*	**375 East Elm Street,**
Tel/Fax:	**484-533-2500 / 484-533-2599**		**Conshohocken, PA 19428-1908**

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
483B-Norsonic	SME Cal Unit	31061	Jul 18, 2013	Scantek, Inc./ NVLAP	Jul 18, 2014
DS-360-SRS	Function Generator	88077	Aug 30, 2012	ACR Env./ A2LA	Aug 30, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 3, 2013	ACR Env./ A2LA	Sep 3, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2014
140-Norsonic	Real Time Analyzer	1403978	Mar 28, 2013	Scantek, Inc. / NVLAP	Mar28, 2014
PC Program 1018 Norsonic	Calibration software	v.5.2	Validated March 2011	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Nov 8, 2013	Scantek, Inc. / NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	92271	Oct 24, 2013	Scantek, Inc./ NVLAP	Oct 24, 2014

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

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Mariana Buzduga
Signature	Lydon Dawkins	Signature	
Date	12/19/2013	Date	12/26/2013

Results summary: Device was tested and complies with following clauses of mentioned specifications:

CLAUSES[1] FROM STANDARDS REFERENCED IN PROCEDURES:	MET[2]	NOT MET	COMMENTS
Manufacturer specifications			
Manufacturer specifications: Sound pressure level	X		
Manufacturer specifications: Frequency	X		
Manufacturer specifications: Total harmonic distortion	X		
Current standards			
ANSI S1.40:2006 B.3 / IEC 60942: 2003 B.2 - Preliminary inspection	X		Unit older than the standard
ANSI S1.40:2006 B.4.4 / IEC 60942: 2003 B.3.4 - Sound pressure level	X		Unit older than the standard
ANSI S1.40:2006 A.5.4 / IEC 60942: 2003 A.4.4 - Sound pressure level stability	-	-	Unit older than the standard
ANSI S1.40:2006 B.4.5 / IEC 60942: 2003 B.3.5 - Frequency	X		Unit older than the standard
ANSI S1.40:2006 B.4.6 / IEC 60942: 2003 B.3.6 - Total harmonic distortion	X		Unit older than the standard

[1] The results of this calibration apply only to the instrument type with serial number identified in this report.

[2] The tests marked with (*) are not covered by the current NVLAP accreditation.

Main measured parameters [3]:

Measured[4]/Acceptable[5] Tone frequency (Hz):	Measured[4]/Acceptable[5] Total Harmonic Distortion (%):	Measured [4]/Acceptable Level[5] (dB):
980.45 ± 2.0/1000.0 ± 20.0	1.0 ± 0.1/ < 3	102.12 ± 0.12/102.0 ± 0.4

[3] The stated level is valid at reference conditions.

[4] The above expanded uncertainties for frequency and distortion are calculated with a coverage factor k=2; for level k=2.00

[5] Acceptable parameters values are from the manufacturer specifications

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.6 ± 1.0	100.60 ± 0.001	39.4 ± 2.0

Tests made with following attachments to instrument:

Calibrator ½" Adaptor Type: 056-990 (Quest)
Other:

Adjustments: Unit was not adjusted.
Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger.
Compliance with any standard cannot be claimed based solely on the periodic tests.

Measured Data: in Acoustical Calibrator Test Report # 30231 of one page.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ -9167
callab@scantekinc.com

TABLE B.1a — **15-Minute Observed Traffic Data**
TMS01: **2014-08-26** **1240 to 1255 Hrs.**
Roadway: SR 0015 (Westbranch Highway)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound		Southbound
	4-Lane Highway		4-Lane Highway
Automobiles:	115		133
Medium Trucks:	5		3
Heavy Trucks:	15		8
Buses:	1		0
Motorcycles:	2		2

TABLE B.1b — **15-Minute Observed Traffic Data**
TMS01: **2014-08-26** **1240 to 1255 Hrs.**
Roadway: County Line Road
Posted Speed Limit: 35 MPH

Vehicle Type	West of SR 0015		East of SR 0015
	2-Lane Road		2-Lane Road
Automobiles:	10		8
Medium Trucks:	0		0
Heavy Trucks:	2		0
Buses:	0		0
Motorcycles:	0		0

TABLE B.2a — **15-Minute Observed Traffic Data**
TMS02: **2014-08-26** **1420 to 1435 Hrs.**
Roadway: SR 0015 (Westbranch Highway)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound		Southbound
	4-Lane Highway		4-Lane Highway
Automobiles:	120		123
Medium Trucks:	7		6
Heavy Trucks:	12		12
Buses:	0		0
Motorcycles:	2		3

TABLE B.2b — **15-Minute Observed Traffic Data**
TMS02: **2014-08-26** **1420 to 1435 Hrs.**
Roadway: County Line Road
Posted Speed Limit: 35 MPH

Vehicle Type	East of SR 0015
	2-Lane Road
Automobiles:	2
Medium Trucks:	0
Heavy Trucks:	0
Buses:	0
Motorcycles:	0

TABLE B.2c — **15-Minute Observed Traffic Data**
TMS02: **2014-08-26** **1420 to 1435 Hrs.**
Roadway: Park Road
Posted Speed Limit: 40 MPH

Vehicle Type	Northbound		Southbound
	2-Lane Road		2-Lane Road
Automobiles:	21		23
Medium Trucks:	0		0
Heavy Trucks:	1		3
Buses:	1		0
Motorcycles:	1		0

TABLE B.3a — **15-Minute Observed Traffic Data**
TMS03: **2014-08-26** **1530 to 1545 Hrs.**
Roadway: SR 0015 (Westbranch Highway)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound 4-Lane Highway		Southbound 4-Lane Highway
Automobiles:	128		177
Medium Trucks:	6		6
Heavy Trucks:	8		9
Buses:	0		0
Motorcycles:	0		3

TABLE B.4a — **15-Minute Observed Traffic Data**
TMS04: **2014-08-27** **1030 to 1045 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	70		76
Medium Trucks:	6		9
Heavy Trucks:	20		15
Buses:	1		1
Motorcycles:	1		1

TABLE B.5a — **15-Minute Observed Traffic Data**
TMS05: **2014-08-27** **1210 to 1225 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	74		71
Medium Trucks:	3		6
Heavy Trucks:	28		15
Buses:	0		0
Motorcycles:	2		3

TABLE B.6a — **15-Minute Observed Traffic Data**
TMS06: **2014-08-27** **1500 to 1515 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	125		123
Medium Trucks:	3		8
Heavy Trucks:	20		19
Buses:	4		1
Motorcycles:	1		2

TABLE B.6b — **15-Minute Observed Traffic Data**
TMS06: **2014-08-27** **1500 to 1515 Hrs.**
Roadway: Ridge Road
Posted Speed Limit: 35 MPH

Vehicle Type	Eastbound 2-Lane Road		Westbound 2-Lane Road
Automobiles:	13		35
Medium Trucks:	3		1
Heavy Trucks:	0		5
Buses:	0		0
Motorcycles:	0		0

TABLE B.7a — **15-Minute Observed Traffic Data**
TMS07: **2014-08-27** **1610 to 1625 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	113		135
Medium Trucks:	8		4
Heavy Trucks:	18		15
Buses:	0		1
Motorcycles:	1		2

TABLE B.8a — **15-Minute Observed Traffic Data**
TMS08: **2014-08-28** **0930 to 0945 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	42		45
Medium Trucks:	1		4
Heavy Trucks:	10		12
Buses:	0		0
Motorcycles:	0		0

TABLE B.9a — **15-Minute Observed Traffic Data**
TMS09: **2014-08-28** **1040 to 1055 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	32		52
Medium Trucks:	5		5
Heavy Trucks:	25		12
Buses:	0		1
Motorcycles:	0		0

TABLE B.10a — **15-Minute Observed Traffic Data**
TMS10: **2014-08-28** **1125 to 1140 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 55 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	47		59
Medium Trucks:	6		7
Heavy Trucks:	28		21
Buses:	1		1
Motorcycles:	1		1

TABLE B.10b — **15-Minute Observed Traffic Data**
TMS10: **2014-08-28** **1125 to 1140 Hrs.**
Roadway: SR 0405 (Susquehanna Trail)
Posted Speed Limit: 35 MPH

Vehicle Type	Northbound 2-Lane Highway		Southbound 2-Lane Highway
Automobiles:	19		26
Medium Trucks:	3		2
Heavy Trucks:	4		4
Buses:	0		1
Motorcycles:	2		0

TABLE B.11a — **15-Minute Observed Traffic Data**
TMS11: **2014-08-28** **1215 to 1230 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound		Southbound
	2-Lane Highway		2-Lane Highway
Automobiles:	64		81
Medium Trucks:	9		4
Heavy Trucks:	24		24
Buses:	0		0
Motorcycles:	1		2

TABLE B.12a — **15-Minute Observed Traffic Data**
TMS12: **2014-08-28** **1310 to 1325 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound		Southbound
	2-Lane Highway		2-Lane Highway
Automobiles:	68		60
Medium Trucks:	3		7
Heavy Trucks:	19		28
Buses:	1		0
Motorcycles:	1		3

TABLE B.12b — **15-Minute Observed Traffic Data**
TMS12: **2014-08-28** **1310 to 1325 Hrs.**
Roadway: Ridge Road
Posted Speed Limit: 35 MPH

Vehicle Type	Eastbound		Westbound
	2-Lane Road		2-Lane Road
Automobiles:	15		10
Medium Trucks:	4		0
Heavy Trucks:	1		5
Buses:	0		0
Motorcycles:	0		1

TABLE B.13a — **15-Minute Observed Traffic Data**
TMS13: **2014-08-28** **1345 to 1400 Hrs.**
Roadway: SR 0147 (Susquehanna Trail)
Posted Speed Limit: 45 MPH

Vehicle Type	Northbound		Southbound
	2-Lane Highway		2-Lane Highway
Automobiles:	58		78
Medium Trucks:	5		3
Heavy Trucks:	19		14
Buses:	1		3
Motorcycles:	3		1

TABLE B.13b — **15-Minute Observed Traffic Data**
TMS13: **2014-08-28** **1345 to 1400 Hrs.**
Roadway: Ridge Road
Posted Speed Limit: 35 MPH

Vehicle Type	Eastbound		Westbound
	2-Lane Road		2-Lane Road
Automobiles:	9		13
Medium Trucks:	1		1
Heavy Trucks:	3		4
Buses:	0		0
Motorcycles:	0		0

TABLE A.a **Receptor M-01.B -- Hourly Equivalent Sound Level (Leq[h]) Calculation -- 2014-08-20 1505-1505 Hrs.**

Hour	15-min Leq Sub-intervals				Hourly Leq	Loudest-Hour Level
	:00	:15	:30	:45	dB(A)	dB(A)
15:05	74.4	74.0	73.9	73.1	**73.9**	
16:05	72.2	71.7	72.5	72.0	72.1	
17:05	71.7	70.8	70.7	70.1	70.9	
18:05	70.7	70.5	70.7	68.7	70.2	
19:05	69.6	70.1	69.5	67.4	69.3	
20:05	68.5	69.1	68.1	69.2	68.7	
21:05	67.8	68.7	68.8	67.7	68.3	
22:05	67.1	68.7	68.1	67.6	67.9	
23:05	67.5	67.1	65.6	63.3	66.1	
0:05	65.4	60.2	61.2	59.3	62.2	
1:05	62.9	61.8	62.5	53.7	61.4	
2:05	65.1	60.2	58.9	65.5	63.3	
3:05	64.2	64.0	62.4	65.1	64.0	
4:05	61.9	65.4	67.0	67.8	66.0	
5:05	69.0	67.9	66.8	68.0	68.0	
6:05	68.3	68.7	69.3	68.6	68.7	
7:05	70.3	69.4	69.7	70.1	69.9	
8:05	69.1	71.5	70.5	72.2	71.0	
9:05	71.1	71.8	72.7	70.6	71.6	
10:05	71.8	70.7	71.6	71.8	71.5	
11:05	72.2	71.8	72.0	71.9	72.0	
12:05	71.2	71.3	72.9	70.6	71.6	
13:05	71.1	70.5	71.5	71.2	71.1	
14:05	72.0	71.9	72.8	77.0	**74.0**	**74**

LEGEND

Loudest-Hour

Narrow Range Loudest-Hour

Wide Range Loudest-Hour

Valid Data Histogram

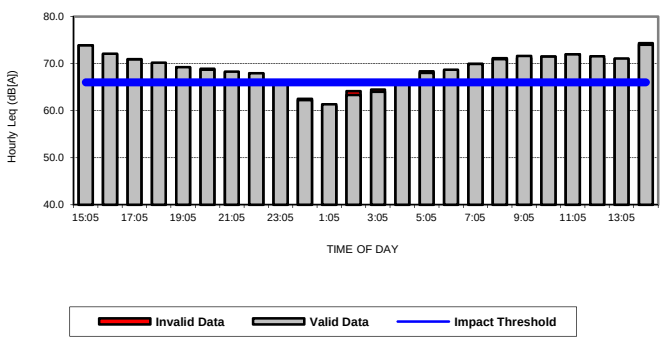


TABLE A.a **Receptor M-01.A -- Hourly Equivalent Sound Level (Leq[h]) Calculation -- 2014-08-20 1505-1505 Hrs.**

Hour	15-min Leq Sub-intervals				Hourly Leq	Loudest-Hour Level
	:00	:15	:30	:45	dB(A)	dB(A)
15:05	78.5	77.7	76.8	77.2	**77.6**	**78**
16:05	76.5	75.6	75.3	75.0	75.6	
17:05	74.9	74.5	74.5	74.2	74.5	
18:05	71.8	73.0	73.3	73.0	72.8	
19:05	71.3	71.4	70.9	70.9	71.2	
20:05	72.7	70.6	70.4	70.3	71.1	
21:05	70.3	71.8	70.5	70.6	70.8	
22:05	70.9	69.2	69.1	70.5	70.0	
23:05	66.8	68.4	67.2	66.4	67.3	
0:05	63.5	63.2	65.6	64.4	64.3	
1:05	61.8	66.2	68.8	64.0	65.9	
2:05	65.8	67.9	65.2	67.3	66.7	
3:05	65.4	62.8	64.2	70.4	66.8	
4:05	68.7	70.9	69.6	69.7	69.8	
5:05	71.7	71.0	71.3	72.2	71.6	
6:05	73.8	75.1	74.1	72.5	74.0	
7:05	73.0	74.0	72.4	72.4	73.0	
8:05	72.2	69.8	70.2	68.3	70.4	
9:05	66.8	67.2	68.7	66.1	67.3	
10:05	66.5	66.5	66.9	67.2	66.8	
11:05	67.5	73.0	66.1	67.4	69.5	
12:05	65.3	66.2	66.2	65.3	65.7	
13:05	66.0	66.2	64.8	65.9	65.7	
14:05	66.7	67.3	67.5	72.6	69.3	

LEGEND

Loudest-Hour

Narrow Range Loudest-Hour

Wide Range Loudest-Hour

Valid Data Histogram

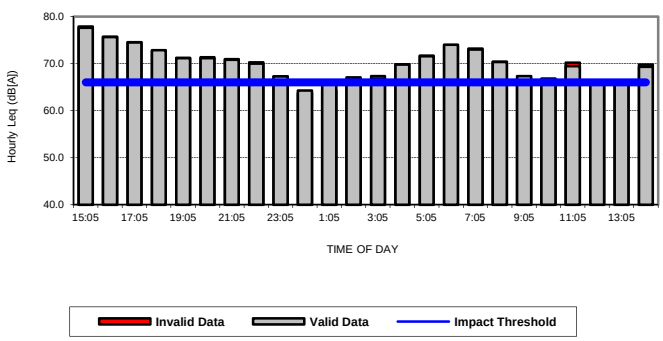


TABLE A.24a Receptor M-02.B -- Hourly Equivalent Sound Level (Leq[h]) Calculation -- 2014-08-21 1900-1900 Hrs.

Hour	15-min Leq Sub-intervals				Hourly Leq	Loudest-Hour Level
	:00	:15	:30	:45	dB(A)	dB(A)
19:00	61.7	63.5	60.7	61.8	**62.1**	**62**
20:00	59.6	58.4	57.6	57.6	58.4	
21:00	55.9	54.6	54.7	54.4	55.0	
22:00	54.4	54.4	54.4	54.4	54.4	
23:00	54.4	54.3	54.3	54.3	54.3	
0:00	54.3	54.3	54.3	54.3	54.3	
1:00	54.3	54.3	54.3	54.3	54.3	
2:00	54.3	54.3	54.3	54.3	54.3	
3:00	54.3	54.2	54.2	54.2	54.2	
4:00	54.2	54.3	54.3	54.3	54.3	
5:00	54.3	54.3	54.3	54.3	54.3	
6:00	54.3	54.3	54.3	54.3	54.3	
7:00	54.3	54.3	54.3	54.3	54.3	
8:00	54.3	54.3	54.3	54.3	54.3	
9:00	54.4	54.4	54.4	54.5	54.4	
10:00	54.6	54.8	54.8	54.8	54.7	
11:00	54.8	54.8	54.9	54.9	54.9	
12:00	54.9	55.0	55.1	55.1	55.0	
13:00	55.1	55.1	55.1	55.1	55.1	
14:00	55.0	55.0	54.9	54.9	54.9	
15:00	54.8	54.8	54.8	54.7	54.8	
16:00	54.7	54.7	54.6	54.6	54.7	
17:00	54.6	54.6	54.6	54.6	54.6	
18:00	54.6	54.6	54.6	54.6	54.6	

LEGEND

Loudest-Hour

Narrow Range Loudest-Hour

Wide Range Loudest-Hour

Valid Data Histogram

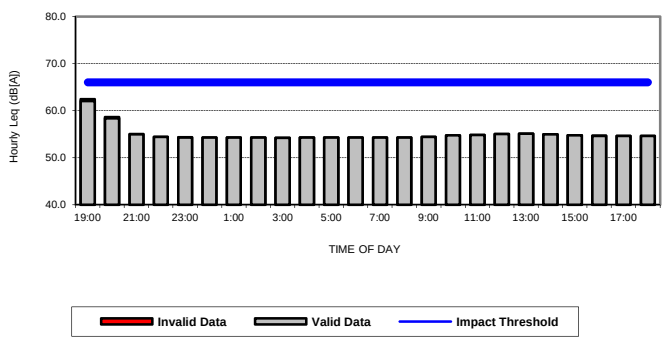


TABLE A.24a Receptor M-02.A -- Hourly Equivalent Sound Level (Leq[h]) Calculation -- 2014-08-21 1900-1900 Hrs.

Hour	15-min Leq Sub-intervals				Hourly Leq	Loudest-Hour Level
	:00	:15	:30	:45	dB(A)	dB(A)
19:00	73.5	74.5	73.8	75.0	74.3	
20:00	72.4	72.9	72.5	72.7	72.6	
21:00	72.8	73.8	73.8	72.6	73.3	
22:00	72.5	71.9	72.6	71.6	72.2	
23:00	72.1	71.5	72.5	71.2	71.8	
0:00	69.8	72.9	69.3	70.4	70.8	
1:00	70.8	69.0	70.8	71.0	70.5	
2:00	71.0	71.7	67.5	69.9	70.3	
3:00	70.0	68.7	69.2	70.4	69.6	
4:00	74.4	71.8	72.2	70.6	72.5	
5:00	71.8	72.6	73.6	74.0	73.1	
6:00	73.9	75.1	74.1	74.7	74.5	
7:00	73.9	74.9	75.9	74.7	**74.9**	
8:00	74.8	76.4	75.3	75.1	**75.5**	
9:00	73.9	76.6	75.7	75.1	**75.5**	
10:00	74.2	75.1	76.4	75.2	**75.3**	
11:00	74.8	75.9	75.1	74.8	**75.2**	
12:00	75.3	75.7	74.8	73.7	**74.9**	
13:00	74.3	73.4	74.4	74.7	74.2	
14:00	73.8	74.7	76.2	74.4	**74.9**	
15:00	74.6	75.6	75.2	75.4	**75.2**	
16:00	76.2	76.5	75.2	75.3	**75.9**	**76**
17:00	75.0	75.1	75.6	75.3	**75.2**	
18:00	75.2	75.8	75.1	73.2	**74.9**	

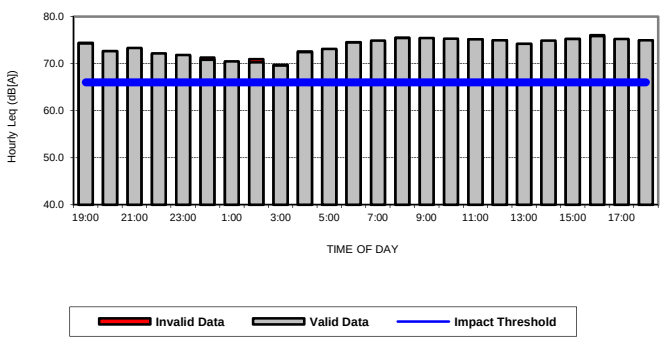
LEGEND

Loudest-Hour

Narrow Range Loudest-Hour

Wide Range Loudest-Hour

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-02 **Description:**

MONITORING INFORMATION

Notes: AU2_0302

Off Peak

Date: 8/26/14
Start Time: 3:30
End Time:
Meter ID: 862938

Roadway: SR 0015
Cars:
MT:
HT:
Monitored Leq: 65.1

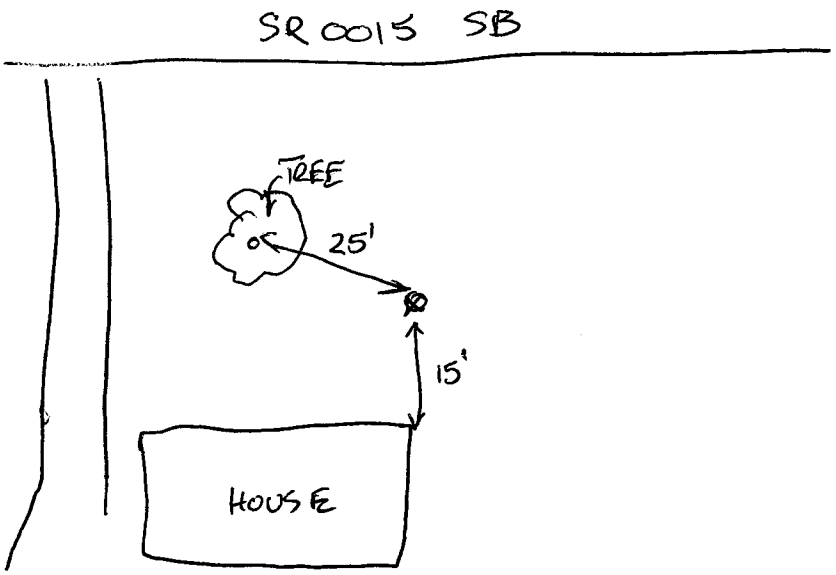
SITE SKETCH:

North Arrow

N

Site Specifics
Employee ID:
Atmospheric Conditions :

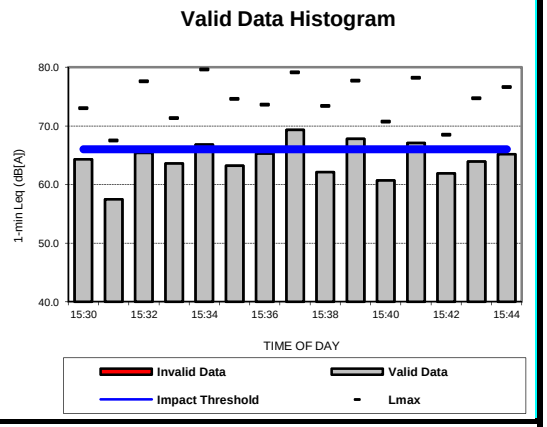
Plan View



Cross-Section

TABLE A.2 Receptor M-02 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS03: 2014-08-26 1530-1545 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:30	64.3	73.0	89.8	68.7	47.7	64.4	65.1	**65**
15:31	57.5	67.5	83.0	62.6	47.9			
15:32	65.4	77.6	92.1	68.9	52.9			
15:33	63.6	71.3	88.1	68.0	47.4			
15:34	66.8	79.6	95.9	68.1	51.4			
15:35	63.2	74.6	92.4	67.8	49.6	66.4		
15:36	65.3	73.6	90.8	69.1	57.4			
15:37	69.3	79.1	95.9	73.8	60.4			
15:38	62.1	73.4	93.2	66.8	50.0			
15:39	67.8	77.7	97.3	70.7	57.5			
15:40	60.7	70.7	85.6	65.9	48.2	64.4		
15:41	67.1	78.2	96.4	70.5	53.8			
15:42	61.9	68.5	85.4	66.6	49.2			
15:43	63.9	74.7	89.1	67.7	46.5			
15:44	65.2	76.6	93.0	68.8	52.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 3 M-03 **Description:** Two Residential Properties

MONITORING INFORMATION

Notes: House Number 96

lawn mower active on County Line Rd

Off Peak

Date: 5/26/14
Start Time: 3:30
End Time: 3:45
Meter ID: 862937

Roadway: Rt. 15 NB
Cars: 128 Bus: 0
MT: 6
HT: 8 Moto: 0
Monitored Leq: 56.8

SITE SKETCH:

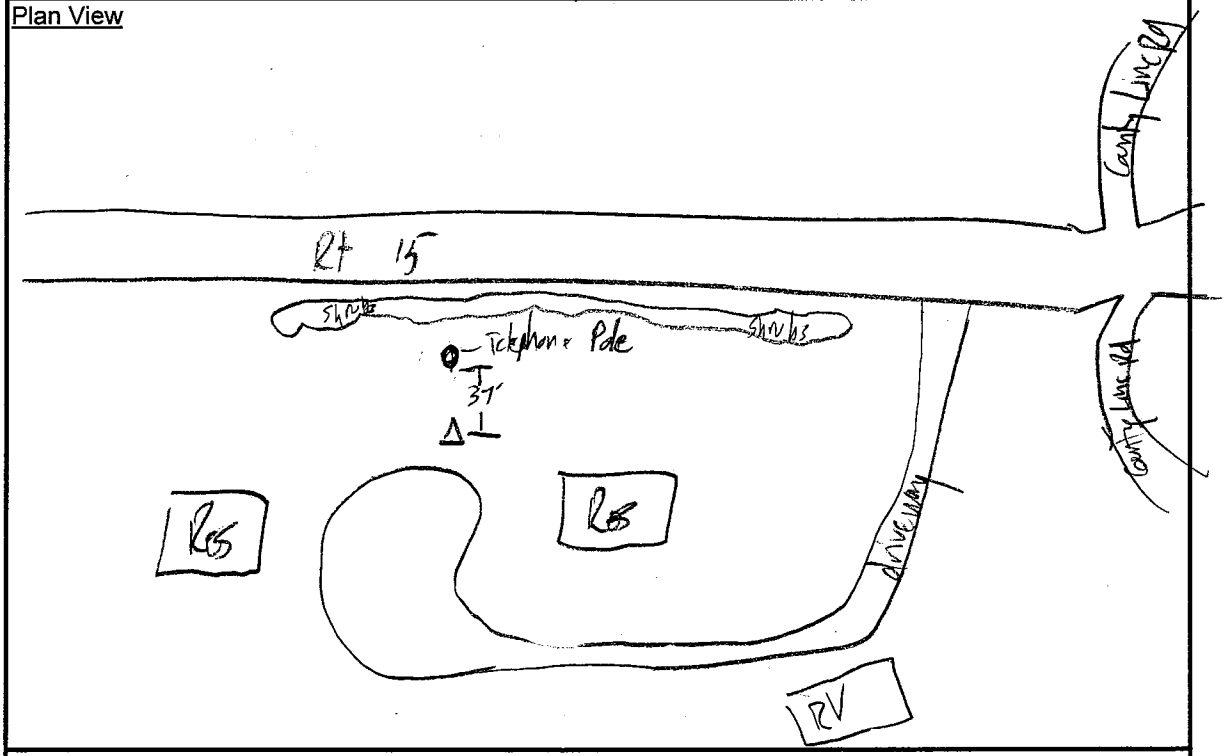
North Arrow →

Site Specifics

Employee ID: BG

Atmospheric Conditions : hot & clear

Plan View



Cross-Section

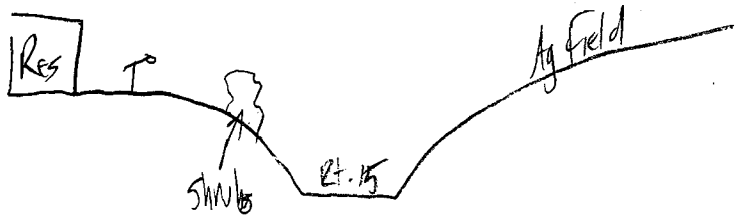
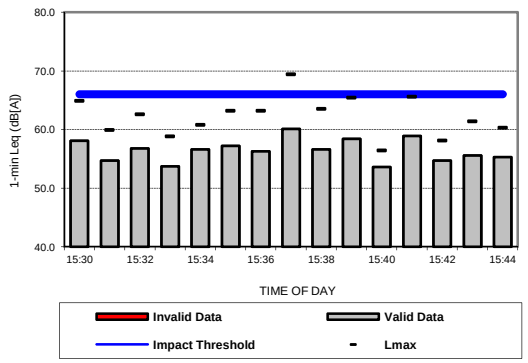


TABLE A.3 Receptor M-03 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS03: 2014-08-26 1530-1545 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:30	58.1	64.9	87.5	61.3	52.8	56.3	56.8	**57**
15:31	54.7	59.9	80.5	57.5	51.9			
15:32	56.8	62.6	83.6	59.1	52.6			
15:33	53.7	58.8	82.4	57.2	50.4			
15:34	56.6	60.8	84.2	58.8	52.6			
15:35	57.2	63.2	85.6	61.2	51.6	58.0		
15:36	56.3	63.2	87.1	59.3	52.7			
15:37	60.1	69.4	87.8	63.1	54.9			
15:38	56.6	63.5	88.7	59.2	53.1			
15:39	58.4	65.4	88.5	60.6	55.5			
15:40	53.6	56.4	80.1	55.0	51.5	56.0		
15:41	58.9	65.6	87.0	62.6	53.1			
15:42	54.7	58.1	80.5	56.4	52.5			
15:43	55.6	61.4	80.3	57.9	52.5			
15:44	55.3	60.3	80.4	57.3	52.7			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site #1 M-04 **Description:** Single Residential Property

MONITORING INFORMATION

Notes: Address: 2564 County Line Rd

Off Peak

Date: 8/20/14
Start Time: 12:40
End Time: 12:55
Meter ID: 86 2938

Roadway: Rt. 15 NB
Cars: 115
MT: 5
HT: 15
Monitored Leq: 54.0

Buses: 1
Motos: 2

SITE SKETCH:

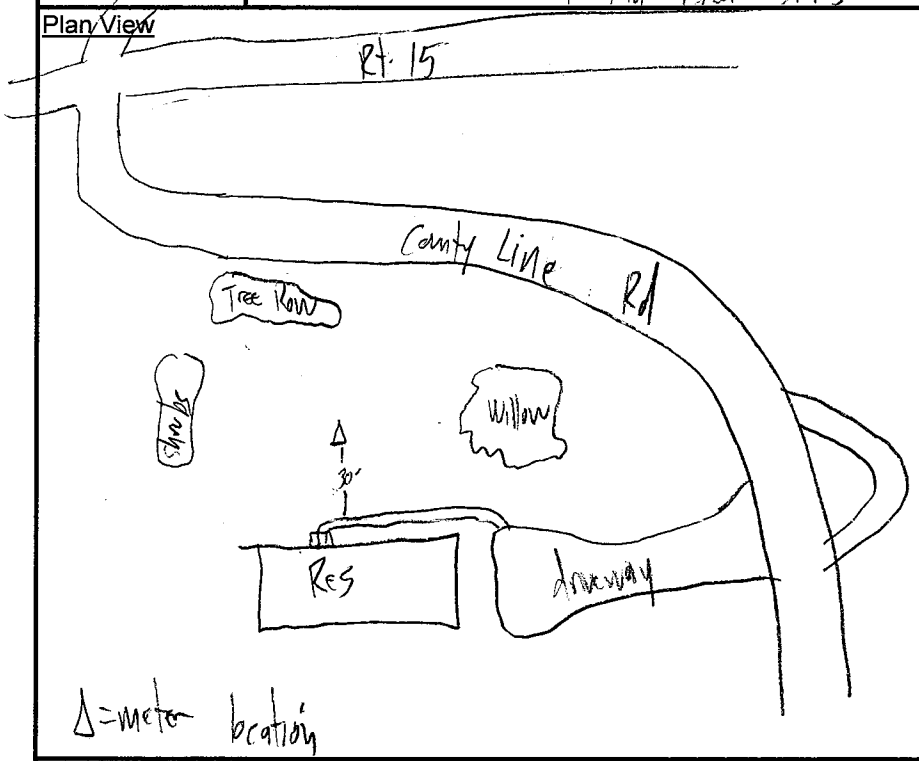
North Arrow: N →

Site Specifics

Employee ID: BS

Atmospheric Conditions: hot and clear skies

Plan View

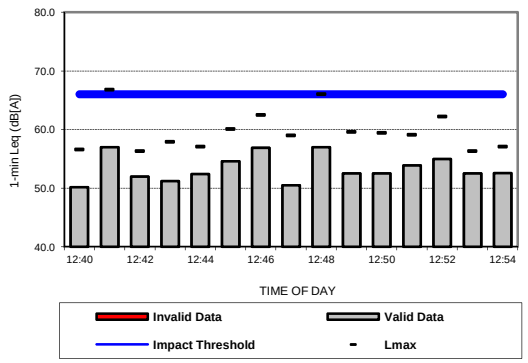


Cross-Section

TABLE A.4 Receptor M-04 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS01: 2014-08-26 1240-1255 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:40	50.2	56.6	75.8	52.7	46.7	53.3	54.0	**54**
12:41	57.0	66.8	90.0	61.3	47.2			
12:42	52.0	56.3	80.6	54.3	49.2			
12:43	51.2	57.9	81.6	53.5	45.4			
12:44	52.4	57.1	80.7	54.9	47.8			
12:45	54.6	60.1	82.9	57.4	47.0	55.0		
12:46	56.9	62.5	89.2	60.3	46.7			
12:47	50.5	59.0	78.5	53.6	44.7			
12:48	57.0	66.0	89.7	61.1	47.4			
12:49	52.5	59.6	83.3	55.2	48.4			
12:50	52.5	59.4	82.5	54.6	49.0	53.4		
12:51	53.9	59.1	84.2	56.7	49.9			
12:52	55.0	62.2	81.9	58.0	51.1			
12:53	52.5	56.3	82.1	54.3	49.8			
12:54	52.6	57.1	83.0	55.4	48.1			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-05 **Description:** 2506 COUNTY LINE ROAD

MONITORING INFORMATION

Notes: AU2_0105

COUNTY LINE :	WEST OF 15	EAST OF 15
A	++++ ++++	++++ |||
M		
H	||	
B		
MOTO		
12:53 BACK-UP BEEPER		

Off Peak

Date: 8/26/14

Start Time: 12:40

End Time: 12:55

Meter ID: 362592

Roadway:

Cars:

MT:

HT:

Monitored Leq: 51.8

SITE SKETCH:

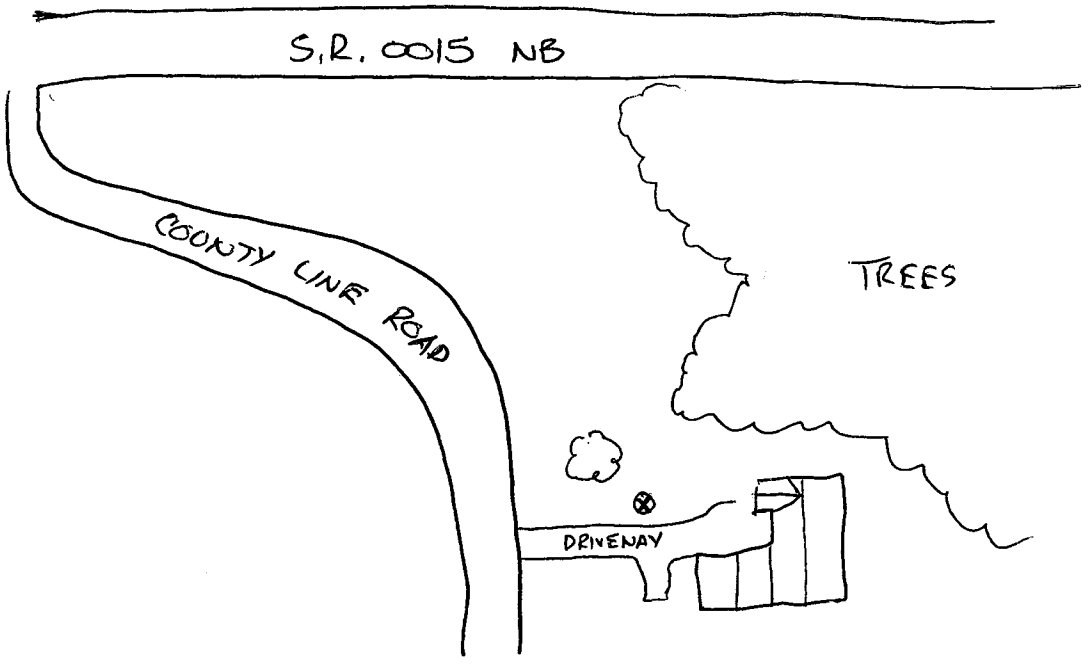
North Arrow

Site Specifics

Employee ID:

Atmospheric Conditions :

Plan View

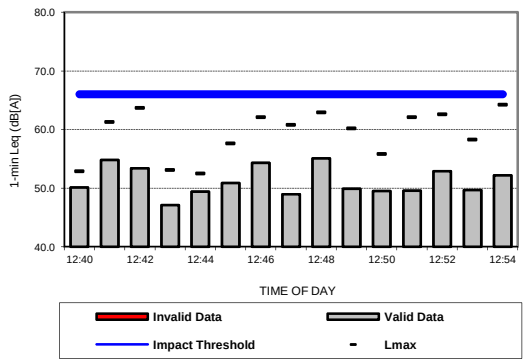


Cross-Section

TABLE A.5 Receptor M-05 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS01: 2014-08-26 1240-1255 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:40	50.1	52.9	76.4	51.3	49.1	51.8	51.8	**52**
12:41	54.8	61.3	87.0	59.2	48.5			
12:42	53.4	63.7	85.5	55.5	48.1			
12:43	47.1	53.1	77.9	49.6	43.3			
12:44	49.4	52.5	78.1	50.6	48.0			
12:45	50.9	57.6	78.7	53.4	48.0	52.5		
12:46	54.3	62.1	83.7	56.8	50.3			
12:47	49.0	60.8	78.7	51.1	41.2			
12:48	55.1	62.9	87.6	59.2	46.5			
12:49	49.9	60.2	80.3	52.7	44.6			
12:50	49.5	55.8	81.0	52.1	45.4	51.0		
12:51	49.6	62.1	79.3	51.1	45.3			
12:52	52.9	62.6	82.4	57.2	48.0			
12:53	49.7	58.3	78.9	51.8	47.0			
12:54	52.2	64.2	80.1	53.1	47.2			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-06 **Description:** 1037 Mills Hallow Rd

MONITORING INFORMATION

Notes:
- car Rolled up in driveway at 12:33
- Siren 12:36
- Plane flying overhead 12:49

* car count on Back of sheet

Off Peak

Date: Aug 26 2014
Start Time: 12:40
End Time: 1:00
Meter ID: 862937

Roadway:
Cars:
MT:
HT:
Monitored Leq: 47.5

SITE SKETCH:

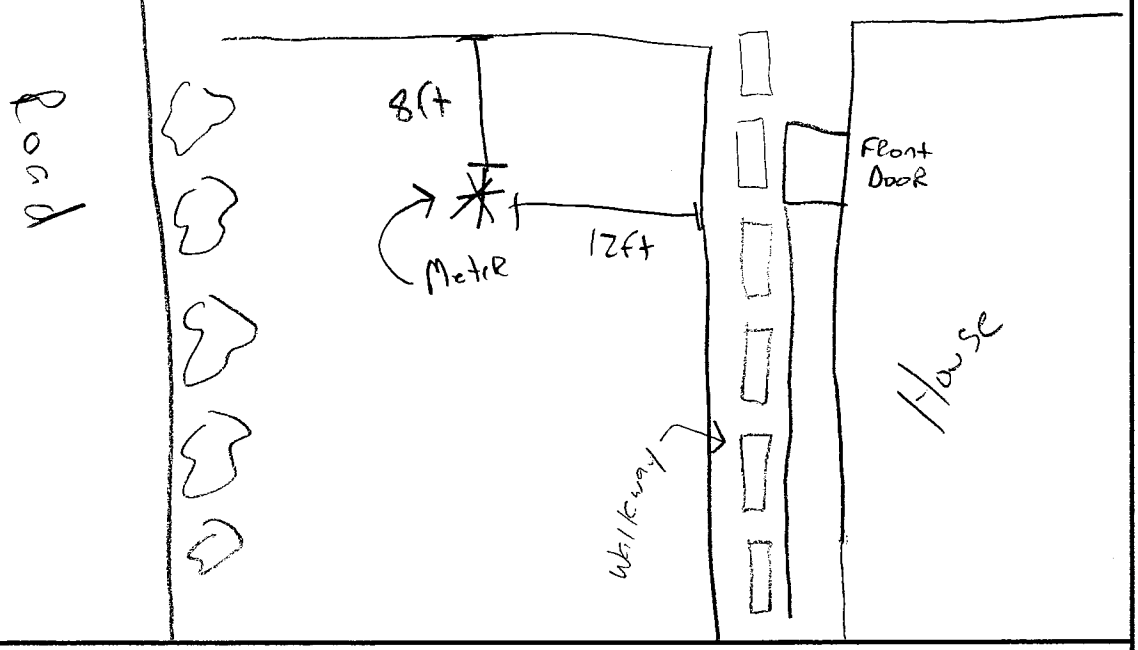
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View

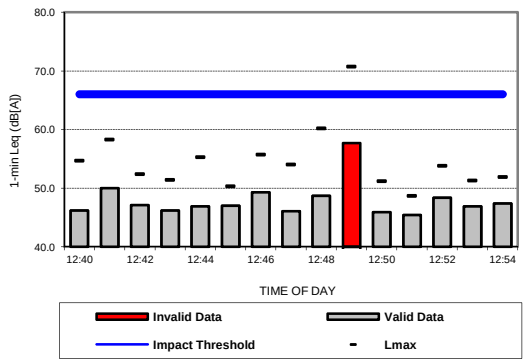


Cross-Section

TABLE A.6 Receptor M-06 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS01: 2014-08-26 1240-1255 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:40	46.2	54.7	67.2	48.0	44.4	47.5	47.5	**47**
12:41	50.0	58.3	77.1	53.1	44.4			
12:42	47.1	52.4	69.9	48.5	44.8			
12:43	46.2	51.4	66.1	47.0	45.2			
12:44	46.9	55.3	74.5	47.7	45.7			
12:45	47.0	50.3	69.3	48.4	45.1	48.0		
12:46	49.3	55.7	75.5	52.5	44.3			
12:47	46.1	54.0	71.9	47.2	44.9			
12:48	48.7	60.2	82.9	50.5	45.1			
12:49	~~57.7~~	~~70.7~~	~~86.9~~	~~62.0~~	~~45.2~~			
12:50	45.9	51.2	73.6	46.8	44.1	46.9		
12:51	45.4	48.7	68.8	46.5	44.1			
12:52	48.4	53.8	70.5	49.8	46.4			
12:53	46.9	51.3	72.2	48.7	44.9			
12:54	47.4	51.9	69.9	48.9	46.3			

Valid Data Histogram



12:49 - 1-min Leq despiked for Airplane flyover.

S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project
Short-term Noise Monitoring

Site # M-07 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/26/2014
Start Time:
End Time:
Meter ID: 362590

Roadway:
Cars:
MT:
HT:
Monitored Leq: 48.5

SITE SKETCH:

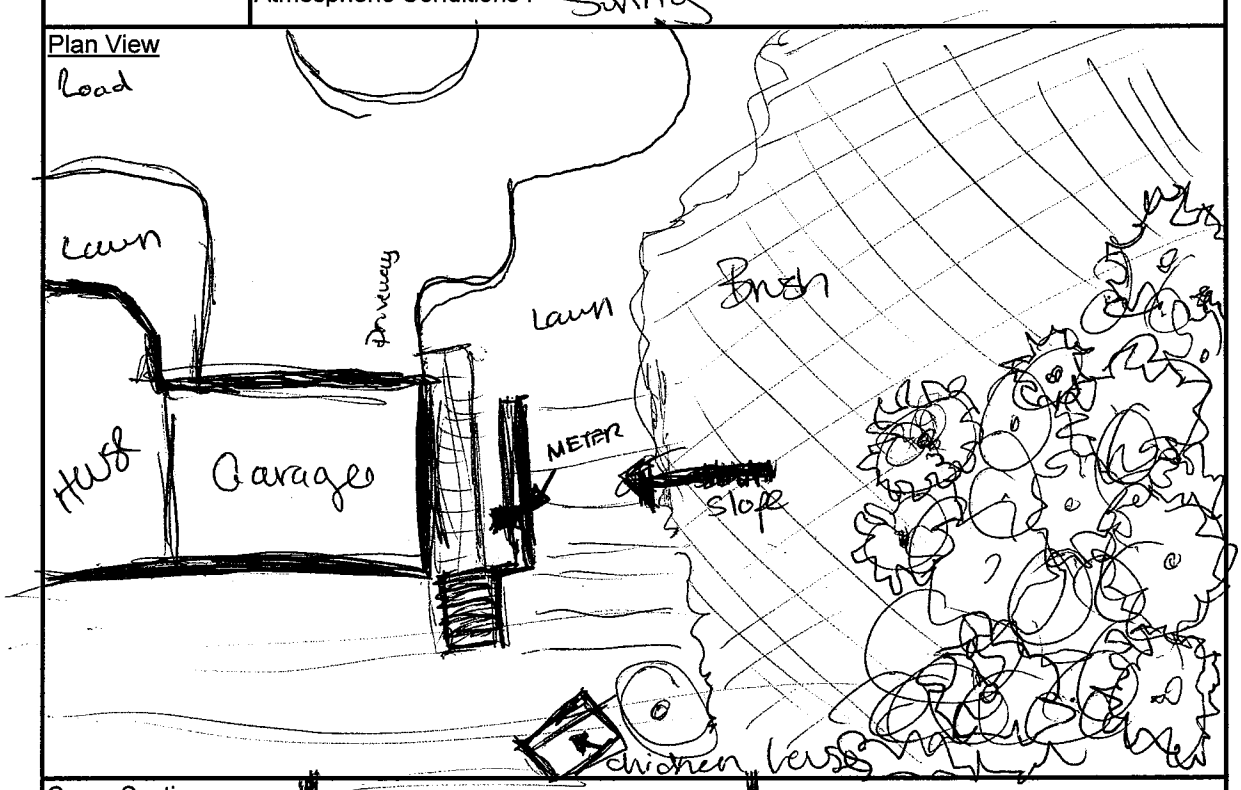
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

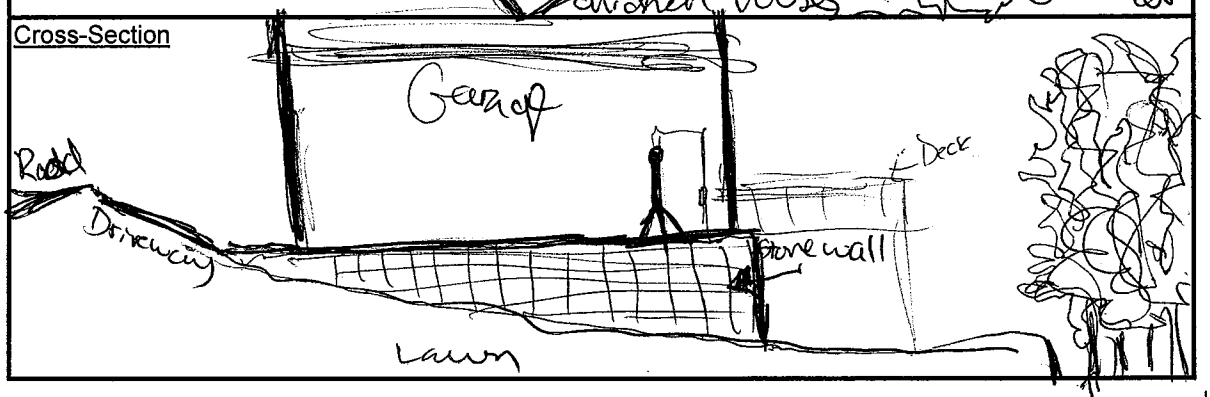
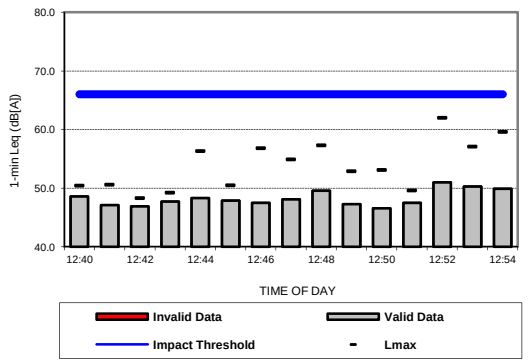


TABLE A.7 Receptor M-07 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS01: 2014-08-26 1240-1255 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:40	48.6	50.4	72.8	49.6	47.2	47.8	48.5	**48**
12:41	47.1	50.6	77.9	48.7	45.9			
12:42	46.9	48.3	70.4	47.6	45.8			
12:43	47.7	49.2	69.5	48.5	46.7			
12:44	48.3	56.3	75.2	48.9	47.1			
12:45	47.9	50.5	74.7	48.7	47.0	48.2		
12:46	47.5	56.8	81.5	48.5	46.4			
12:47	48.1	54.9	75.4	50.8	45.2			
12:48	49.6	57.3	78.1	52.4	46.4			
12:49	47.3	52.9	78.9	49.6	44.5			
12:50	46.6	53.1	72.9	47.7	44.5	49.4		
12:51	47.5	49.6	70.3	48.4	46.5			
12:52	51.0	62.0	73.2	54.1	47.7			
12:53	50.3	57.1	72.3	53.0	48.2			
12:54	49.9	59.6	71.5	51.0	47.9			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-~~04~~ 08 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/26/2014
Start Time:
End Time:
Meter ID: 362590

Roadway:
Cars:
MT:
HT:
Monitored Leq: 51.1

SITE SKETCH:

North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View

Cross-Section

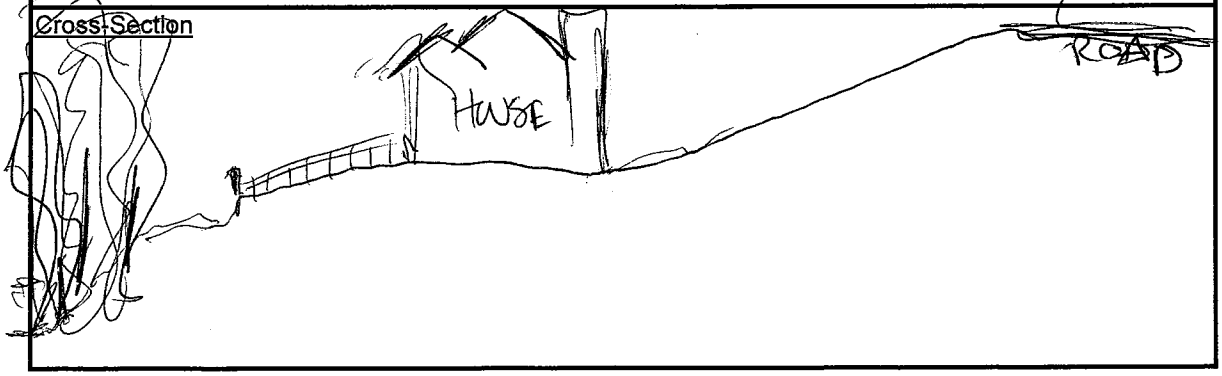
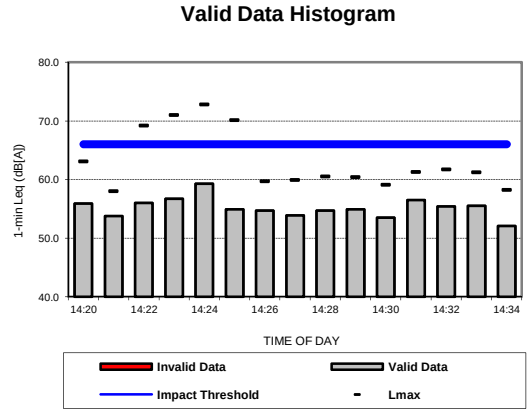


TABLE A.8 Receptor M-08 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS02: 2014-08-26 1420-1435 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
14:20	55.9	63.1	83.8	57.4	53.4	56.7	55.5	**56**
14:21	53.8	58.0	81.5	55.7	51.1			
14:22	56.0	69.2	83.7	58.8	50.1			
14:23	56.7	71.0	84.1	59.2	49.6			
14:24	59.3	72.8	88.8	63.3	53.4			
14:25	54.9	70.1	85.7	56.4	52.0	54.6		
14:26	54.7	59.7	84.1	57.0	51.6			
14:27	53.9	59.9	83.4	56.2	50.7			
14:28	54.7	60.5	84.3	57.3	50.3			
14:29	54.9	60.4	81.6	57.6	49.1			
14:30	53.5	59.1	82.3	56.2	49.1	54.9		
14:31	56.5	61.3	83.9	58.7	52.3			
14:32	55.4	61.7	84.2	58.9	49.3			
14:33	55.5	61.2	83.5	58.8	50.4			
14:34	52.1	58.2	81.7	55.3	47.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-09 **Description:** SEVEN KITCHENS ROAD

MONITORING INFORMATION

Notes: AU2-0409

Off Peak

Date: 8/27/2014
Start Time: 10:30 AM
End Time: 10:45 AM
Meter ID: 862937

Roadway: S.R. 0147
Cars:
MT:
HT:
Monitored Leq: 44.1

SITE SKETCH:

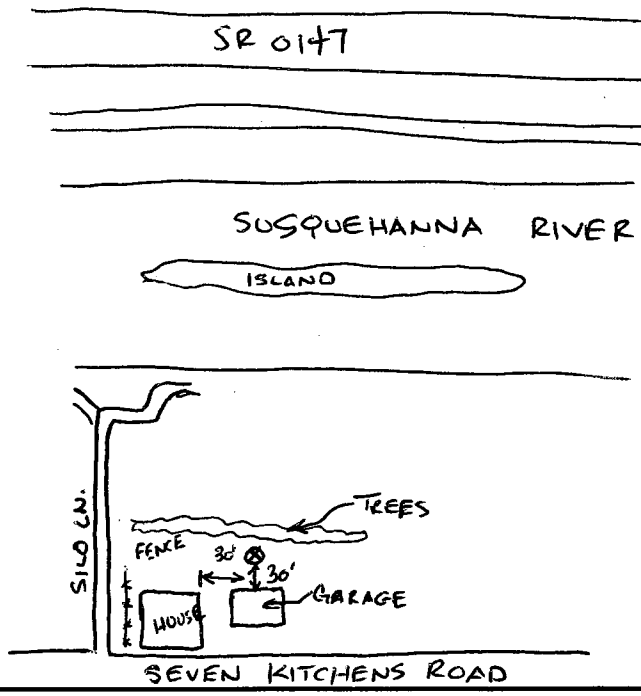
North Arrow

Site Specifics

Employee ID: FES

Atmospheric Conditions : 73°

Plan View

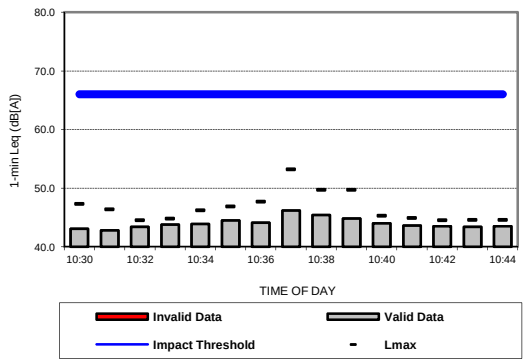


Cross-Section

TABLE A.9 Receptor M-09 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS04: 2014-08-27 1030-1045 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:30	43.1	47.3	68.8	43.8	42.6	43.4	44.1	**44**
10:31	42.8	46.4	70.6	43.1	42.3			
10:32	43.4	44.5	69.2	43.9	42.9			
10:33	43.8	44.8	70.5	44.2	43.5			
10:34	43.9	46.2	70.8	44.5	43.5			
10:35	44.5	46.9	72.8	45.2	43.8	45.1		
10:36	44.1	47.7	69.0	44.6	43.6			
10:37	46.2	53.2	70.8	49.1	43.4			
10:38	45.4	49.7	70.4	47.6	43.4			
10:39	44.8	49.7	70.4	46.3	43.8			
10:40	44.0	45.3	72.1	44.4	43.6	43.6		
10:41	43.6	44.9	69.9	44.0	43.3			
10:42	43.5	44.5	70.4	44.0	43.1			
10:43	43.4	44.6	69.7	43.8	43.1			
10:44	43.5	44.6	69.2	44.0	43.1			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 4M-10 **Description:** Silo Lane

MONITORING INFORMATION

Notes: AUZ 04-10

Off Peak

Date: Aug 27 2014

Start Time: J

End Time:

Meter ID: 862938

Roadway:

Cars:

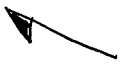
MT:

HT:

Monitored Leq:

SITE SKETCH:

North Arrow

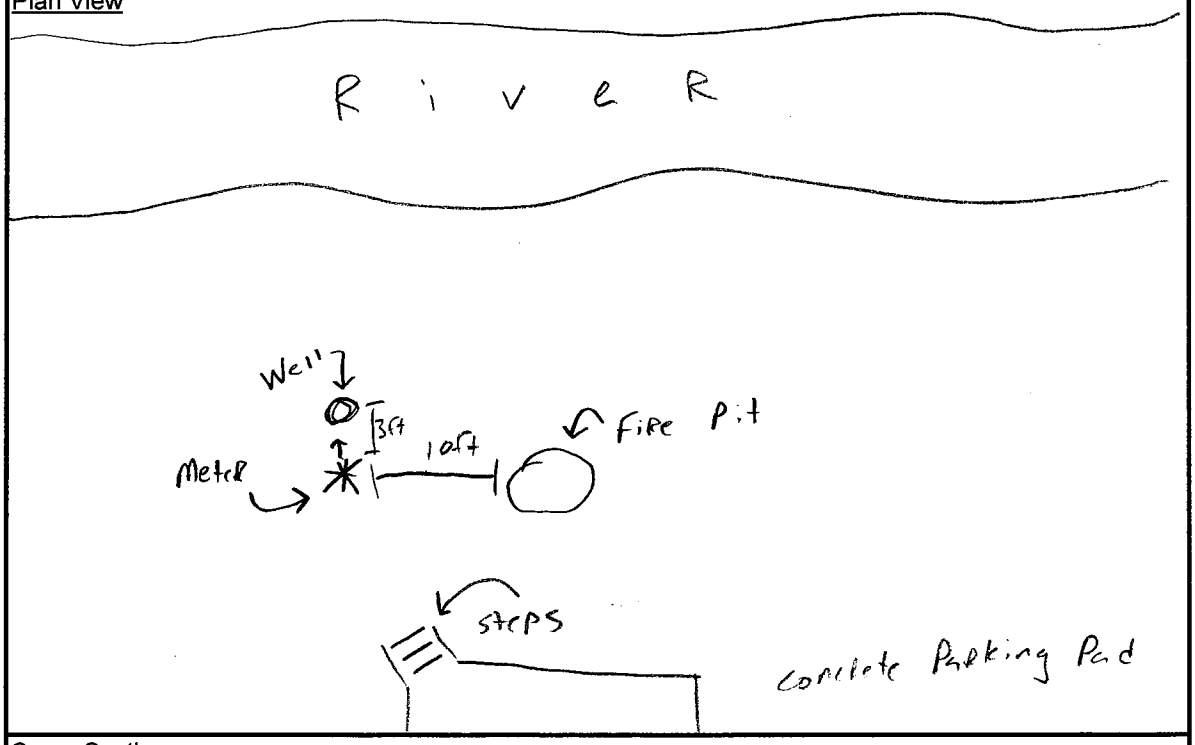


Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

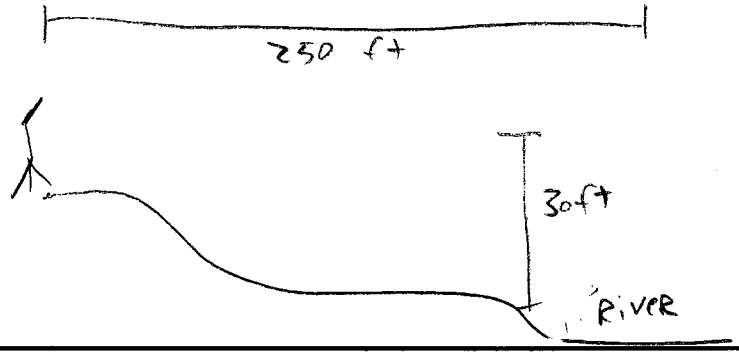
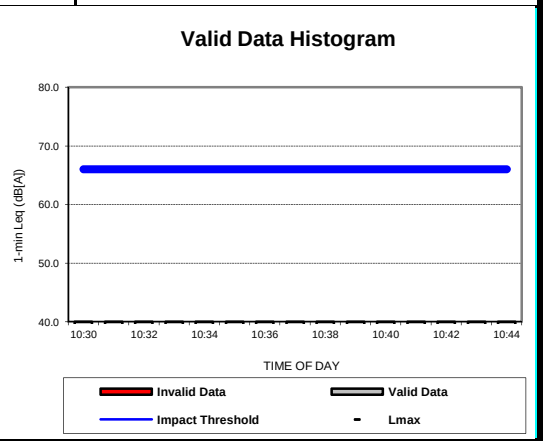


TABLE A.10 Receptor M-10 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS04: 2014-08-27 1030-1045 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:30						0.0	#DIV/0!	**#DIV/0!**
10:31								
10:32								
10:33								
10:34								
10:35						0.0		
10:36								
10:37								
10:38								
10:39								
10:40						0.0		
10:41								
10:42								
10:43								
10:44								



10:30 - 5-min Leq despiked for No Data.10:35 - 5-min Leq despiked for No Data.10:40 - 5-min Leq despiked for No Data.

S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M- 11 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/27/2014
Start Time:
End Time:
Meter ID: 362592

Roadway:
Cars:
MT:
HT:
Monitored Leq: 43.4

SITE SKETCH:

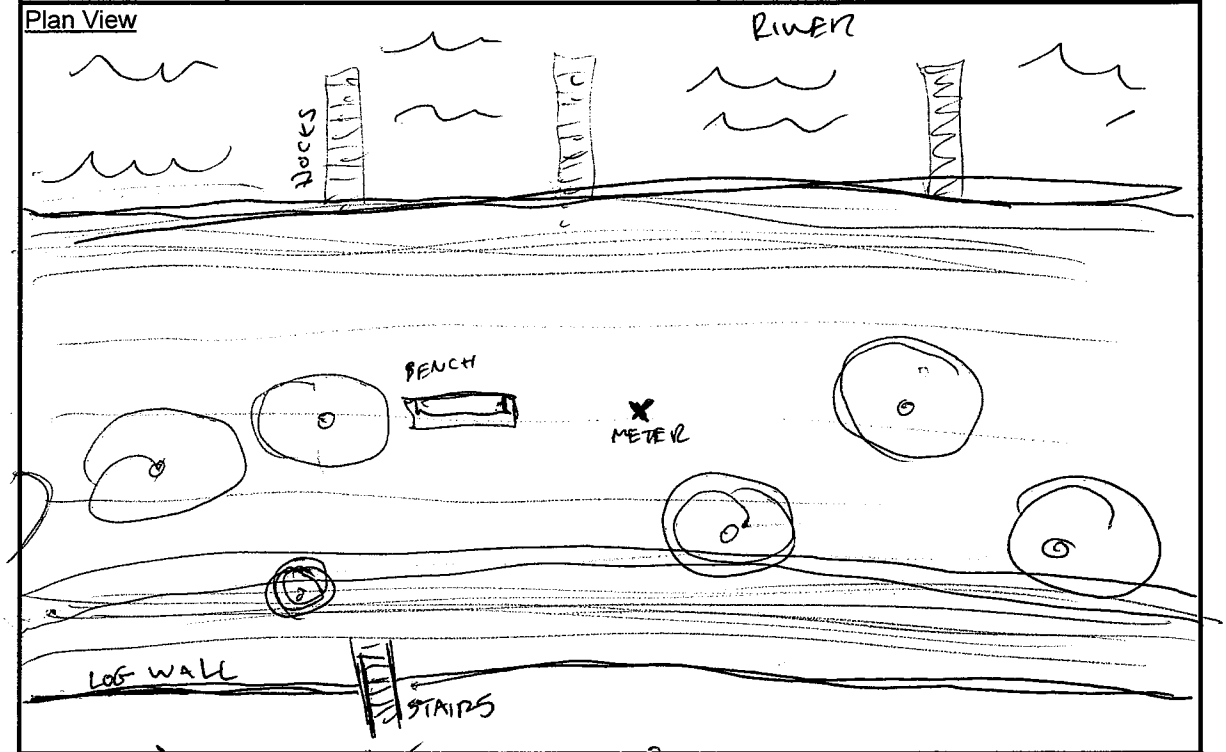
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

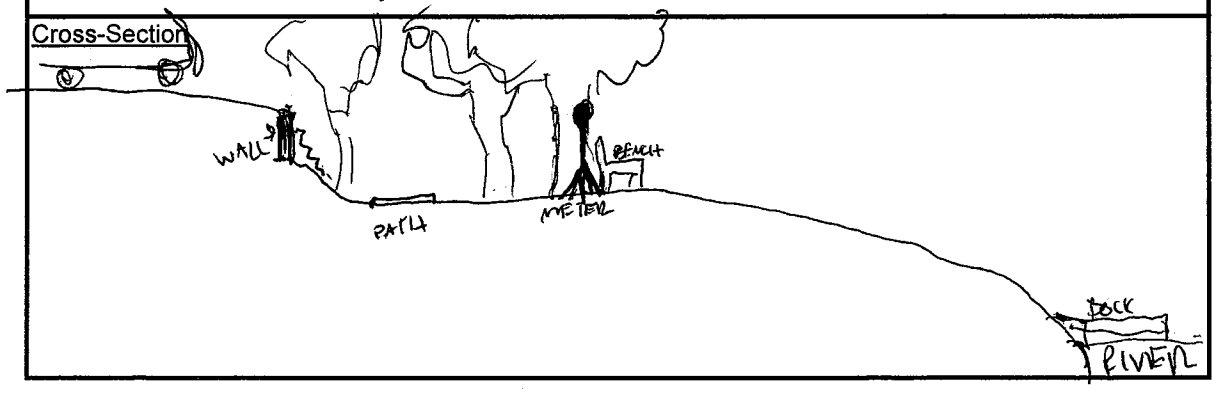
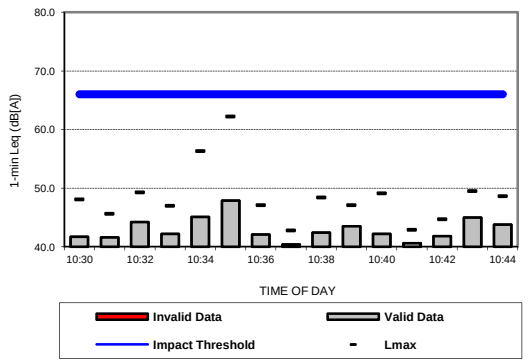


TABLE A.11 Receptor M-11 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS04: 2014-08-27 1030-1045 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:30	41.7	48.1	72.4	44.1	39.0	43.2	43.4	**43**
10:31	41.6	45.6	72.8	42.9	39.4			
10:32	44.2	49.3	73.4	46.1	42.1			
10:33	42.2	47.0	73.9	43.0	41.2			
10:34	45.1	56.3	81.3	46.7	42.6			
10:35	47.9	62.2	78.8	51.1	42.2	44.1		
10:36	42.1	47.1	70.6	44.2	39.7			
10:37	40.4	42.8	72.5	41.4	39.2			
10:38	42.4	48.4	72.8	43.9	40.5			
10:39	43.5	47.1	73.7	44.6	42.2			
10:40	42.2	49.1	71.8	43.8	40.1	43.0		
10:41	40.6	42.9	72.8	41.5	39.7			
10:42	41.8	44.7	72.8	43.6	40.2			
10:43	45.0	49.5	74.9	48.1	42.2			
10:44	43.8	48.6	71.9	46.9	39.6			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 4 M- 12 **Description:** Vacation home property

MONITORING INFORMATION

Notes: traffic noise heard from across river

Off Peak

Date: 8/27/14

Start Time:

End Time:

Meter ID: 362590

Roadway:

Cars:

MT:

HT:

Monitored Leq: 41.8

SITE SKETCH:

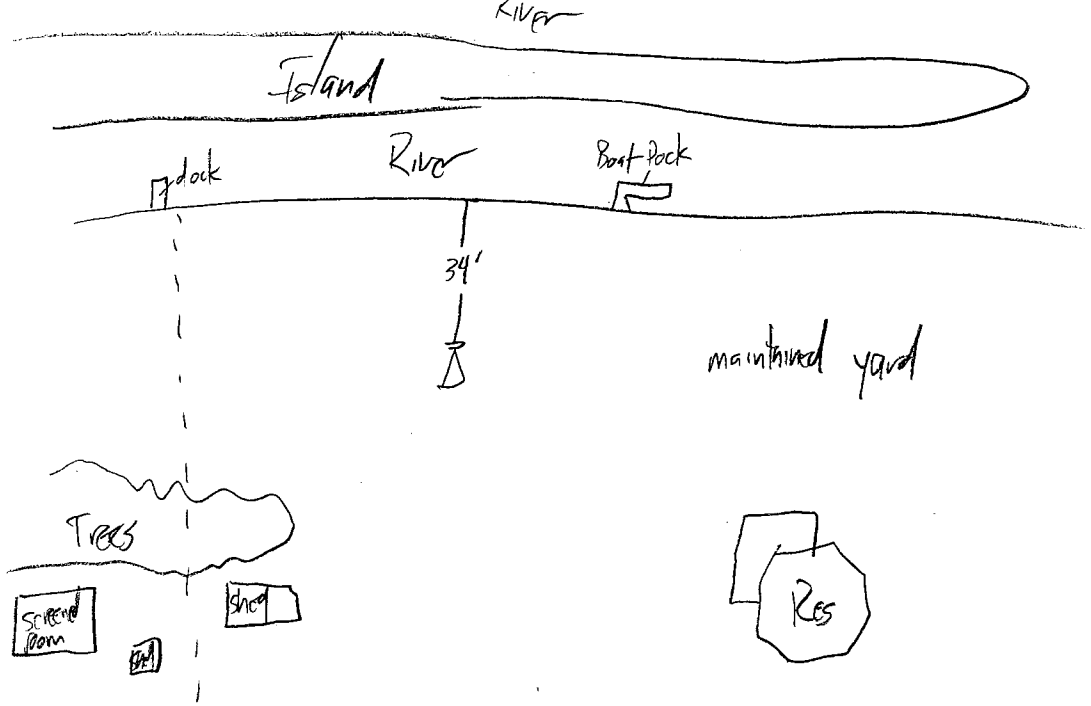
North Arrow: N

Site Specifics

Employee ID: BG

Atmospheric Conditions :

Plan View



Cross-Section

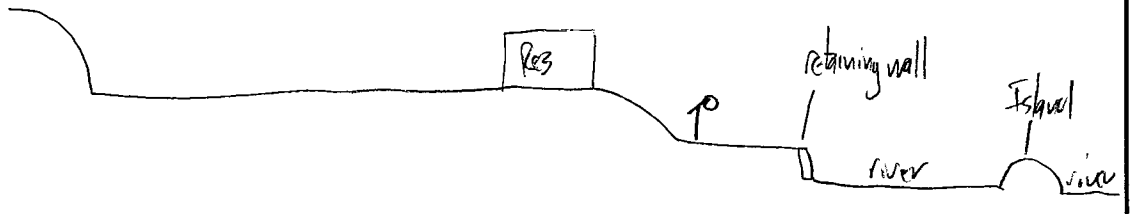
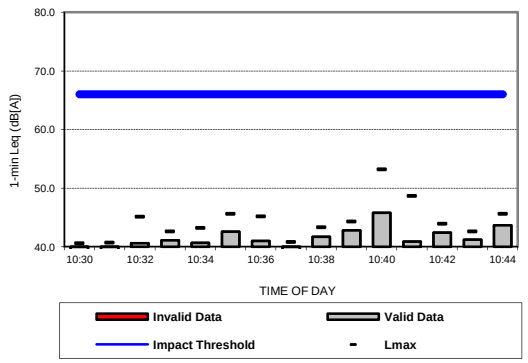


TABLE A.12 Receptor M-12 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS04: 2014-08-27 1030-1045 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:30	39.3	40.6	72.1	40.0	38.6	40.2	41.8	**42**
10:31	38.7	40.7	74.5	39.3	37.8			
10:32	40.6	45.1	73.0	41.1	39.8			
10:33	41.1	42.6	73.4	42.1	40.0			
10:34	40.7	43.2	71.1	42.1	39.5			
10:35	42.6	45.6	72.6	43.8	41.4	41.6		
10:36	41.0	45.2	72.6	44.5	37.8			
10:37	38.7	40.8	72.1	39.7	37.2			
10:38	41.7	43.3	73.2	42.2	41.0			
10:39	42.8	44.3	76.0	43.9	41.6			
10:40	45.8	53.2	81.9	46.5	43.7	43.2		
10:41	40.9	48.7	77.1	42.8	38.9			
10:42	42.4	43.9	75.1	43.5	41.3			
10:43	41.2	42.6	73.6	41.9	40.5			
10:44	43.7	45.6	73.7	44.9	42.4			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project
Short-term Noise Monitoring

Site ~~105~~M-13 **Description:**

MONITORING INFORMATION

Notes: AU2_05_13

No home on lot

Off Peak
Date: Aug 27 2014
Start Time:
End Time:
Meter ID: 862938

Roadway: 147
Cars:
MT:
HT:
Monitored Leq: 65.4

SITE SKETCH:

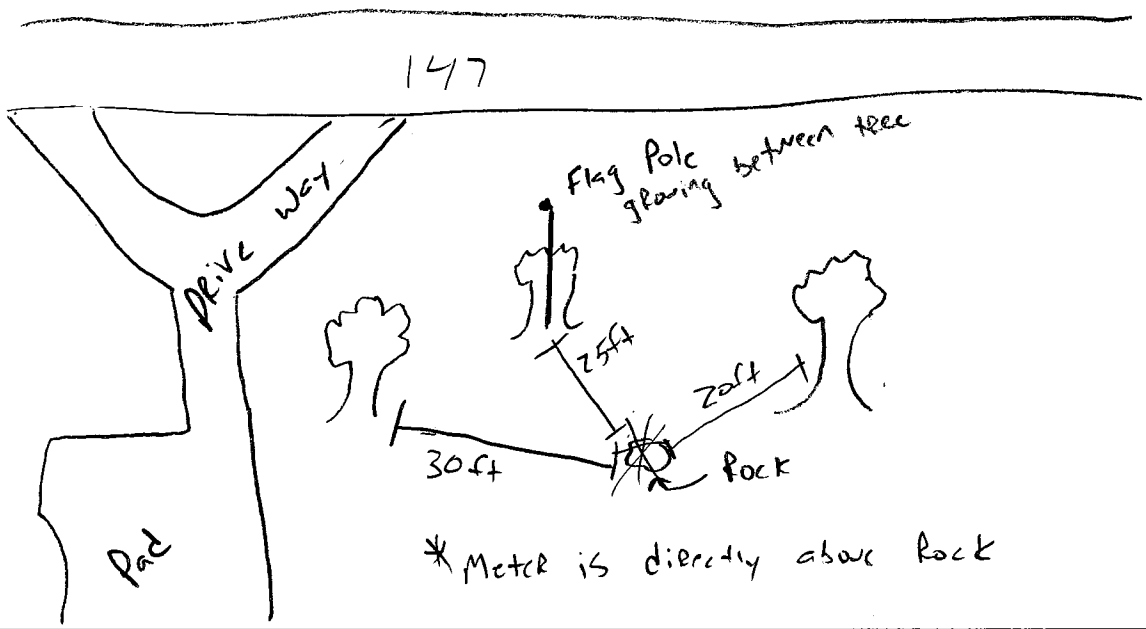
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

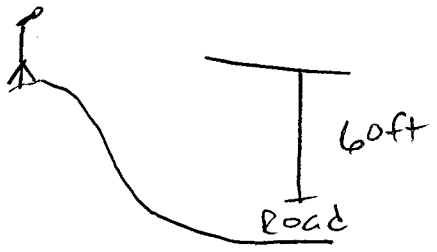
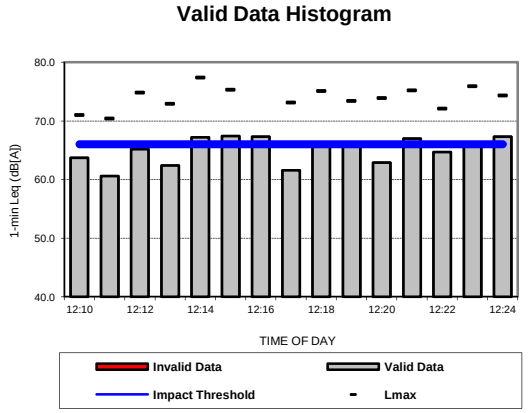


TABLE A.13 Receptor M-13 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS05: 2014-08-27 1210-1225 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:10	63.7	71.0	92.5	68.2	48.4	64.4	65.4	**65**
12:11	60.6	70.4	86.7	64.3	47.9			
12:12	65.2	74.8	92.1	69.8	55.6			
12:13	62.4	72.9	91.2	66.1	48.8			
12:14	67.2	77.4	99.5	71.2	52.5			
12:15	67.4	75.3	98.5	72.1	58.0	65.9		
12:16	67.3	80.7	101.3	69.2	51.6			
12:17	61.6	73.1	89.1	64.5	48.4			
12:18	65.6	75.1	96.7	69.4	52.4			
12:19	65.7	73.4	94.9	69.3	55.0			
12:20	62.9	73.9	90.8	68.5	47.4	65.8		
12:21	67.0	75.2	92.9	70.5	49.7			
12:22	64.7	72.1	89.9	68.8	49.0			
12:23	65.8	75.9	101.0	70.7	48.9			
12:24	67.3	74.3	94.6	71.3	54.6			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site 5 **M-** 14 **Description:** Singer Family residential

MONITORING INFORMATION

Notes: hammer started at 12:28 next door

Off Peak

Date: 8/27/14

Start Time:

End Time:

Meter ID:

Roadway:

Cars:

MT:

HT:

Monitored Leq: 58.5

SITE SKETCH:

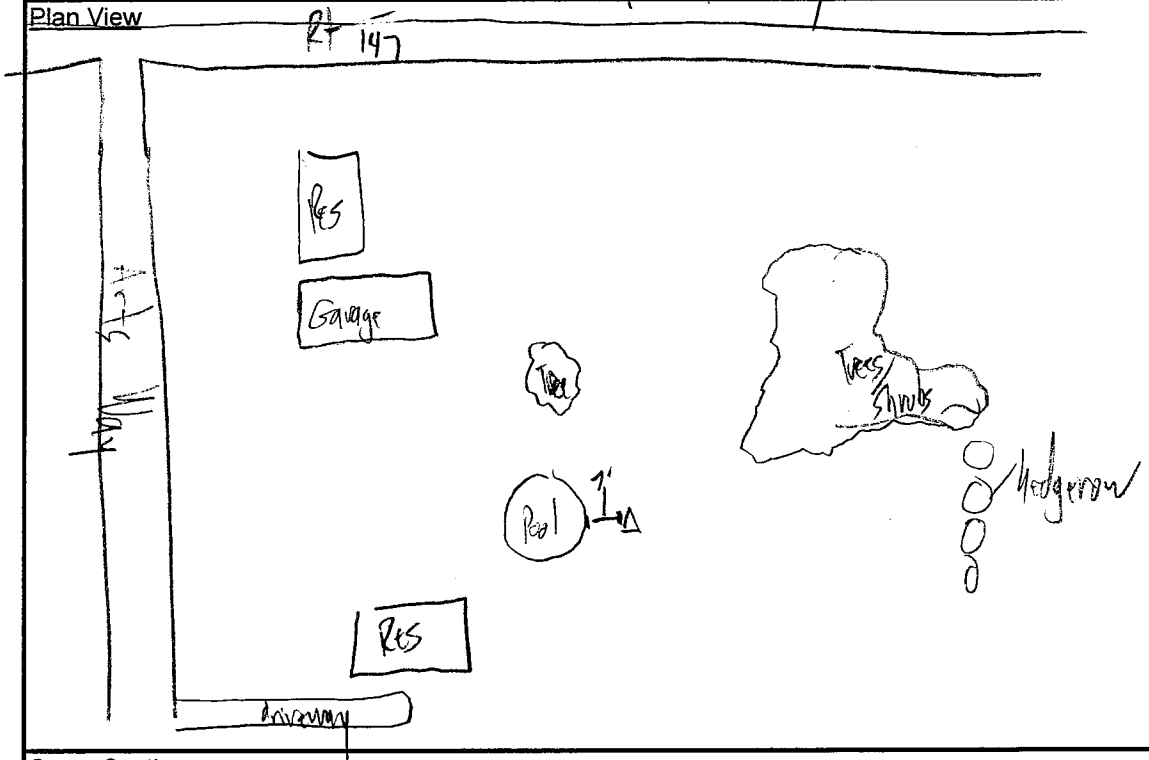
North Arrow: N →

Site Specifics

Employee ID: BG

Atmospheric Conditions : hot & clear sky

Plan View



Cross-Section

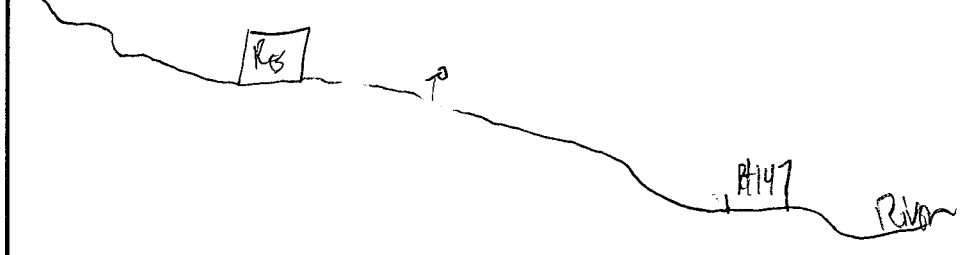
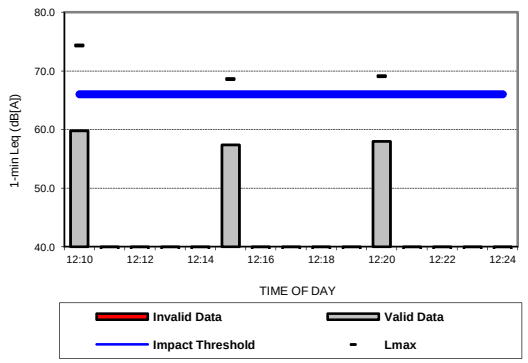


TABLE A.14 Receptor M-14 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS05: 2014-08-27 1210-1225 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:10	59.8	74.3	96.4	63.2	49.6	59.8	58.5	**59**
12:11								
12:12								
12:13								
12:14								
12:15	57.4	68.6	91.9	61.1	48.5	57.4		
12:16								
12:17								
12:18								
12:19								
12:20	58.0	69.1	91.3	61.9	48.1	58.0		
12:21								
12:22								
12:23								
12:24								

Valid Data Histogram



12:11 - 1-min Leq despiked for Data collected in 5-minute increments.12:12 - 1-min Leq despiked for Data collected in 5-minute increments.12:13 - 1-min Leq despiked fo

S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

05

Site # M-15 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/27/2014
Start Time:
End Time:
Meter ID: 36 2590

Roadway:
Cars:
MT:
HT:
Monitored Leq: 47.7

SITE SKETCH:

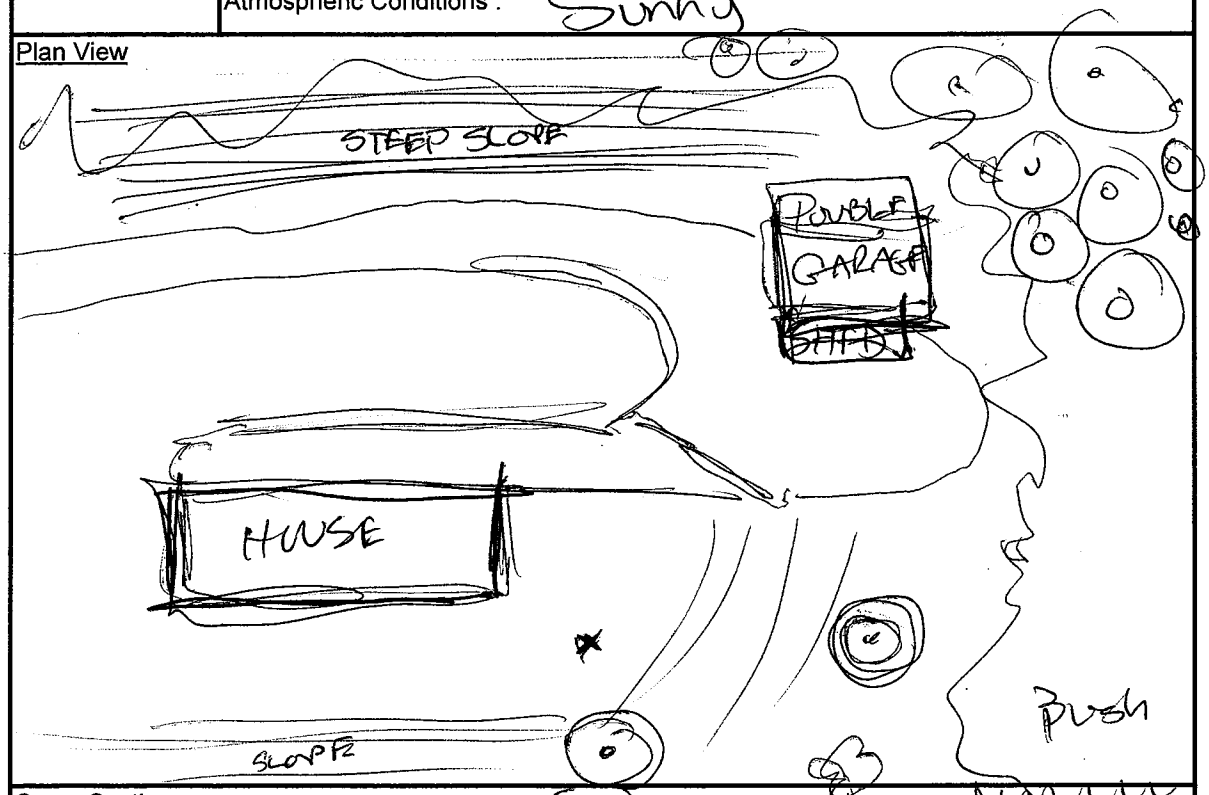
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

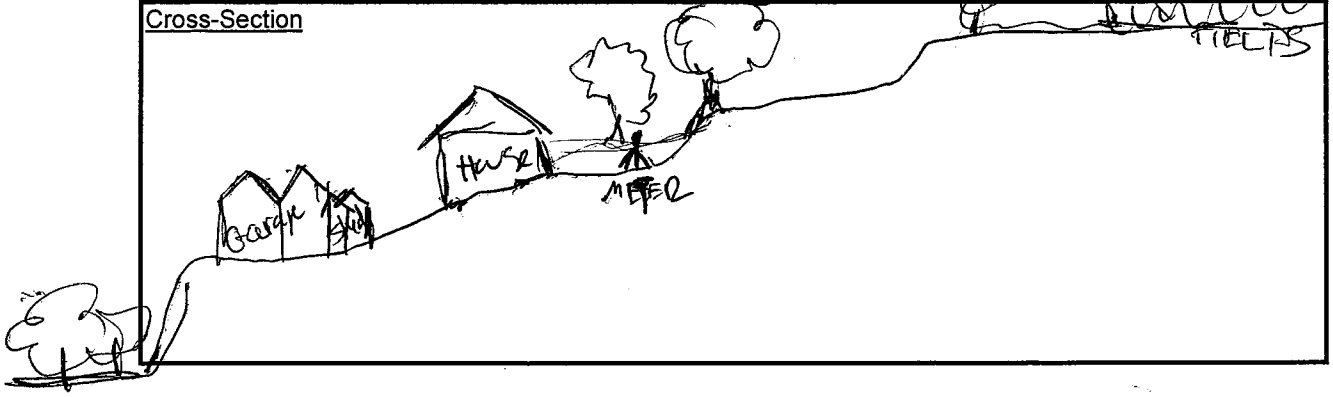
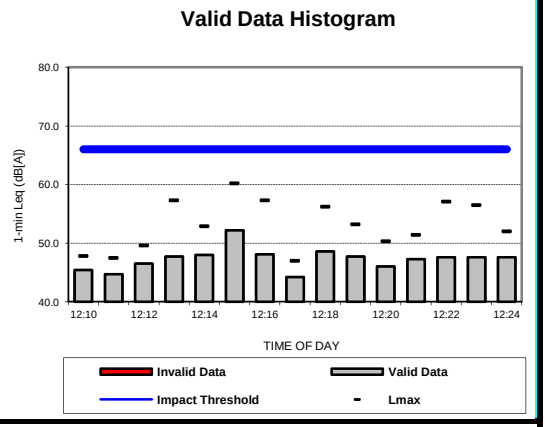


TABLE A.15 Receptor M-15 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS05: 2014-08-27 1210-1225 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:10	45.4	47.8	74.2	46.5	44.0	46.6	47.7	**48**
12:11	44.7	47.5	71.7	45.8	43.4			
12:12	46.5	49.6	78.1	48.4	44.2			
12:13	47.7	57.3	80.8	50.0	44.5			
12:14	48.0	52.9	78.6	49.3	46.3			
12:15	52.2	60.2	79.3	56.2	46.2	48.9		
12:16	48.1	57.3	80.6	51.7	43.9			
12:17	44.2	47.0	70.7	45.0	43.5			
12:18	48.6	56.2	79.8	52.1	44.6			
12:19	47.7	53.2	80.7	50.2	45.6			
12:20	46.0	50.3	75.7	48.1	43.5	47.3		
12:21	47.3	51.4	75.2	49.3	44.9			
12:22	47.6	57.1	79.9	49.2	44.5			
12:23	47.6	56.5	78.5	50.9	44.3			
12:24	47.6	52.0	77.0	49.4	45.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-16 **Description:** 1082 (SR147)

MONITORING INFORMATION

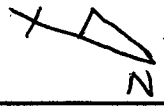
Notes: AU2_0516

Off Peak

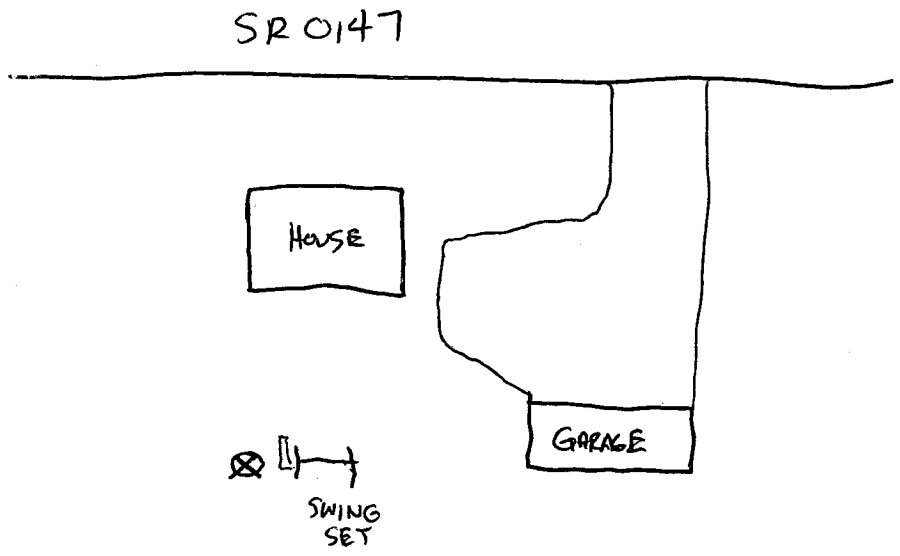
Date: 8/27/2014
Start Time: 12:10 PM
End Time: 12:25 PM
Meter ID: 862937

Roadway:
Cars:
MT:
HT:
Monitored Leq: 58.4

SITE SKETCH:

North Arrow	Site Specifics
	Employee ID:
	Atmospheric Conditions :

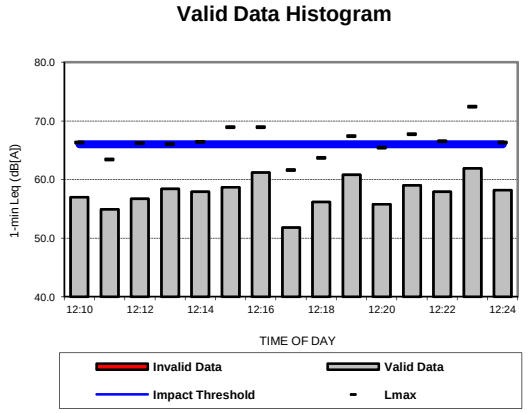
Plan View



Cross-Section

TABLE A.16 Receptor M-16 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS05: 2014-08-27 1210-1225 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:10	57.0	66.3	87.3	61.9	41.2	57.1	58.4	**58**
12:11	54.9	63.4	82.4	58.9	43.2			
12:12	56.7	66.2	86.5	61.9	47.5			
12:13	58.4	66.0	85.9	62.0	50.3			
12:14	57.9	66.4	86.5	63.1	45.2			
12:15	58.7	68.9	88.2	62.2	48.5	58.8		
12:16	61.2	68.9	93.9	64.8	54.3			
12:17	51.8	61.6	83.2	55.4	42.9			
12:18	56.2	63.7	84.5	60.0	49.2			
12:19	60.8	67.4	92.8	64.3	55.2			
12:20	55.8	65.4	84.4	60.6	43.9	59.0		
12:21	59.0	67.7	92.2	62.3	45.0			
12:22	57.9	66.5	86.4	63.0	42.4			
12:23	61.9	72.4	91.6	64.9	52.4			
12:24	58.2	66.3	91.3	63.4	47.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 16 **M-** 17 **Description:** Single Residential Property

MONITORING INFORMATION

Notes: 145 Blossom Hill

traffic on SR 147 main noise source

traffic on Ridge Rd audible

Off Peak

Date: 8/27/14

Start Time: 3:00 pm

End Time: 3:15 pm

Meter ID: 824537

Roadway:

Cars:

MT:

HT:

Monitored Leq: 42.4

SITE SKETCH:

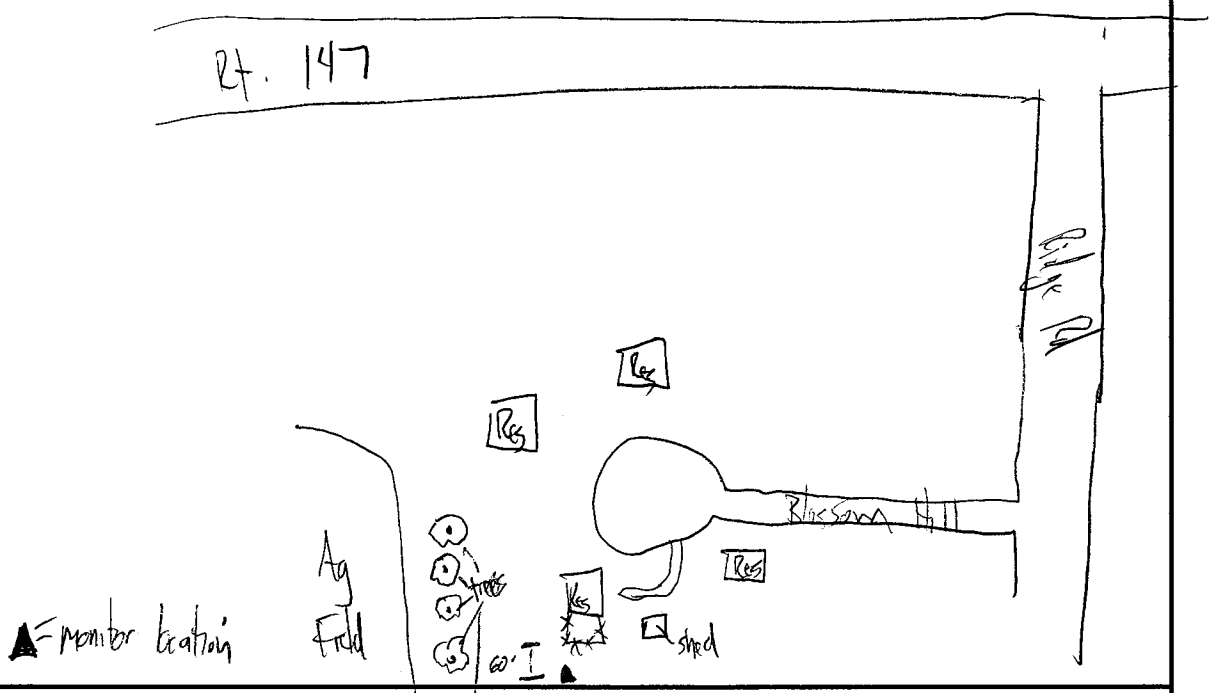
North Arrow: N →

Site Specifics

Employee ID: BF

Atmospheric Conditions: hot & Clear sky

Plan View



Cross-Section

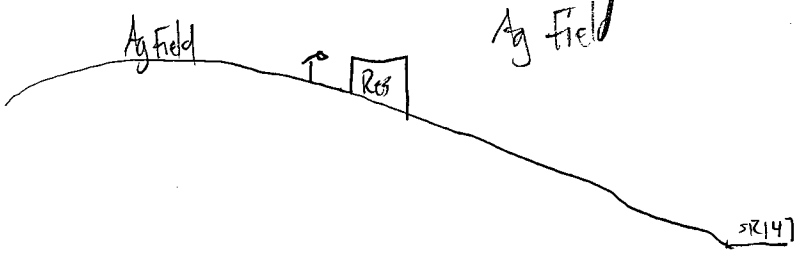
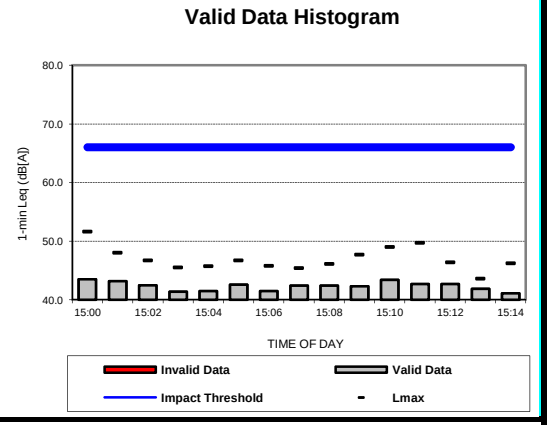


TABLE A.17 Receptor M-17 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS06: 2014-08-27 1500-1515 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:00	43.5	51.6	77.2	46.3	40.5	42.5	42.4	**42**
15:01	43.2	48.0	75.5	45.5	40.4			
15:02	42.5	46.7	72.4	44.1	40.9			
15:03	41.4	45.5	69.2	42.3	40.3			
15:04	41.5	45.7	69.7	42.5	40.5			
15:05	42.6	46.7	73.8	44.0	41.2	42.3		
15:06	41.5	45.8	73.7	43.4	39.9			
15:07	42.4	45.4	71.7	43.6	40.7			
15:08	42.4	46.1	74.3	43.7	41.0			
15:09	42.3	47.7	75.2	43.8	40.6			
15:10	43.4	49.0	73.8	45.8	40.6	42.4		
15:11	42.7	49.7	76.5	44.4	40.5			
15:12	42.7	46.4	73.6	43.7	41.5			
15:13	41.9	43.6	71.2	42.7	40.6			
15:14	41.1	46.2	72.7	42.2	40.1			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 16M-18 **Description:**

MONITORING INFORMATION

Notes: Aug-06-18

Off Peak

Date: Aug 27 2014
Start Time: 3
End Time: 315
Meter ID: 362592

Roadway: Ridge
Cars:
MT:
HT:
Monitored Leq: 48.3

SITE SKETCH:

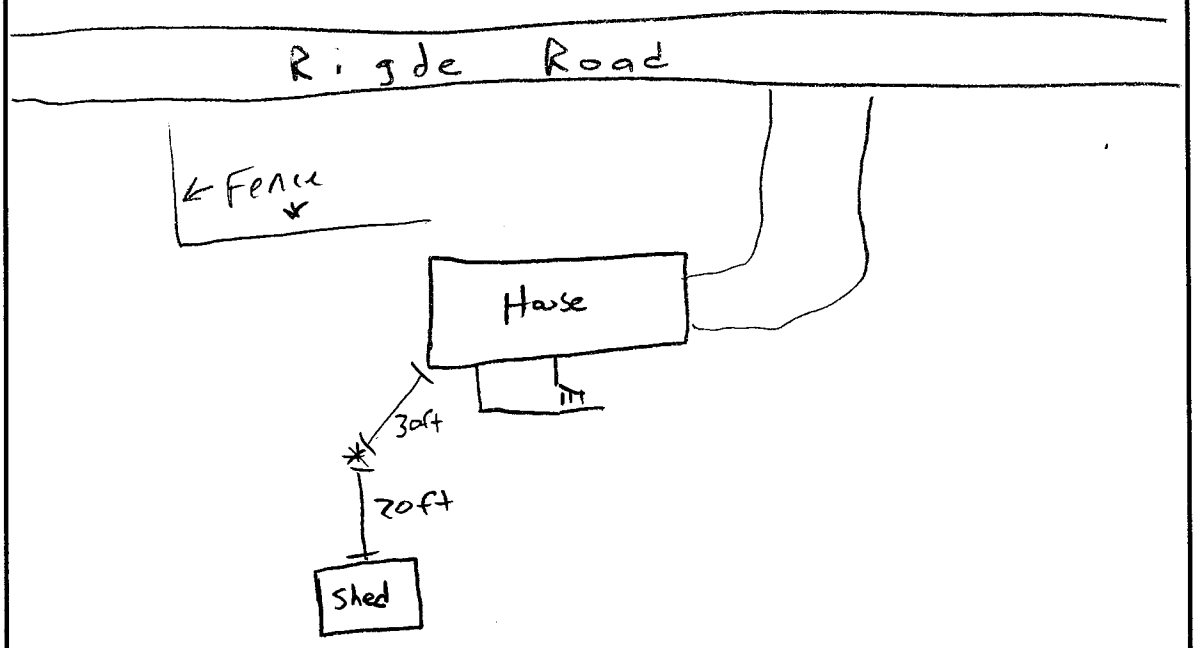
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

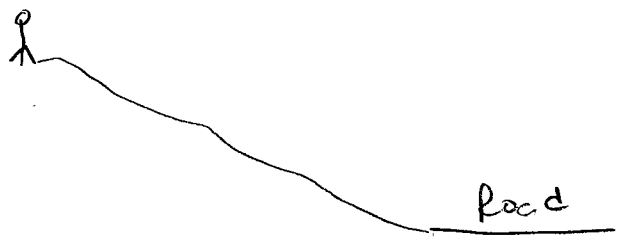
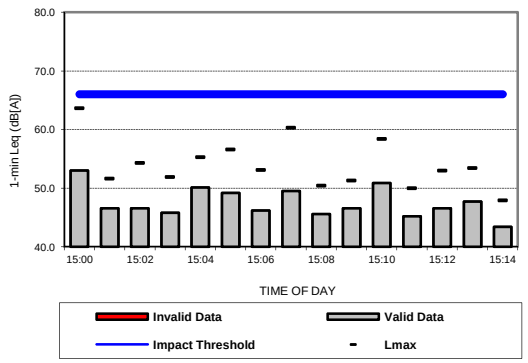


TABLE A.18 Receptor M-18 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS06: 2014-08-27 1500-1515 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:00	53.0	63.6	86.6	57.4	45.0	49.4	48.3	**48**
15:01	46.6	51.6	80.7	49.1	43.4			
15:02	46.6	54.3	71.7	49.7	42.4			
15:03	45.8	51.9	74.5	49.4	42.0			
15:04	50.1	55.3	80.0	53.7	43.5			
15:05	49.2	56.6	75.1	53.7	43.0	47.7		
15:06	46.2	53.1	72.3	48.7	42.2			
15:07	49.5	60.3	84.4	52.3	44.1			
15:08	45.6	50.4	73.0	48.1	42.2			
15:09	46.6	51.3	71.1	48.1	44.5			
15:10	50.9	58.4	81.5	54.3	46.2	47.5		
15:11	45.2	50.0	73.0	48.1	41.3			
15:12	46.6	53.0	76.0	49.3	43.0			
15:13	47.7	53.4	73.7	50.8	43.3			
15:14	43.4	47.9	69.7	45.3	41.3			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 7M-19 **Description:** MCL Pool & Spa Services

MONITORING INFORMATION

Notes: AV2_07_19

MCL Pool & Spa Services
Rt 147
1413 Susquehanna Trail
Northumberland PA 17857

Off Peak

Date: Aug 27 2014
Start Time:
End Time:
Meter ID: 862938

Roadway: 147
Cars:
MT:
HT:
Monitored Leq: 60.4

SITE SKETCH:

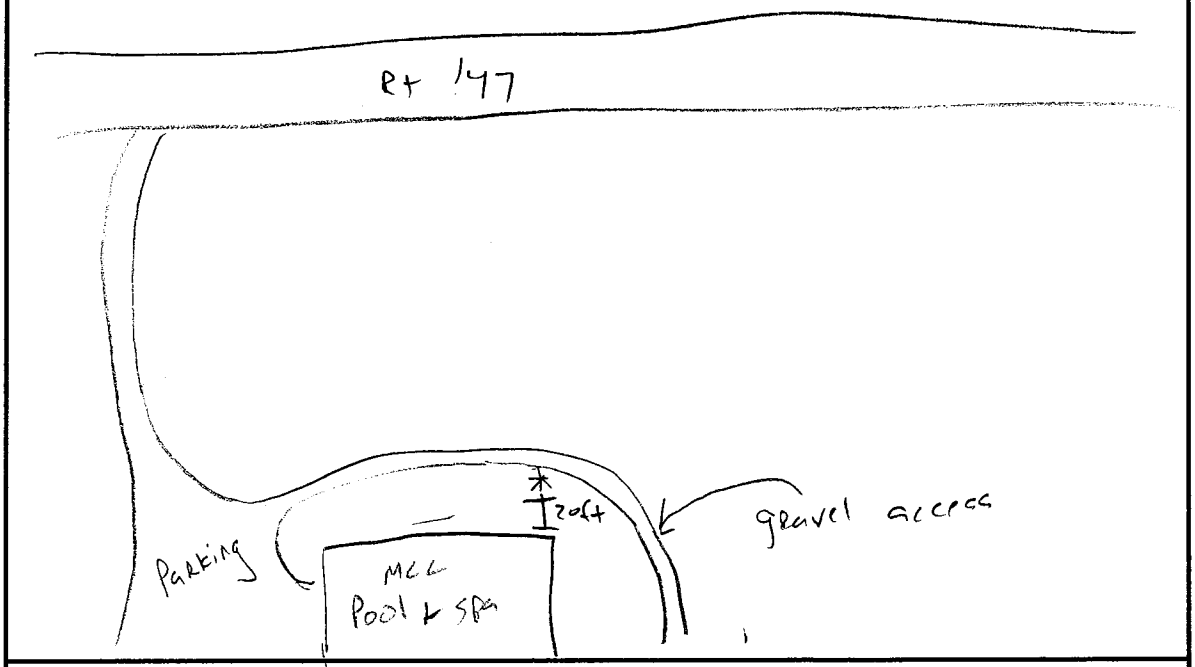
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

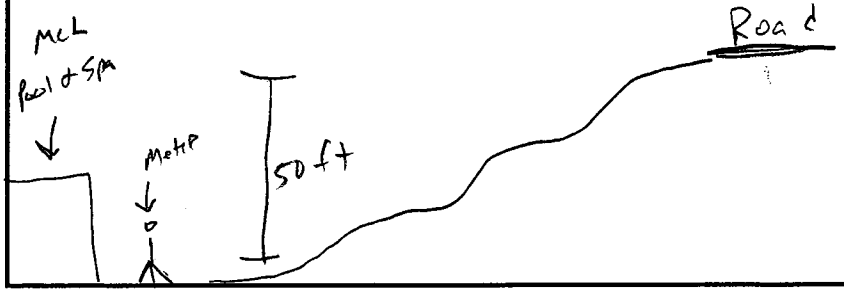
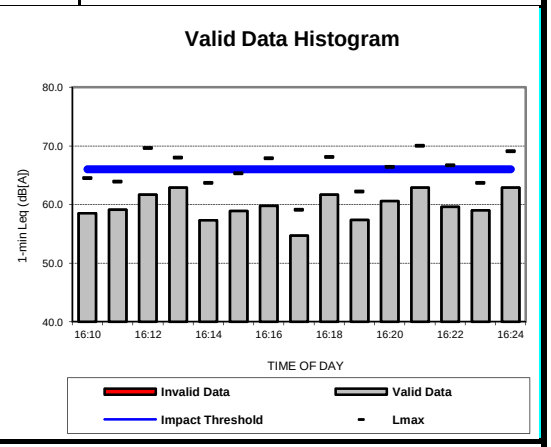


TABLE A.19 Receptor M-19 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS07: 2014-08-27 1610-1625 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
16:10	58.5	64.5	86.9	60.7	55.4	60.4	60.4	**60**
16:11	59.1	63.9	83.9	62.0	54.6			
16:12	61.7	69.6	89.5	66.0	51.7			
16:13	62.9	68.0	87.6	65.4	58.8			
16:14	57.3	63.7	83.7	61.8	45.6			
16:15	58.9	65.3	86.4	62.9	52.5	59.1		
16:16	59.8	67.9	86.9	64.8	53.2			
16:17	54.7	59.1	80.2	57.2	48.3			
16:18	61.7	68.1	86.8	65.8	56.0			
16:19	57.4	62.2	83.3	59.3	55.1			
16:20	60.6	66.4	86.7	64.1	51.7	61.3		
16:21	62.9	70.0	91.9	66.9	56.3			
16:22	59.6	66.7	88.4	64.3	54.1			
16:23	59.0	63.7	84.4	62.2	54.5			
16:24	62.9	69.1	90.2	66.1	55.5			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M- 06 **Description:** Ridgeway Evangelical Church

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/27/2014

Start Time:

End Time:

Meter ID: ~~8~~ 862938

Roadway:

Cars:

MT:

HT:

Monitored Leq: 56.7

SITE SKETCH:

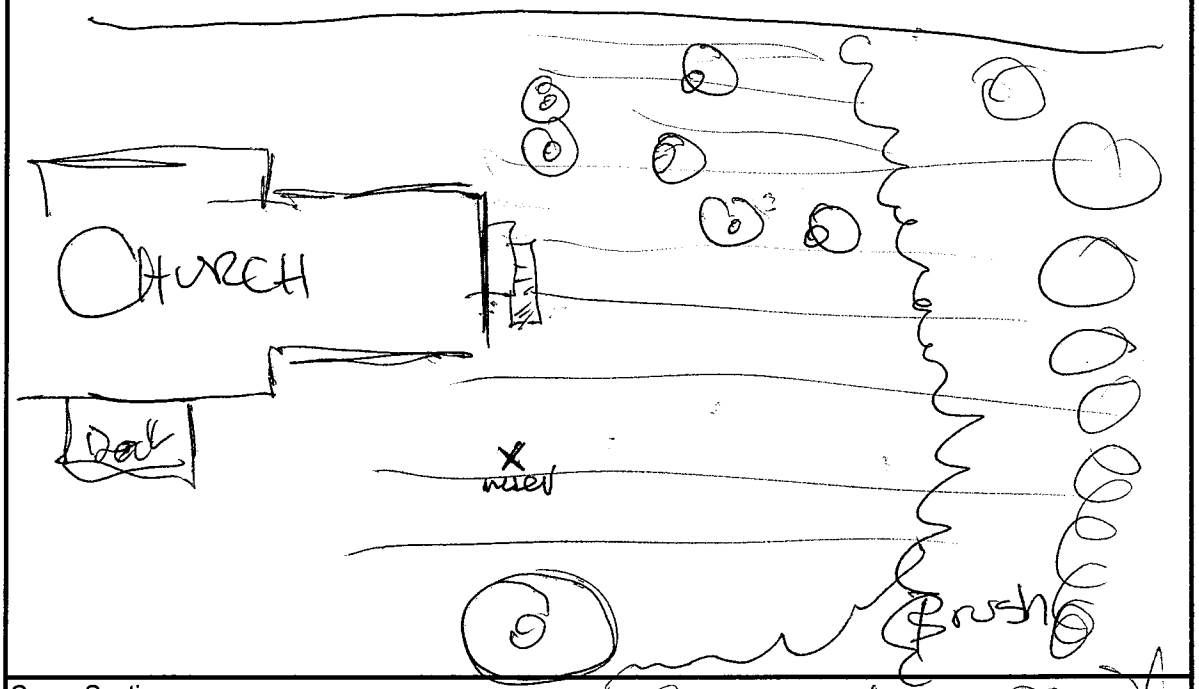
North Arrow

Site Specifics

Employee ID: SDriscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

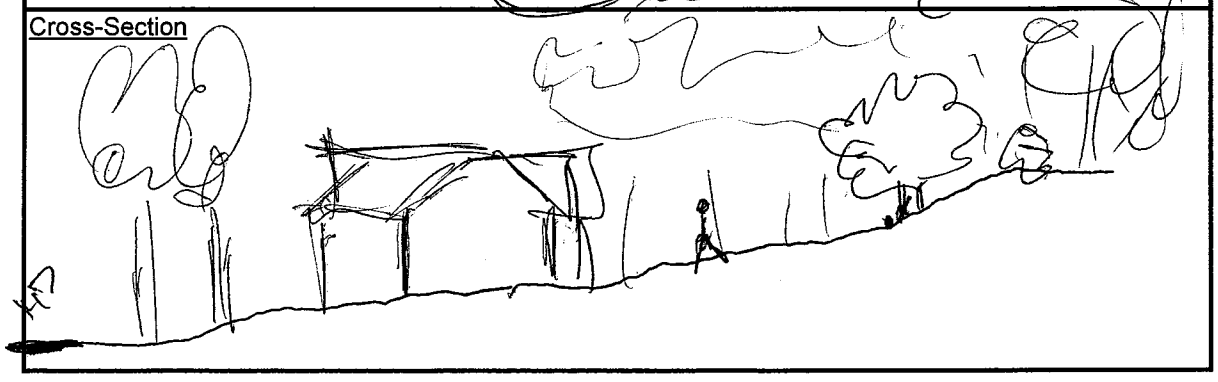
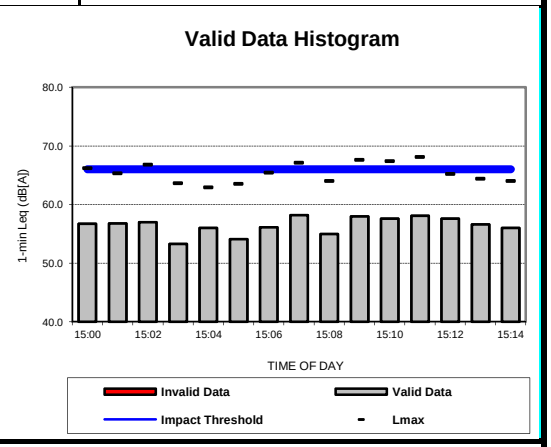


TABLE A.20 Receptor M-20 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS06: 2014-08-27 1500-1515 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:00	56.7	66.2	82.0	59.7	50.5	56.1	56.7	**57**
15:01	56.8	65.3	81.2	59.2	50.7			
15:02	57.0	66.8	82.5	60.4	49.4			
15:03	53.3	63.6	80.4	57.0	45.7			
15:04	56.0	62.9	85.0	59.1	48.6			
15:05	54.1	63.5	79.2	57.2	48.2	56.6		
15:06	56.1	65.4	85.2	59.1	49.5			
15:07	58.2	67.1	81.7	61.9	52.8			
15:08	55.0	64.0	82.4	57.8	50.2			
15:09	58.0	67.6	86.3	60.6	53.2			
15:10	57.6	67.4	82.7	60.7	52.0	57.2		
15:11	58.1	68.1	88.8	61.1	49.1			
15:12	57.6	65.2	81.5	61.4	52.0			
15:13	56.6	64.4	83.3	59.3	50.9			
15:14	56.0	64.0	82.0	58.7	49.9			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M- 21 06 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/27/2019
Start Time:
End Time:
Meter ID: 362590

Roadway:
Cars:
MT:
HT:
Monitored Leq: 65.4

SITE SKETCH:

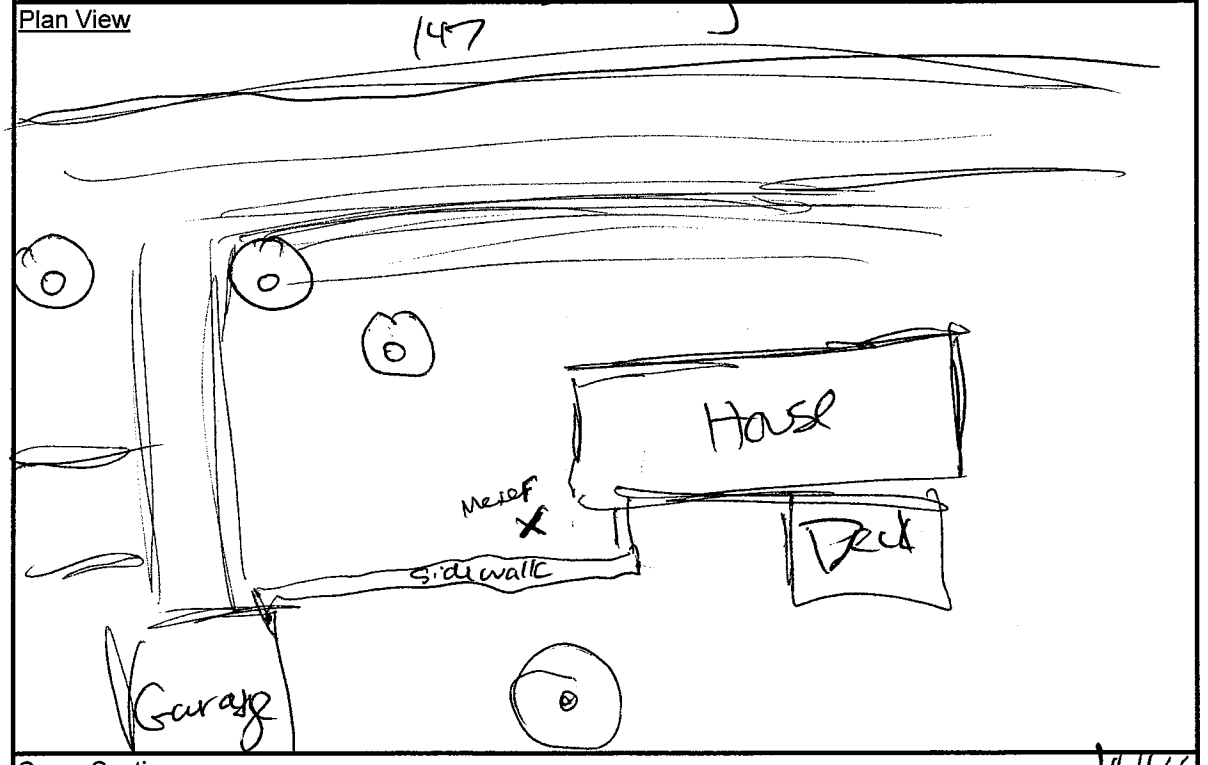
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

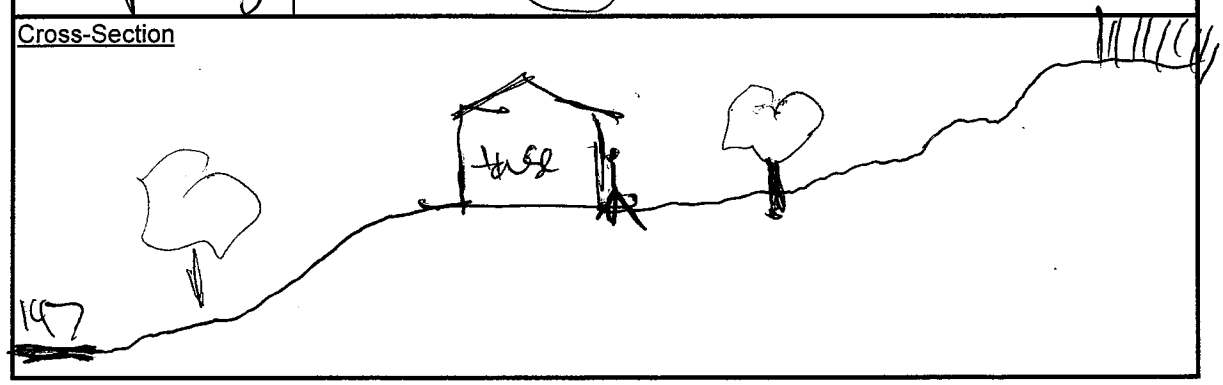
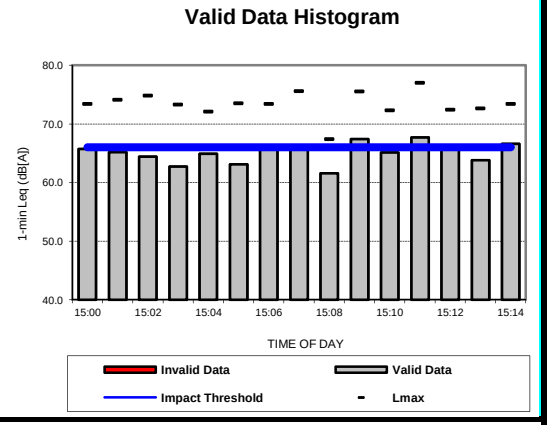


TABLE A.21 Receptor M-21 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS06: 2014-08-27 1500-1515 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
15:00	65.7	73.4	93.5	69.5	57.2	64.7	65.4	**65**
15:01	65.2	74.1	87.9	69.4	53.9			
15:02	64.4	74.8	88.5	69.0	50.1			
15:03	62.7	73.3	86.9	66.0	50.7			
15:04	64.9	72.1	89.6	68.1	57.6			
15:05	63.1	73.5	88.4	67.8	46.3	65.4		
15:06	66.3	73.4	91.4	70.6	51.0			
15:07	66.2	75.6	92.1	70.7	55.2			
15:08	61.6	67.4	83.4	65.5	47.1			
15:09	67.4	75.5	94.4	71.3	57.5			
15:10	65.1	72.3	91.7	68.4	51.7	66.1		
15:11	67.7	77.0	95.6	71.5	58.7			
15:12	66.1	72.4	88.2	69.9	51.3			
15:13	63.8	72.6	88.2	68.0	48.8			
15:14	66.6	73.4	92.5	70.4	57.1			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 12M- 22 **Description:** Empty Lot off of Ridge

MONITORING INFORMATION

Notes: 12 - 22

Vacant Lot
Meter was set up in center of lot.

Off Peak

Date: Aug 28 2014
Start Time: 9
End Time:
Meter ID: 362592

Roadway: Ridge / 147
Cars:
MT:
HT:
Monitored Leq: 54.1

SITE SKETCH:

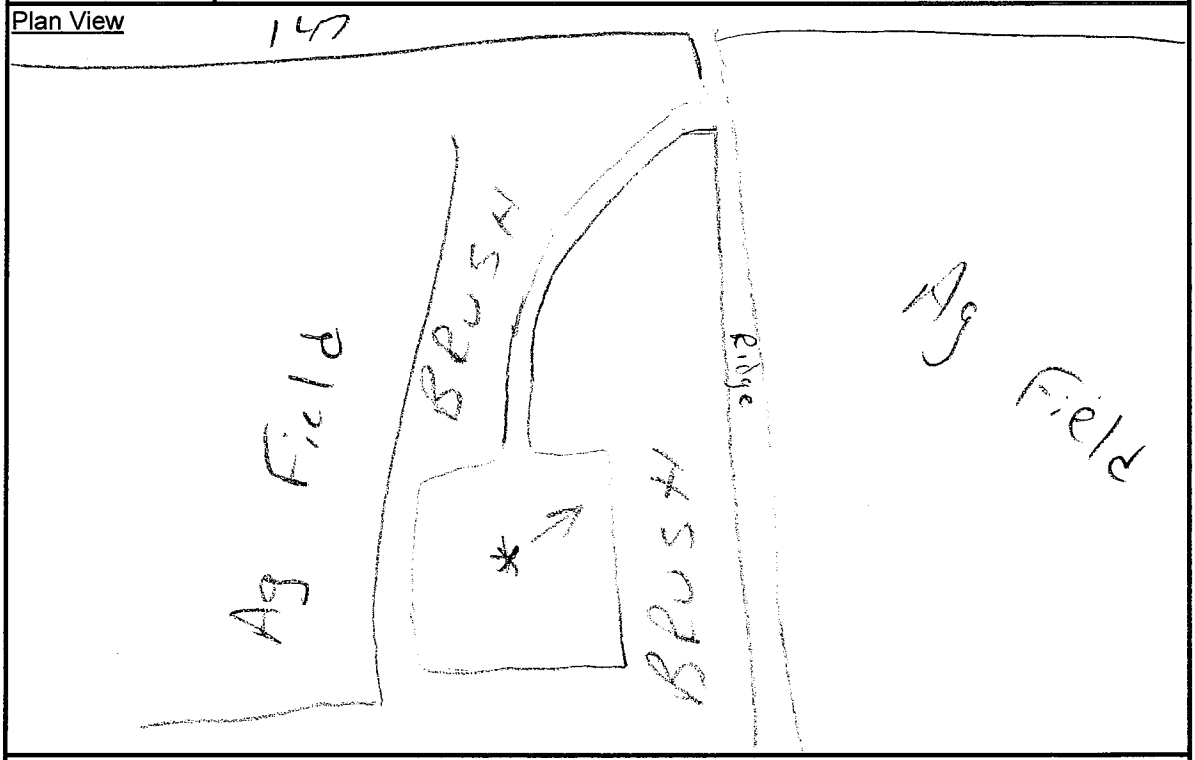
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View

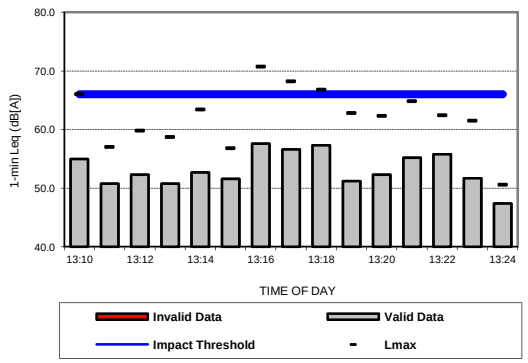


Cross-Section

TABLE A.22 Receptor M-22 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS12: 2014-08-28 1310-1325 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
13:10	55.0	66.0	83.1	58.3	48.1	52.6	54.1	**54**
13:11	50.8	57.0	77.8	55.0	46.4			
13:12	52.3	59.8	78.1	55.9	47.6			
13:13	50.8	58.7	77.1	54.4	47.3			
13:14	52.7	63.4	79.8	55.7	48.1			
13:15	51.6	56.8	77.4	54.4	48.2	55.7		
13:16	57.6	70.7	91.2	59.9	47.5			
13:17	56.6	68.2	88.7	58.5	47.8			
13:18	57.3	66.8	88.5	63.3	48.4			
13:19	51.2	62.8	75.7	54.3	47.9			
13:20	52.3	62.3	77.7	56.7	48.3	53.4		
13:21	55.2	64.8	83.2	59.5	47.3			
13:22	55.8	62.4	83.2	60.7	48.1			
13:23	51.7	61.5	79.8	55.2	47.2			
13:24	47.4	50.6	70.5	48.2	46.5			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M- 13-23 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/28/14
Start Time:
End Time:
Meter ID: 8629357

Roadway:
Cars:
MT:
HT:
Monitored Leq: 52.4

SITE SKETCH:

North Arrow

Site Specifics

Employee ID: SDriscoll

Atmospheric Conditions : Partly Cloudy

Plan View

Cross-Section

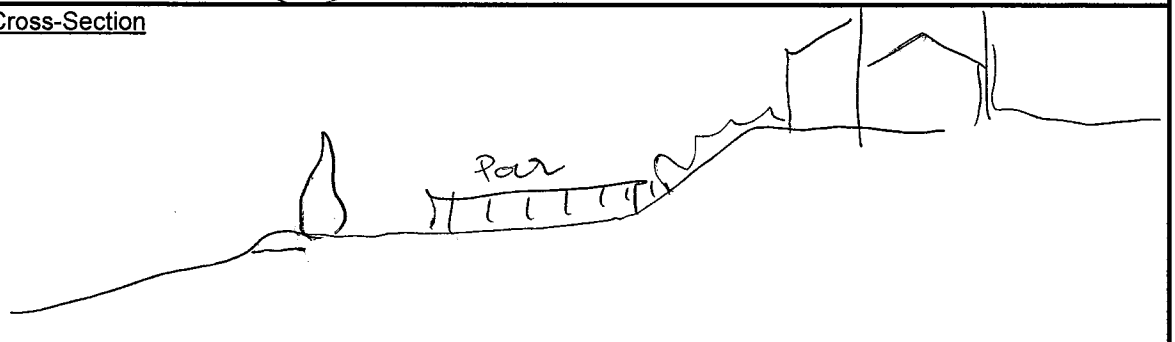
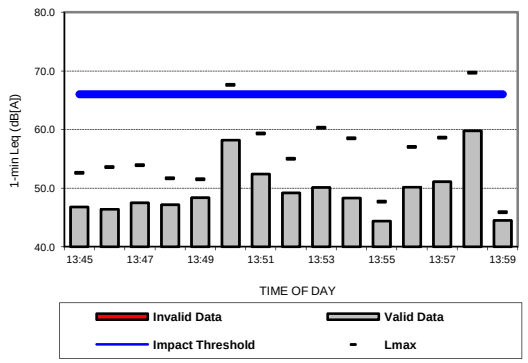


TABLE A.23 Receptor M-23 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS13: 2014-08-28 1345-1400 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
13:45	46.8	52.6	74.2	49.7	43.9	47.3	52.4	**52**
13:46	46.4	53.6	78.0	47.8	44.3			
13:47	47.5	53.9	70.3	49.5	44.3			
13:48	47.2	51.7	69.8	49.2	44.8			
13:49	48.4	51.5	76.0	50.4	45.6			
13:50	58.2	67.6	85.8	64.3	47.3	53.4		
13:51	52.4	59.3	82.7	57.1	46.0			
13:52	49.2	55.0	82.7	52.3	46.1			
13:53	50.1	60.3	81.4	54.8	45.3			
13:54	48.3	58.5	82.3	49.9	45.4			
13:55	44.4	47.7	69.4	45.1	43.7	54.0		
13:56	50.2	57.0	77.9	54.5	45.1			
13:57	51.1	58.6	81.3	54.4	45.1			
13:58	59.8	69.7	94.0	66.3	44.0			
13:59	44.5	45.9	68.7	45.3	44.0			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site #: Z M-24 **Description:** Vacant Residential Property

MONITORING INFORMATION

Notes: Ridge Rd

Off Peak

Date: 8/29/14
Start Time: 1:10
End Time: 1:25
Meter ID: 862938

Roadway: Ridge Rd Westbound
Cars: 10
MT: 0
HT: 5
Monitored Leq: 54.2

Moto: 1
Bus: 0

SITE SKETCH:

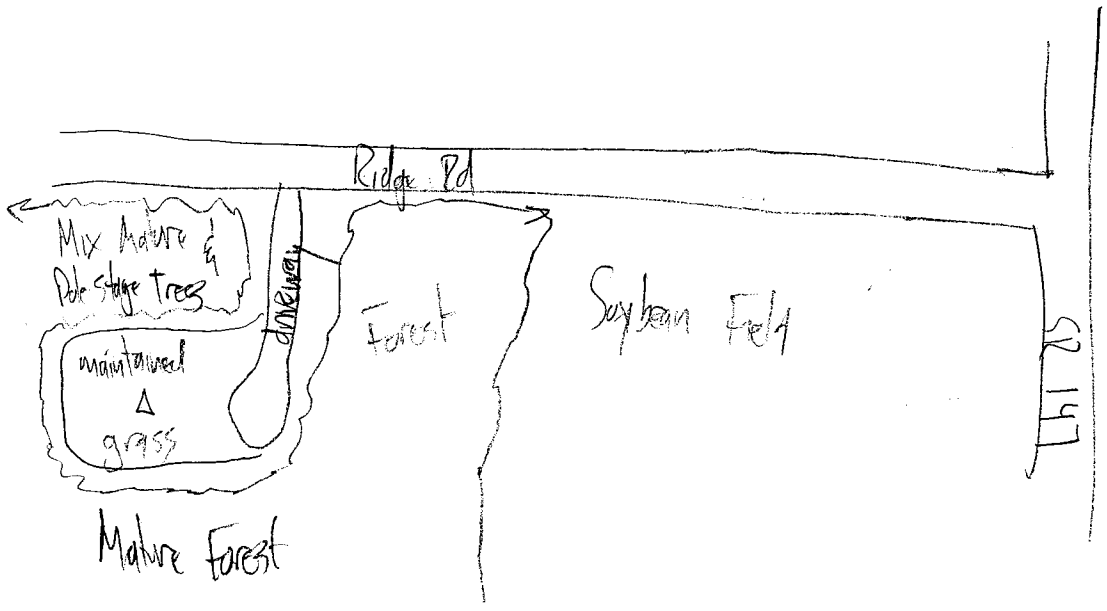
North Arrow

Site Specifics

Employee ID: BG

Atmospheric Conditions : Hot & Partly Cloudy

Plan View



Cross-Section

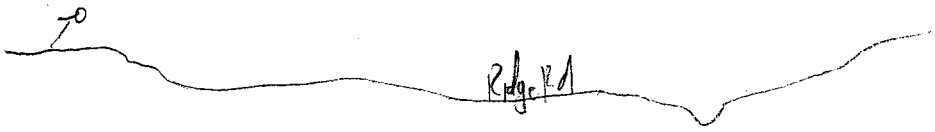
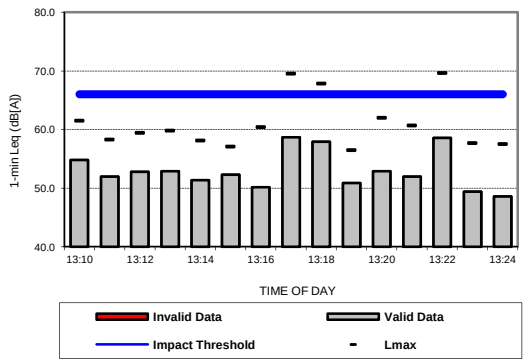


TABLE A.24 Receptor M-24 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS12: 2014-08-28 1310-1325 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
13:10	54.8	61.5	84.4	59.5	48.5	52.9	54.2	**54**
13:11	52.0	58.3	81.2	55.5	48.4			
13:12	52.8	59.4	75.8	55.7	48.5			
13:13	52.9	59.8	82.5	57.2	48.4			
13:14	51.4	58.1	75.5	54.1	47.8			
13:15	52.3	57.1	80.8	55.2	47.9	55.5		
13:16	50.2	60.4	78.7	53.6	46.0			
13:17	58.7	69.5	90.7	64.7	46.2			
13:18	57.9	67.8	90.1	62.6	46.7			
13:19	50.9	56.5	75.4	54.5	46.7			
13:20	52.9	62.0	79.9	56.7	47.6	53.9		
13:21	52.0	60.7	78.6	54.6	47.5			
13:22	58.6	69.6	90.4	62.6	47.0			
13:23	49.4	57.7	76.0	52.1	46.3			
13:24	48.6	57.5	75.7	49.5	46.7			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 13 M-25 **Description:** Single Residential Property

MONITORING INFORMATION

Notes: 377 Ridge Rd

Off Peak

Date: 8/29/14
Start Time: 1:45
End Time: 2:00
Meter ID: 86.29.38

Roadway: Ridge Rd
Cars: EB: 9 WB: 13
MT: EB: 1 WB: 1
HT: EB: 3 WB: 4
Monitored Leq: 53.4

Moto: 0
Bus: 0

SITE SKETCH:

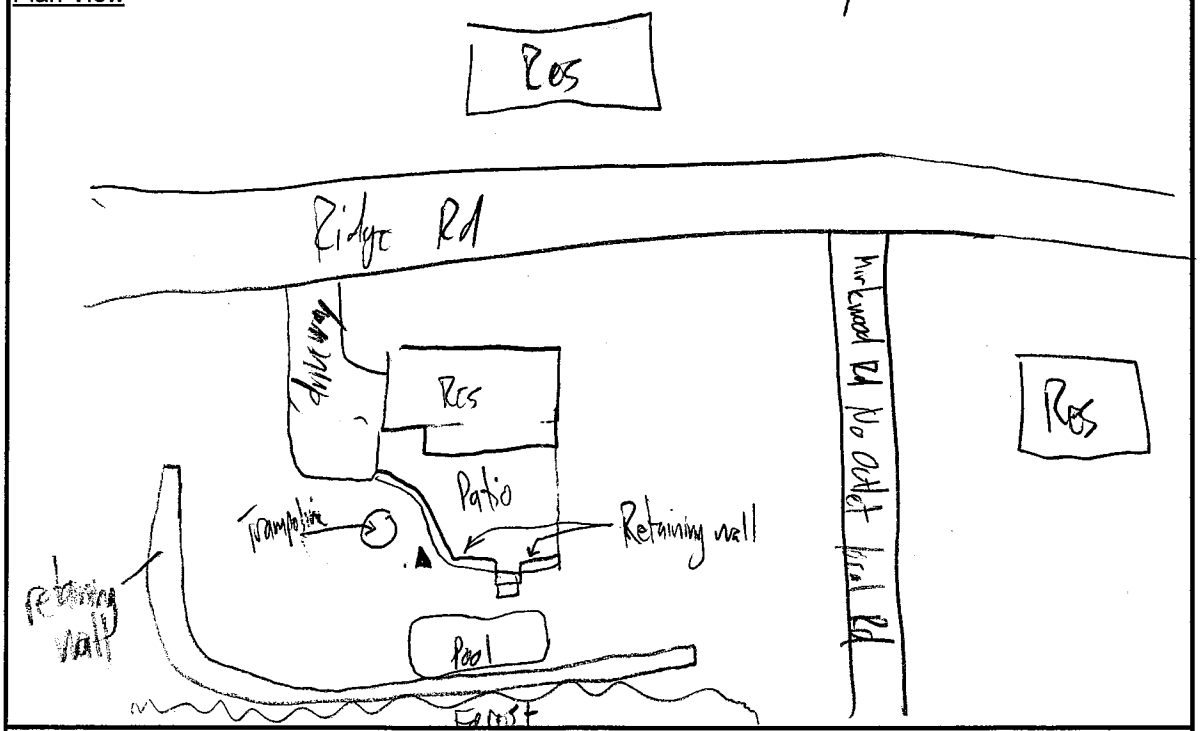
North Arrow: N

Site Specifics

Employee ID: BG

Atmospheric Conditions: hot & Partly Cloudy

Plan View



Cross-Section

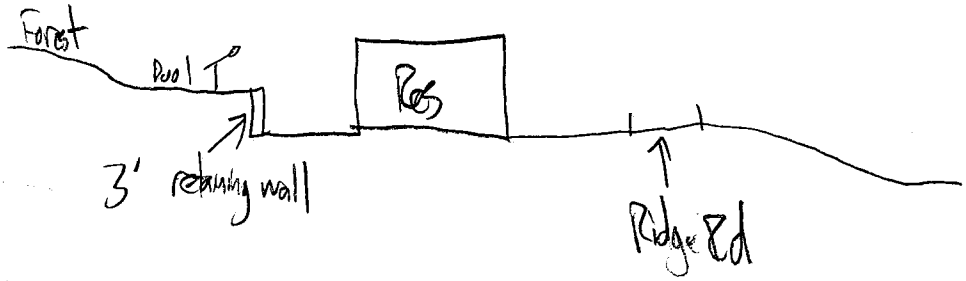
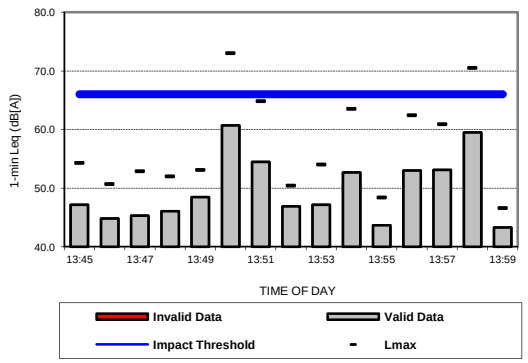


TABLE A.25 Receptor M-25 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS13: 2014-08-28 1345-1400 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
13:45	47.2	54.3	79.0	51.3	41.6	46.6	53.4	**53**
13:46	44.8	50.7	74.7	48.9	40.5			
13:47	45.3	52.9	72.2	48.1	42.4			
13:48	46.1	52.0	71.7	49.6	43.0			
13:49	48.5	53.1	73.9	51.7	43.2			
13:50	60.7	73.0	91.1	65.1	46.4	55.4		
13:51	54.5	64.8	81.1	58.0	47.7			
13:52	46.9	50.4	85.9	49.1	45.2			
13:53	47.2	54.0	74.0	50.3	42.3			
13:54	52.7	63.5	86.1	55.7	43.8			
13:55	43.7	48.4	67.3	47.1	41.4	54.3		
13:56	53.0	62.4	84.2	57.1	43.4			
13:57	53.1	60.9	83.0	57.8	43.0			
13:58	59.5	70.5	90.8	64.3	43.7			
13:59	43.3	46.6	75.1	43.9	42.2			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # B M-26 **Description:** 155 Morkwood DR

MONITORING INFORMATION

Notes: AUZ 13-26

Off Peak

Date: Aug 28 2014

Start Time: 1

End Time:

Meter ID: 362592

Roadway: 147

Cars:

MT:

HT:

Monitored Leq: 46.7

SITE SKETCH:

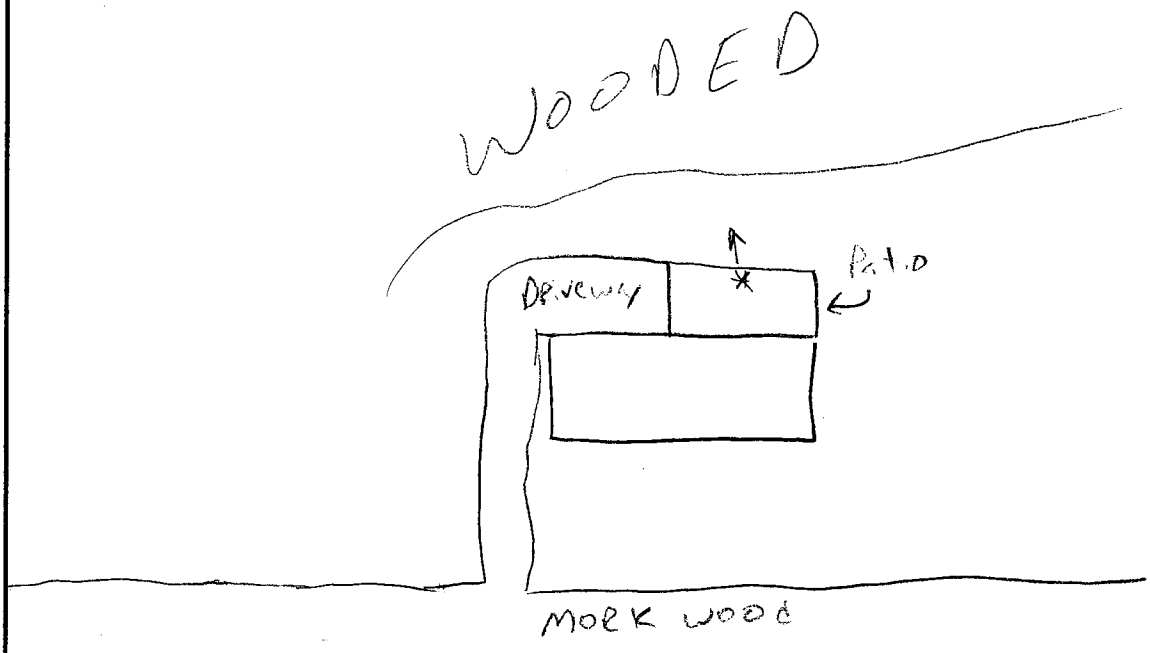
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View

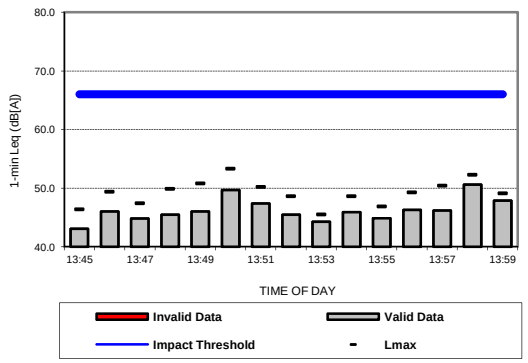


Cross-Section

TABLE A.26 Receptor M-26 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS13: 2014-08-28 1345-1400 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
13:45	43.1	46.4	66.1	45.1	41.5	45.2	46.7	**47**
13:46	46.0	49.4	65.6	47.3	43.1			
13:47	44.8	47.4	63.9	46.3	42.8			
13:48	45.5	49.9	69.5	46.4	43.7			
13:49	46.0	50.8	69.5	47.0	44.9			
13:50	49.7	53.3	74.2	52.3	46.4	47.0		
13:51	47.4	50.2	72.9	49.6	45.7			
13:52	45.5	48.6	67.1	46.3	44.5			
13:53	44.3	45.5	67.9	44.9	43.5			
13:54	45.9	48.6	68.2	47.5	44.4			
13:55	44.9	46.9	80.5	46.2	43.3	47.7		
13:56	46.3	49.3	70.0	48.3	44.5			
13:57	46.2	50.4	69.4	48.7	44.4			
13:58	50.6	52.3	75.8	51.4	49.7			
13:59	47.9	49.1	73.5	48.5	47.4			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project
Short-term Noise Monitoring

Site #~~07~~M- 29 **Description:**

MONITORING INFORMATION

Notes:

Off Peak
Date: 8/27/14
Start Time:
End Time:
Meter ID: 362592

Roadway:
Cars:
MT:
HT:
Monitored Leq: 48.2

SITE SKETCH:

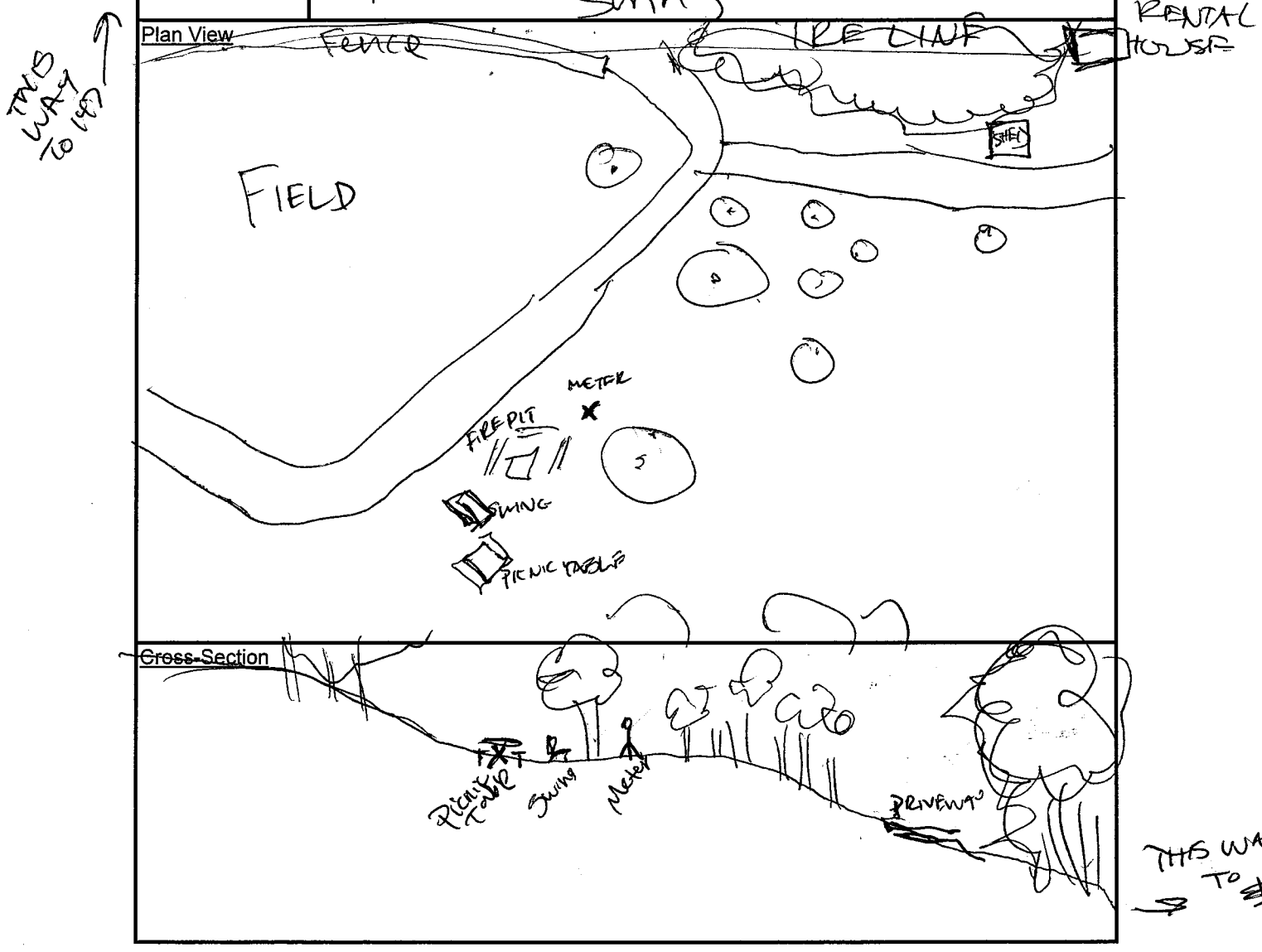
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View

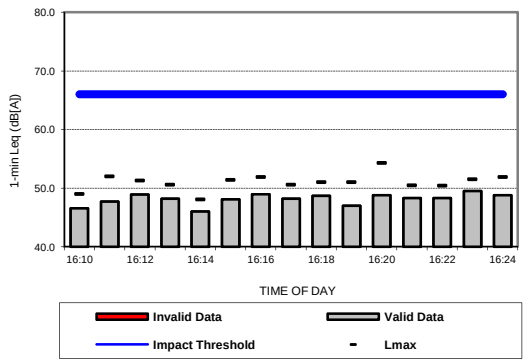


Cross-Section

TABLE A.29 Receptor M-29 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS07: 2014-08-27 1610-1625 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
16:10	46.6	49.0	77.9	47.4	45.6	47.6	48.2	**48**
16:11	47.7	52.0	74.9	49.3	45.1			
16:12	48.9	51.3	75.2	49.7	48.0			
16:13	48.2	50.6	75.8	49.7	46.7			
16:14	46.0	48.1	73.7	47.1	45.1			
16:15	48.1	51.4	74.9	49.5	46.4	48.3		
16:16	49.0	51.9	77.7	50.3	46.9			
16:17	48.2	50.6	75.2	49.2	47.2			
16:18	48.7	51.0	76.4	50.1	46.9			
16:19	47.0	51.0	76.0	47.7	46.2			
16:20	48.8	54.3	76.3	50.1	47.4	48.8		
16:21	48.3	50.5	77.0	49.3	47.4			
16:22	48.3	50.4	77.0	49.2	47.3			
16:23	49.5	51.5	77.1	50.2	48.6			
16:24	48.8	51.9	78.2	50.0	46.9			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site ~~M-~~ M-20 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/27

Start Time:

End Time:

Meter ID: 3625 90

Roadway:

Cars:

MT:

HT:

Monitored Leq: 57.3

SITE SKETCH:

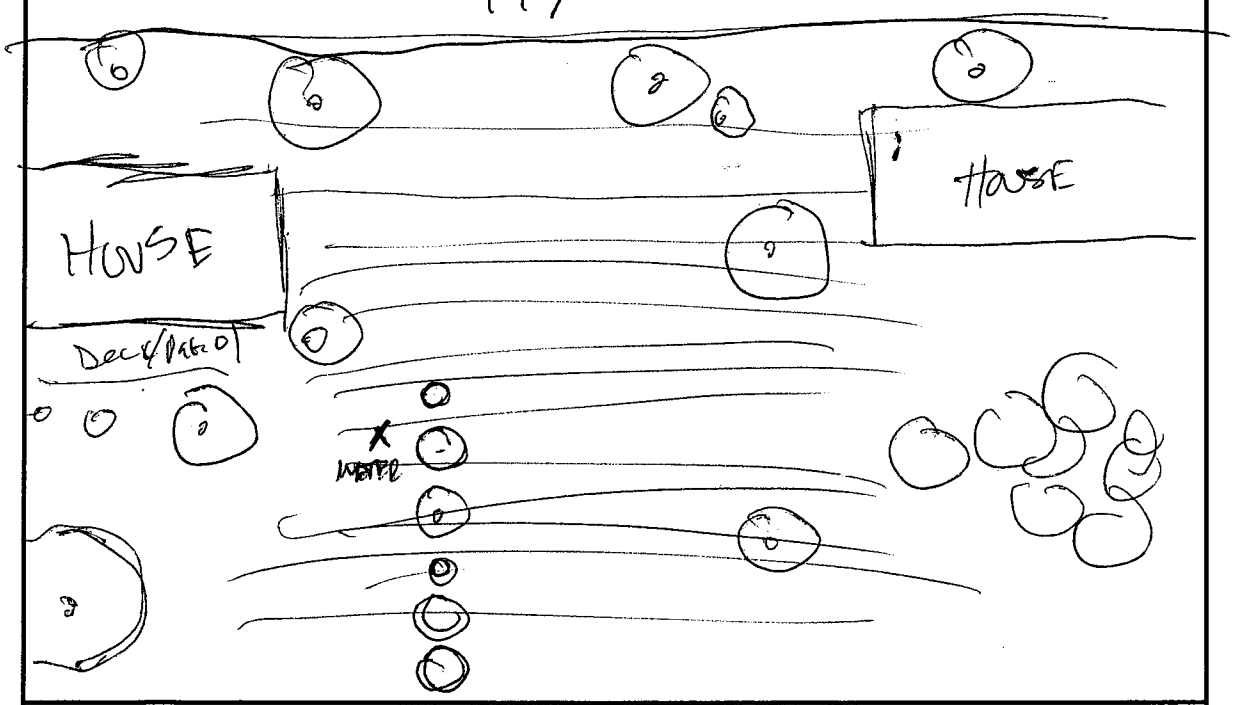
North Arrow

Site Specifics

Employee ID: SDriscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

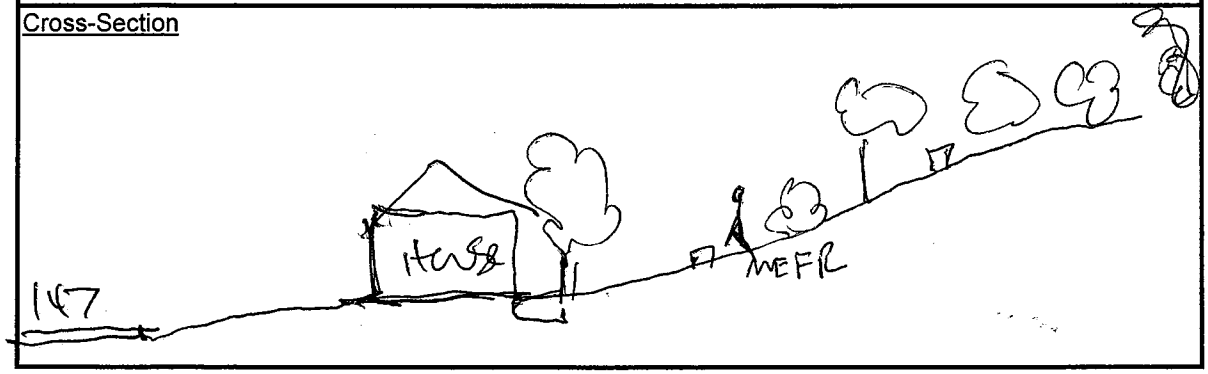
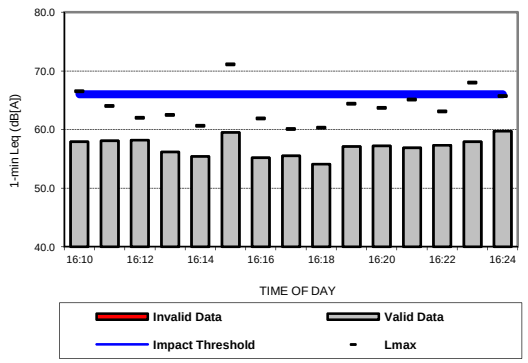


TABLE A.30 Receptor M-30 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS07: 2014-08-27 1610-1625 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
16:10	57.9	66.5	88.4	59.4	53.6	57.3	57.3	**57**
16:11	58.1	64.0	85.0	60.7	51.9			
16:12	58.2	62.0	85.5	60.5	55.7			
16:13	56.2	62.5	83.0	58.8	51.5			
16:14	55.4	60.6	83.6	58.4	50.2			
16:15	59.5	71.1	92.8	62.2	52.9	56.7		
16:16	55.2	61.9	82.6	58.3	51.2			
16:17	55.5	60.1	79.8	57.7	51.5			
16:18	54.1	60.3	76.6	56.4	49.7			
16:19	57.1	64.4	83.5	60.2	52.4			
16:20	57.2	63.7	87.1	60.0	54.4	57.9		
16:21	56.9	65.1	82.6	59.6	53.0			
16:22	57.3	63.1	85.3	59.5	53.0			
16:23	57.9	68.0	90.7	61.2	51.7			
16:24	59.7	65.7	89.9	63.9	54.2			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 1 M-31 **Description:** Single Family Residence

MONITORING INFORMATION

Notes:

Off Peak

Date: 5/27/14

Start Time:

End Time:

Meter ID: 86293

Roadway:

Cars:

MT:

HT:

Monitored Leq: 54.2

SITE SKETCH:

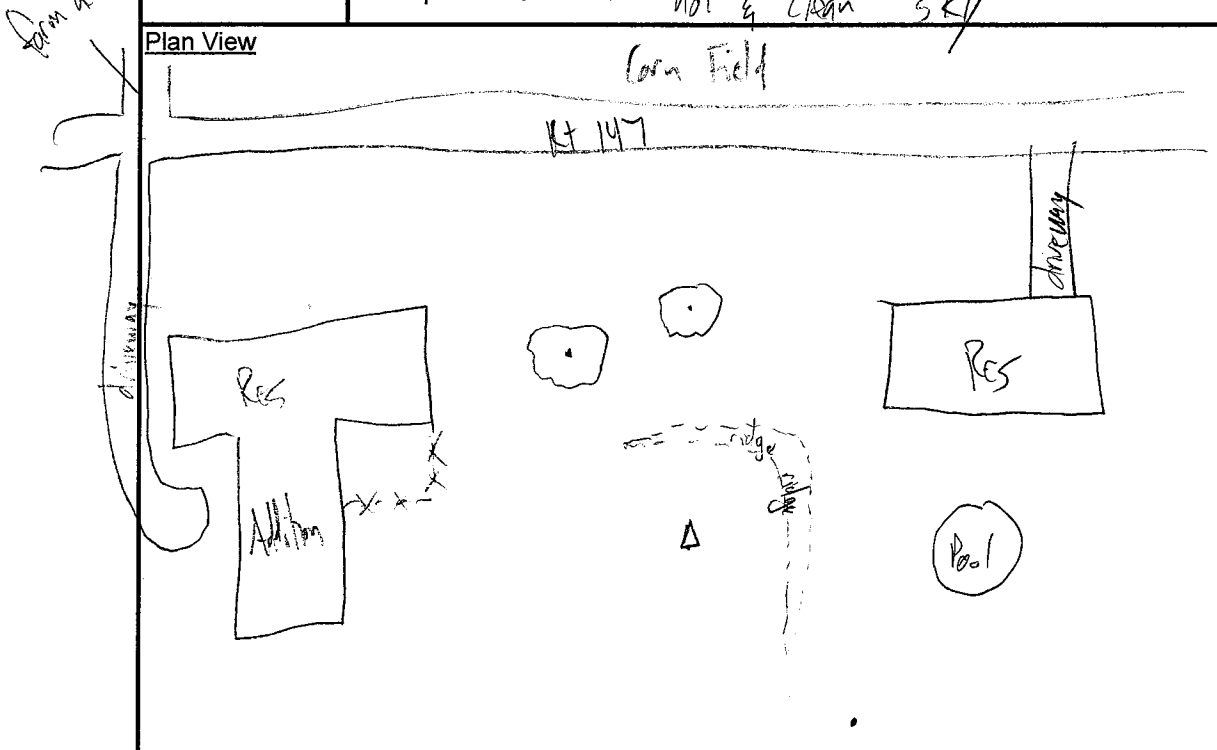
North Arrow

Site Specifics

Employee ID: BG

Atmospheric Conditions : hot & clear sky

Plan View



Cross-Section

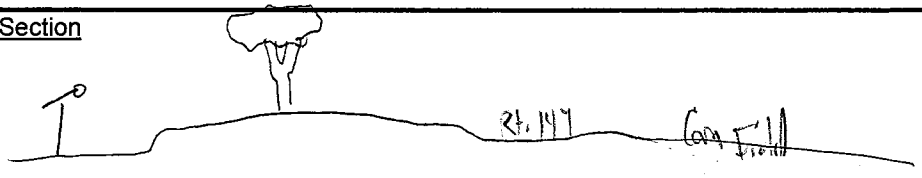
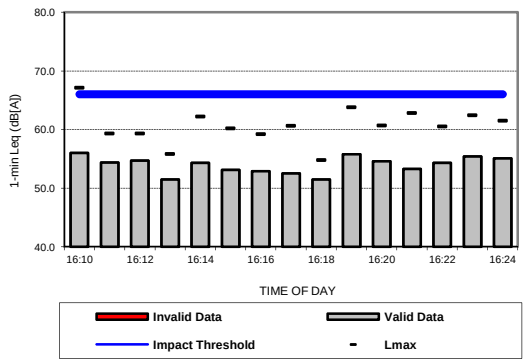


TABLE A.31 Receptor M-31 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS07: 2014-08-27 1610-1625 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
16:10	56.0	67.1	89.8	59.1	50.5	54.4	54.2	**54**
16:11	54.4	59.3	81.6	56.7	51.2			
16:12	54.7	59.3	80.0	56.9	51.0			
16:13	51.5	55.8	78.1	53.9	47.2			
16:14	54.3	62.2	88.3	58.7	48.3			
16:15	53.1	60.2	85.3	56.0	48.8	53.4		
16:16	52.9	59.2	80.2	57.0	45.3			
16:17	52.5	60.6	83.6	56.7	46.1			
16:18	51.5	54.8	79.2	53.4	47.2			
16:19	55.8	63.8	85.8	60.2	50.2			
16:20	54.6	60.7	85.9	58.5	47.6	54.6		
16:21	53.3	62.8	82.9	55.9	47.0			
16:22	54.3	60.5	81.9	57.8	47.8			
16:23	55.4	62.4	83.5	60.1	47.0			
16:24	55.1	61.5	83.4	58.3	50.3			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site #11 M- 32 **Description:** Oak View

MONITORING INFORMATION

Notes: AU2_11_32

Property Slopes to the South

Dog Barked until I walked away, limited barking occured during 15 min session.

Off Peak

Date: Aug 28 2014

Start Time:

End Time:

Meter ID: 862937

Roadway:

Cars:

MT:

HT:

Monitored Leq: 50.1

SITE SKETCH:

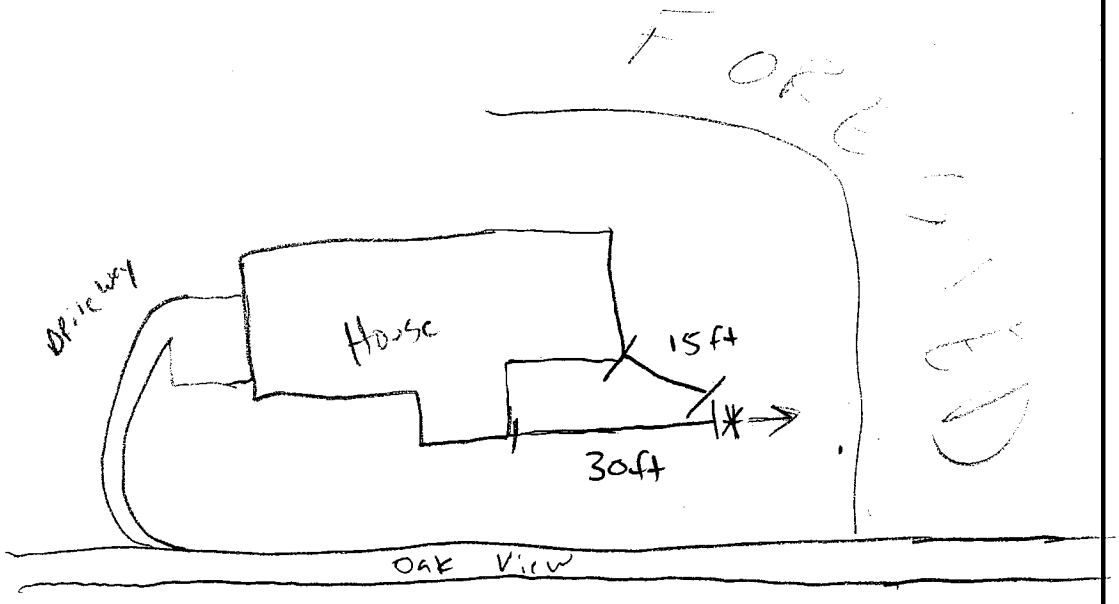
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

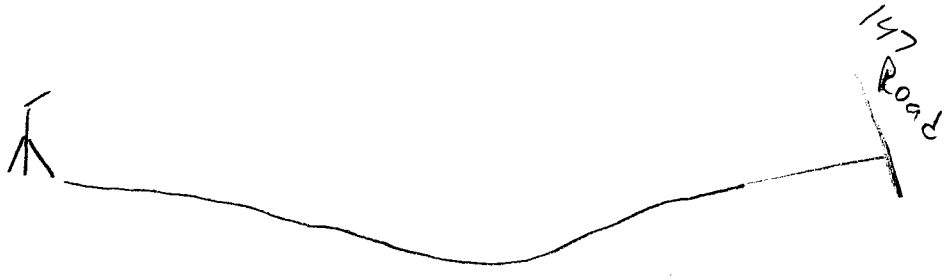
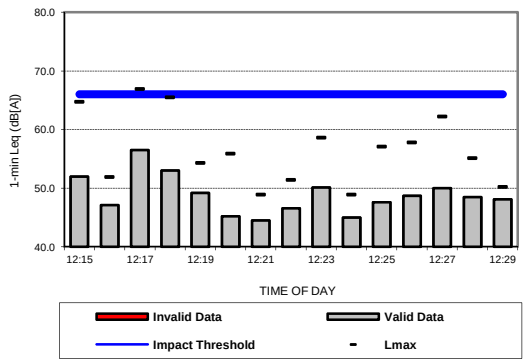


TABLE A.32 Receptor M-32 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS11: 2014-08-28 1215-1230 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:15	52.0	64.7	77.7	54.7	47.2	52.7	50.1	**50**
12:16	47.1	51.9	75.3	48.9	45.4			
12:17	56.5	66.9	81.3	61.4	46.4			
12:18	53.0	65.5	85.3	55.4	48.7			
12:19	49.2	54.3	82.7	52.0	44.9			
12:20	45.2	55.9	74.0	48.0	40.9	46.8		
12:21	44.5	48.9	69.8	46.2	41.3			
12:22	46.6	51.4	75.0	48.9	42.8			
12:23	50.1	58.6	75.1	53.2	43.7			
12:24	45.0	48.9	73.3	46.7	43.0			
12:25	47.6	57.1	75.4	51.3	41.8	48.7		
12:26	48.7	57.8	73.3	54.9	42.3			
12:27	50.0	62.2	80.1	55.2	41.7			
12:28	48.5	55.1	80.6	50.0	43.3			
12:29	48.1	50.2	73.2	49.0	47.4			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 11 M- 33 **Description:** Single family residence in Woods

MONITORING INFORMATION

Notes: good waterfall audible

Off Peak

Date: 8/29/14

Start Time:

End Time:

Meter ID: 807938

Roadway:

Cars:

MT:

HT:

Monitored Leq: 49.0

SITE SKETCH:

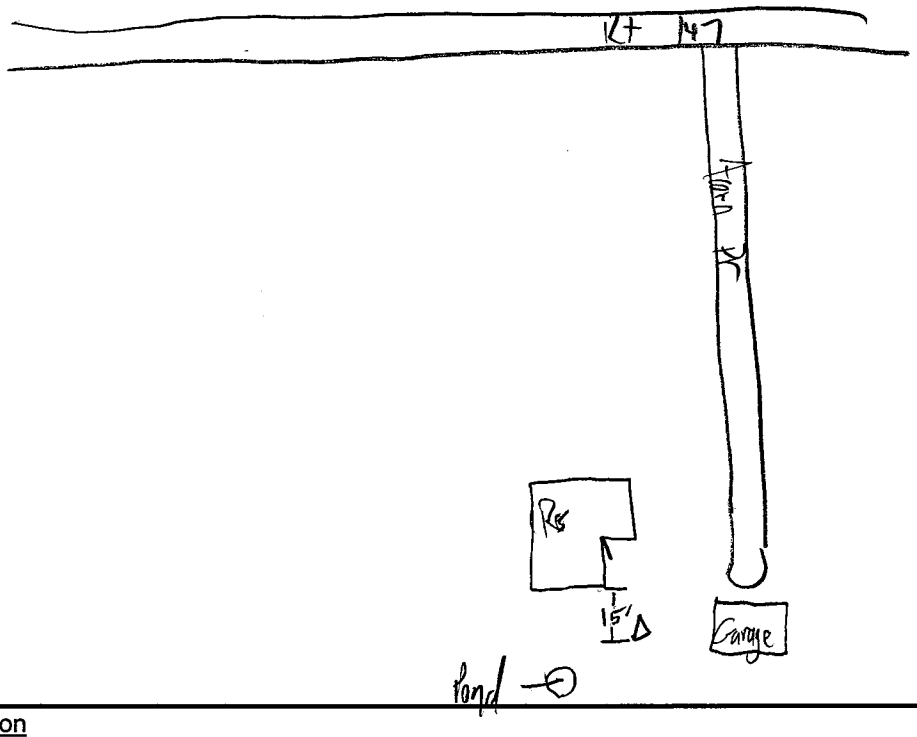
North Arrow: N →

Site Specifics

Employee ID: BG

Atmospheric Conditions : warm & partly cloudy

Plan View

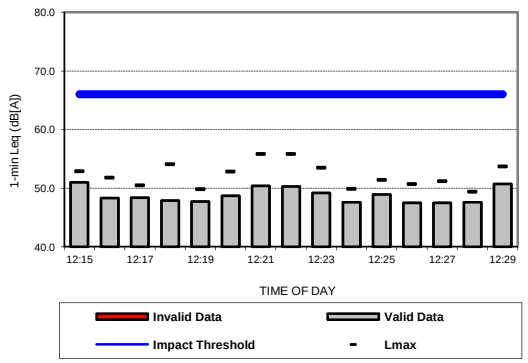


Cross-Section

TABLE A.33 Receptor M-33 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS11: 2014-08-28 1215-1230 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:15	51.0	52.9	77.0	52.2	49.3	48.8	49.0	**49**
12:16	48.3	51.8	72.8	49.9	46.9			
12:17	48.4	50.5	71.6	49.2	47.3			
12:18	47.9	54.1	80.9	48.5	47.1			
12:19	47.7	49.8	69.4	48.5	47.1			
12:20	48.7	52.8	72.1	50.3	47.2	49.4		
12:21	50.4	55.8	76.2	51.6	48.7			
12:22	50.3	55.8	83.0	54.4	47.0			
12:23	49.2	53.5	70.7	52.2	47.1			
12:24	47.6	49.9	70.3	48.3	46.8			
12:25	48.9	51.4	79.2	50.3	47.5	48.6		
12:26	47.5	50.7	66.5	48.5	46.6			
12:27	47.5	51.2	69.2	48.7	46.4			
12:28	47.6	49.4	69.5	48.8	46.3			
12:29	50.7	53.7	72.0	53.1	47.7			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

11 **Site # M-** 34 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

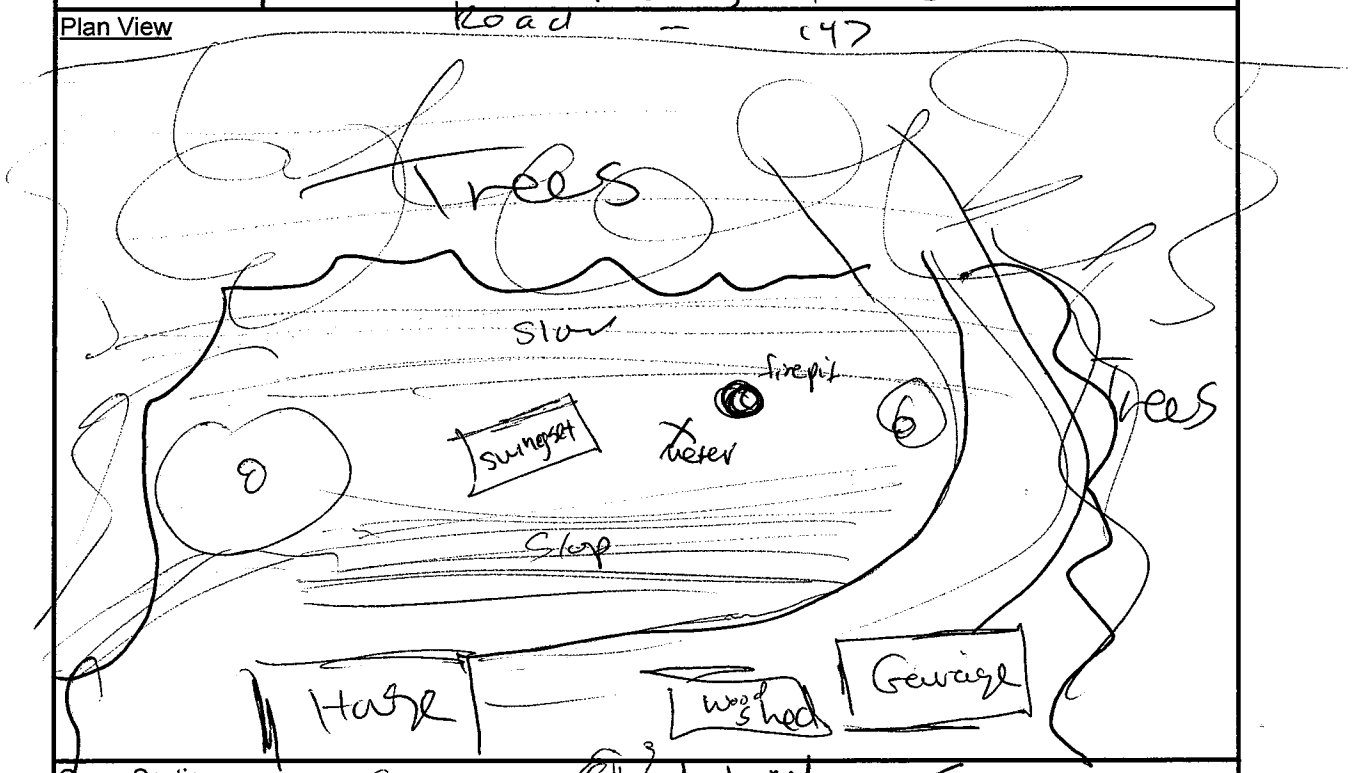
Date: 8/26/2014
Start Time:
End Time:
Meter ID: 362597

Roadway:
Cars:
MT:
HT:
Monitored Leq: 51.2

SITE SKETCH:

North Arrow	**Site Specifics**
	Employee ID: S. Driscoll
	Atmospheric Conditions: Partly Cloudy

Plan View



Cross-Section

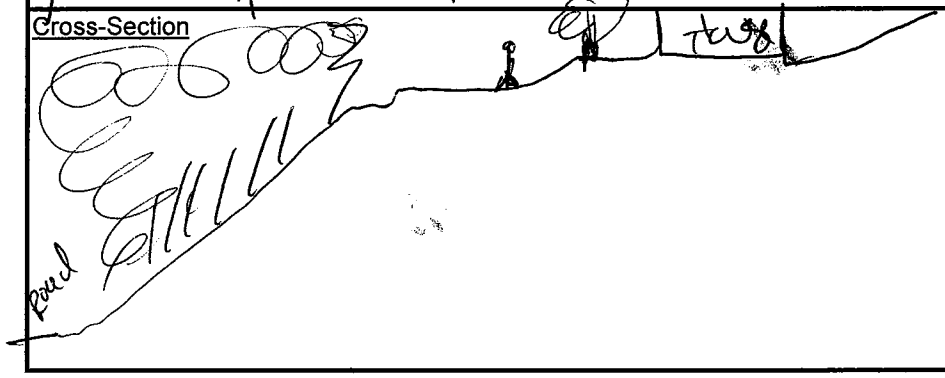
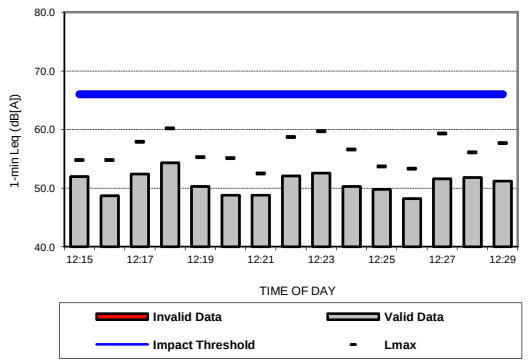


TABLE A.34 Receptor M-34 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS11: 2014-08-28 1215-1230 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:15	52.0	54.8	77.0	53.3	50.1	51.9	51.2	**51**
12:16	48.7	54.8	74.4	50.5	45.8			
12:17	52.4	57.9	84.0	55.1	49.1			
12:18	54.3	60.2	85.1	56.9	50.3			
12:19	50.3	55.3	75.9	52.8	47.1			
12:20	48.8	55.1	74.2	51.3	46.0	50.8		
12:21	48.8	52.5	74.5	50.8	46.6			
12:22	52.1	58.7	75.9	54.5	48.5			
12:23	52.6	59.7	79.7	57.3	47.3			
12:24	50.3	56.6	76.2	53.2	46.4			
12:25	49.8	53.7	73.7	51.7	45.3	50.7		
12:26	48.2	53.3	75.3	50.7	44.9			
12:27	51.6	59.3	78.2	55.2	46.4			
12:28	51.8	56.1	78.8	53.4	49.2			
12:29	51.2	57.7	76.7	53.7	49.1			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 10 M-35 **Description:** Single Family Residence

MONITORING INFORMATION

Notes: Mdi 199 Ryan Lane

Off Peak

Date: 8/29/14

Start Time:

End Time:

Meter ID: 867938

Roadway:

Cars:

MT:

HT:

Monitored Leq: 58.0

SITE SKETCH:

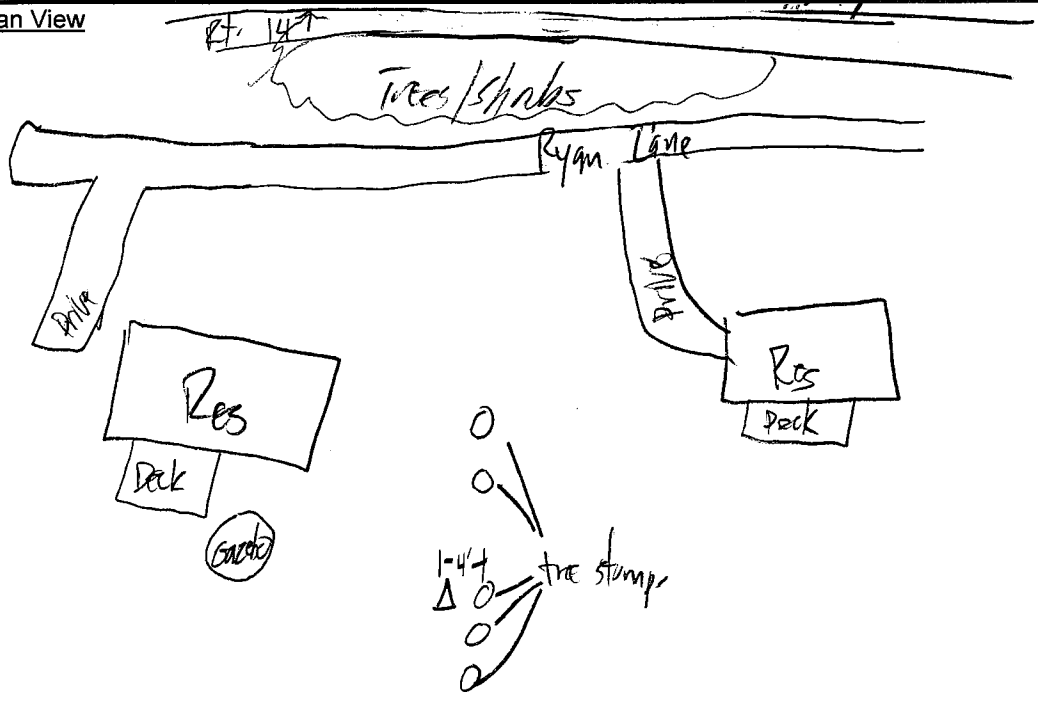
North Arrow: N →

Site Specifics

Employee ID: BG

Atmospheric Conditions : Warm & partly cloudy

Plan View



Cross-Section

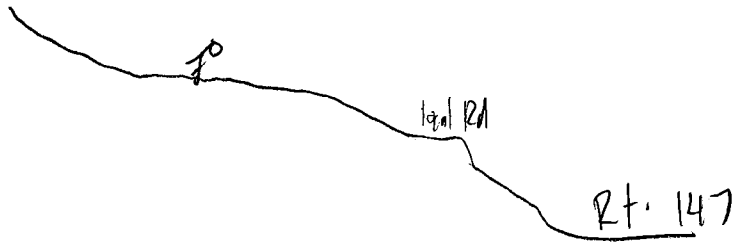
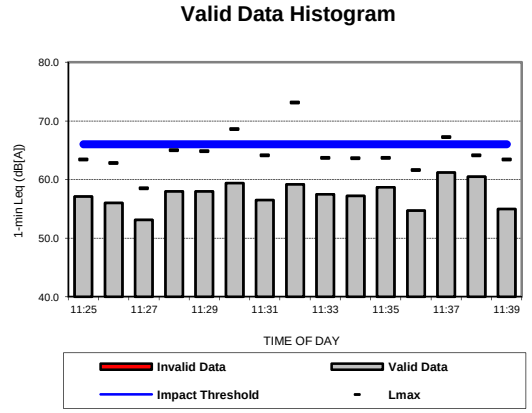


TABLE A.35 Receptor M-35 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS10: 2014-08-28 1125-1140 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
11:25	57.1	63.4	85.4	60.4	53.1	56.8	58.0	**58**
11:26	56.0	62.8	96.8	58.0	53.9			
11:27	53.1	58.5	90.1	56.0	50.1			
11:28	58.0	65.0	92.2	61.9	52.9			
11:29	58.0	64.8	98.2	61.9	51.5			
11:30	59.4	68.6	87.8	62.2	54.4	58.1		
11:31	56.5	64.1	81.6	59.9	51.6			
11:32	59.2	73.1	84.6	61.6	52.2			
11:33	57.5	63.7	92.2	60.6	50.0			
11:34	57.2	63.6	84.3	59.8	51.4			
11:35	58.7	63.7	84.0	61.4	52.4	58.8		
11:36	54.7	61.6	82.0	57.6	49.4			
11:37	61.2	67.2	87.1	64.2	57.3			
11:38	60.5	64.1	84.1	62.6	57.3			
11:39	55.0	63.4	82.9	58.3	51.6			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 10M-36 **Description:** Ryan Road

MONITORING INFORMATION

Notes: AUZ_10_36

Property Appears to be owned/ used by camp ground.

Off Peak

Date: Aug 28 2014

Start Time:

End Time:

Meter ID: 36z592

Roadway:

Cars:

MT:

HT:

Monitored Leq: 62.3

SITE SKETCH:

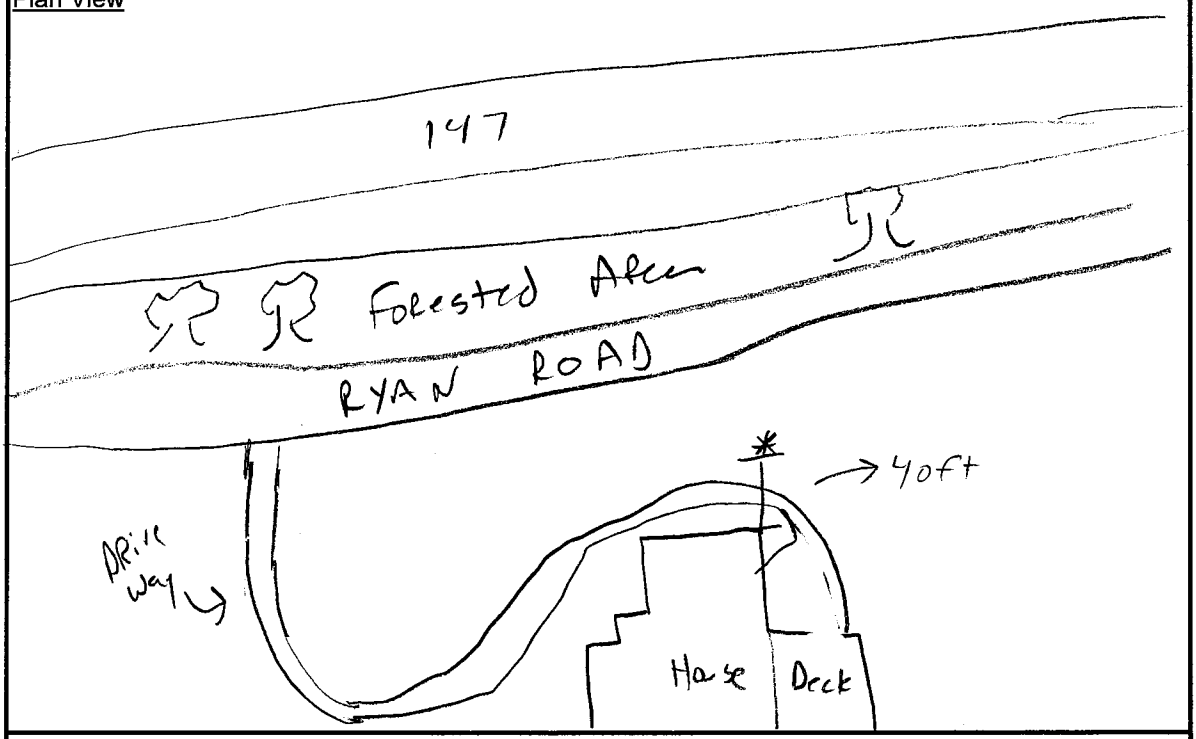
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

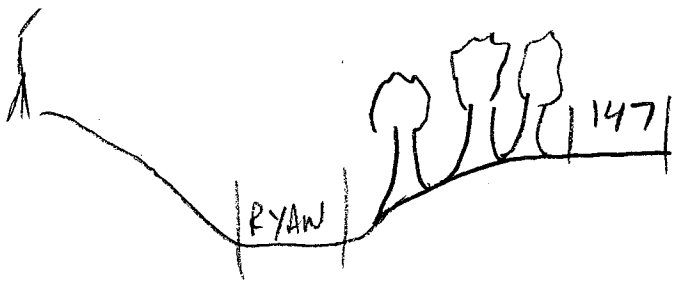
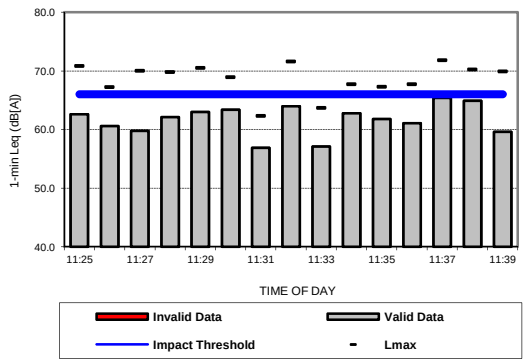


TABLE A.36 Receptor M-36 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS10: 2014-08-28 1125-1140 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
11:25	62.6	70.8	89.5	68.2	54.6	61.8	62.3	**62**
11:26	60.6	67.2	85.7	63.4	55.9			
11:27	59.8	70.0	88.8	66.1	48.0			
11:28	62.1	69.8	89.0	67.0	54.8			
11:29	63.0	70.5	91.6	67.3	53.4			
11:30	63.4	68.9	93.9	67.0	56.2	61.8		
11:31	56.9	62.3	82.0	59.9	51.0			
11:32	64.0	71.6	86.9	67.2	57.0			
11:33	57.1	63.7	83.7	61.0	47.9			
11:34	62.8	67.7	88.2	65.5	59.0			
11:35	61.8	67.3	89.9	65.7	53.8	63.1		
11:36	61.1	67.7	86.2	64.5	51.9			
11:37	65.4	71.8	91.5	68.0	60.1			
11:38	64.9	70.2	90.3	67.1	60.8			
11:39	59.6	69.9	86.4	61.6	52.6			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

11 **Site # M-** 37 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/28/14

Start Time:

End Time:

Meter ID: 362590

Roadway:

Cars:

MT:

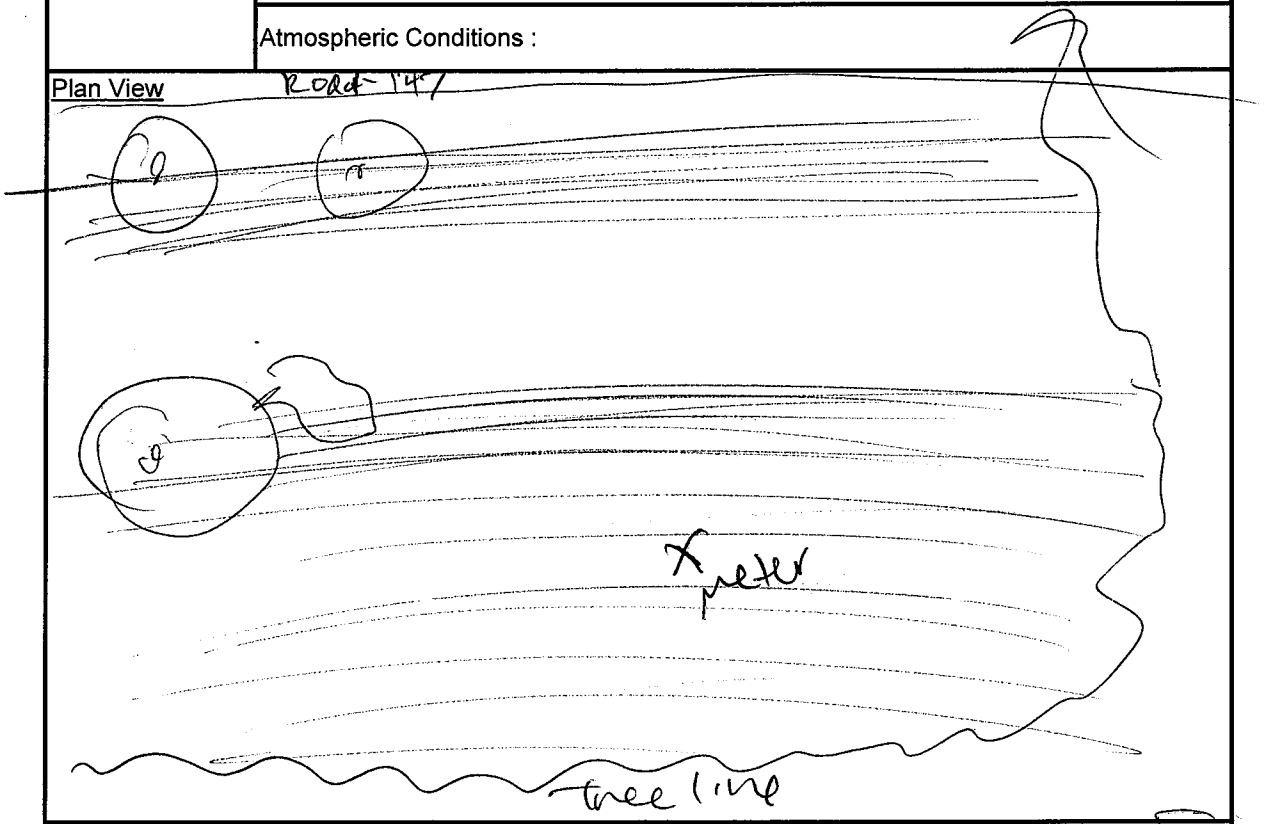
HT:

Monitored Leq: 58.4

SITE SKETCH:

North Arrow	**Site Specifics**
	Employee ID:
	Atmospheric Conditions :

Plan View



Cross-Section

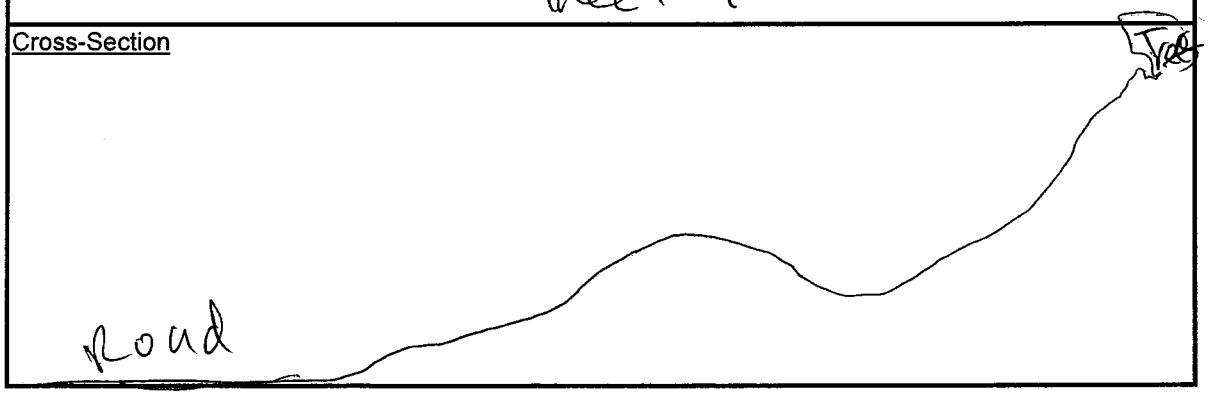
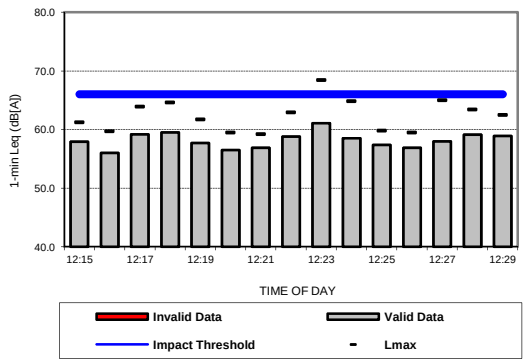


TABLE A.37 Receptor M-37 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS11: 2014-08-28 1215-1230 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
12:15	57.9	61.2	82.5	59.8	55.5	58.2	58.4	**58**
12:16	56.0	59.7	82.9	57.7	54.5			
12:17	59.2	63.9	88.2	61.2	56.7			
12:18	59.5	64.6	89.1	61.8	56.2			
12:19	57.7	61.7	83.9	59.4	55.5			
12:20	56.5	59.5	83.1	57.6	55.5	58.7		
12:21	56.9	59.2	81.1	58.0	55.7			
12:22	58.8	62.9	82.9	61.0	56.2			
12:23	61.1	68.4	89.4	64.9	56.7			
12:24	58.5	64.8	83.7	62.3	55.5			
12:25	57.4	59.8	81.9	58.8	56.0	58.1		
12:26	56.9	59.5	82.2	58.2	55.7			
12:27	58.0	65.0	86.5	61.3	55.0			
12:28	59.1	63.4	85.0	60.4	57.4			
12:29	58.9	62.5	83.5	60.8	57.0			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

10 **Site # M-~~64~~ 38** **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 9/28/2014
Start Time:
End Time:
Meter ID: 362590

Roadway:
Cars:
MT:
HT:
Monitored Leq: 60.3

SITE SKETCH:

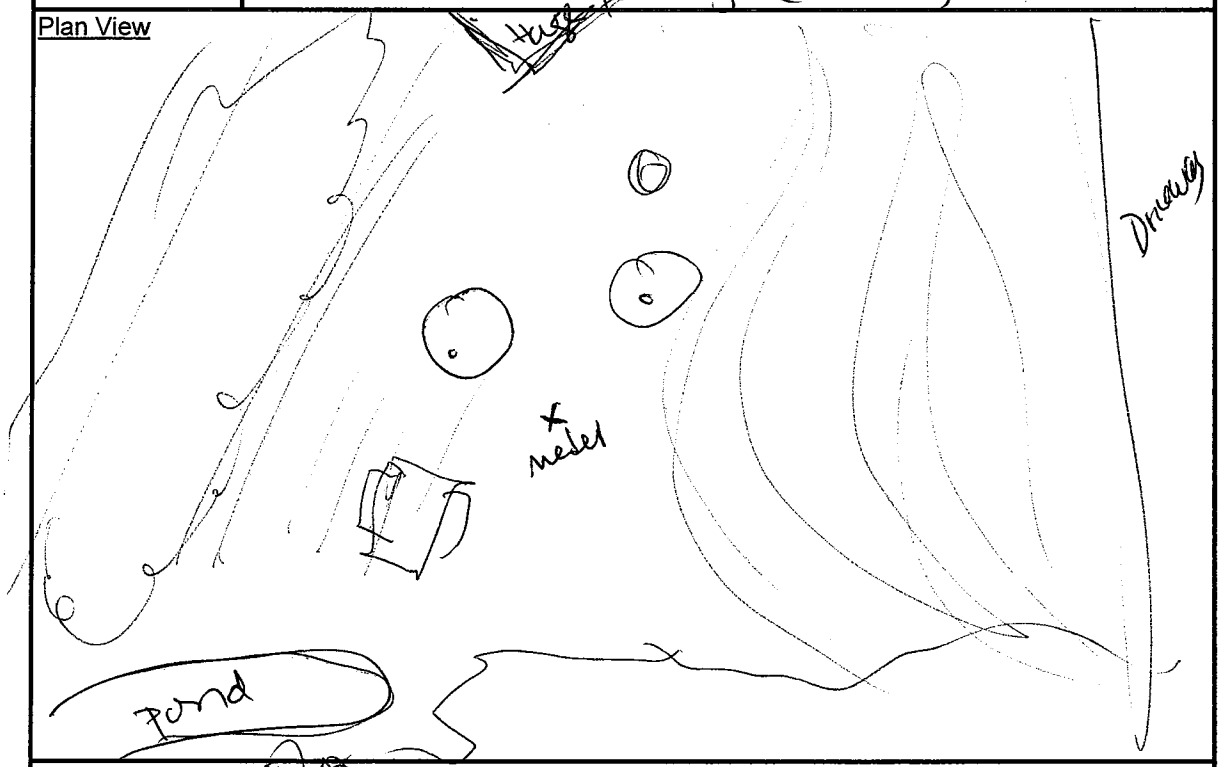
North Arrow

Site Specifics

Employee ID: SDrizcoll

Atmospheric Conditions : Partly Cloudy

Plan View



Cross-Section

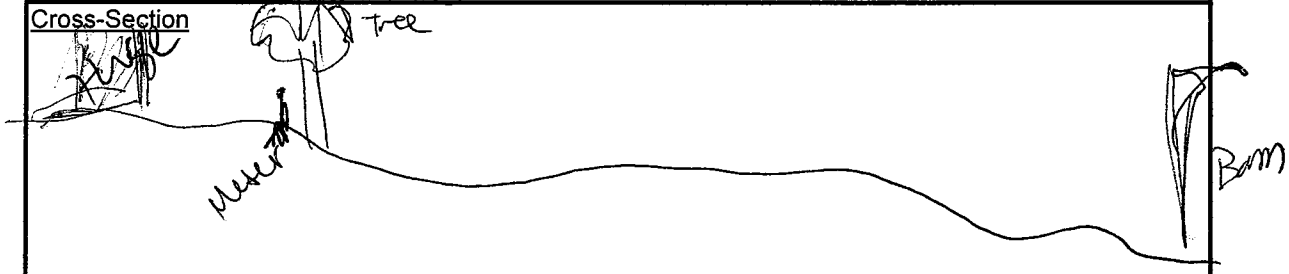
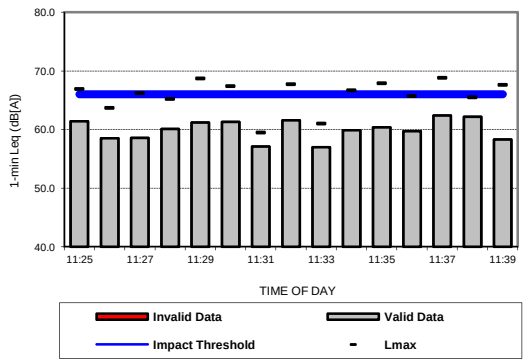


TABLE A.38 Receptor M-38 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS10: 2014-08-28 1125-1140 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
11:25	61.4	66.9	89.2	64.5	56.4	60.1	60.3	**60**
11:26	58.5	63.7	87.4	61.9	54.5			
11:27	58.6	66.2	85.7	63.7	51.6			
11:28	60.1	65.2	89.4	63.3	55.4			
11:29	61.2	68.7	92.0	65.7	53.4			
11:30	61.3	67.4	90.2	65.3	54.7	59.8		
11:31	57.1	59.5	79.9	58.6	55.0			
11:32	61.6	67.7	89.9	65.1	58.2			
11:33	57.0	61.0	86.0	59.7	53.1			
11:34	59.9	66.7	88.6	62.1	55.5			
11:35	60.4	67.9	91.6	64.9	53.2	60.9		
11:36	59.7	65.7	88.0	63.4	55.8			
11:37	62.4	68.8	88.3	64.8	58.2			
11:38	62.2	65.5	86.9	64.4	57.9			
11:39	58.3	67.6	86.2	62.3	52.4			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

08 **Site #** M-39 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/28/2014

Start Time:

End Time:

Meter ID: 36 2592

Roadway:

Cars:

MT:

HT:

Monitored Leq: 54.9

SITE SKETCH:

North Arrow

Site Specifics

Employee ID: SDriscoll

Atmospheric Conditions : Partly Cloudy

Plan View

Cross-Section

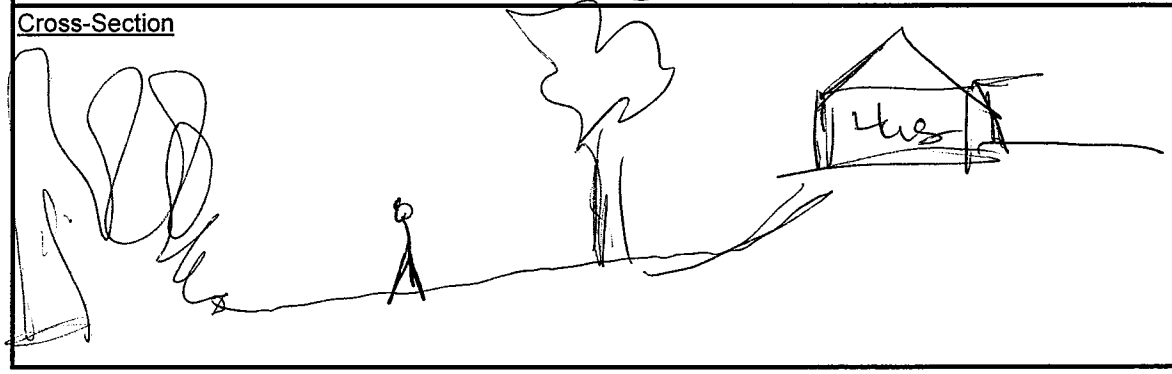
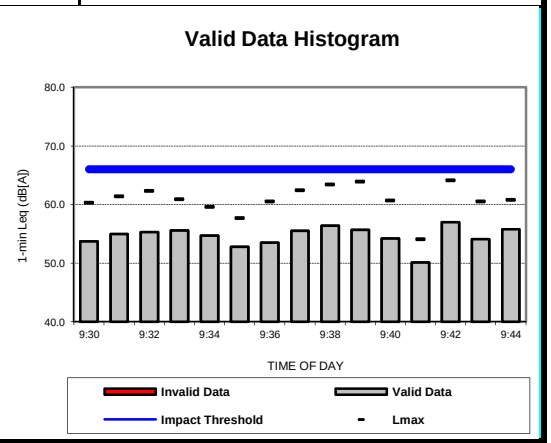


TABLE A.39 Receptor M-39 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS08: 2014-08-28 0930-0945 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
9:30	53.7	60.3	76.4	56.7	49.3	54.9	54.9	**55**
9:31	55.0	61.4	79.2	58.3	49.5			
9:32	55.3	62.3	84.8	59.8	50.0			
9:33	55.6	60.9	81.5	59.3	50.6			
9:34	54.7	59.6	80.1	57.1	50.0			
9:35	52.8	57.7	74.6	54.9	49.4	55.0		
9:36	53.5	60.5	77.0	55.9	49.9			
9:37	55.5	62.4	78.6	57.6	52.7			
9:38	56.4	63.4	82.6	59.7	51.9			
9:39	55.7	63.9	78.7	58.1	51.3			
9:40	54.2	60.7	79.6	58.5	49.2	54.8		
9:41	50.1	54.1	72.4	52.1	48.5			
9:42	57.0	64.1	83.9	60.8	50.3			
9:43	54.1	60.5	82.5	57.4	48.9			
9:44	55.8	60.8	81.8	58.7	51.8			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-40 **Description:** Single Family Residence

MONITORING INFORMATION

Notes: 150 Chili. Otts Rd.

Off Peak

Date: 8/28/14

Start Time:

End Time:

Meter ID: 862937

Roadway:

Cars:

MT:

HT:

Monitored Leq: 54.7

SITE SKETCH:

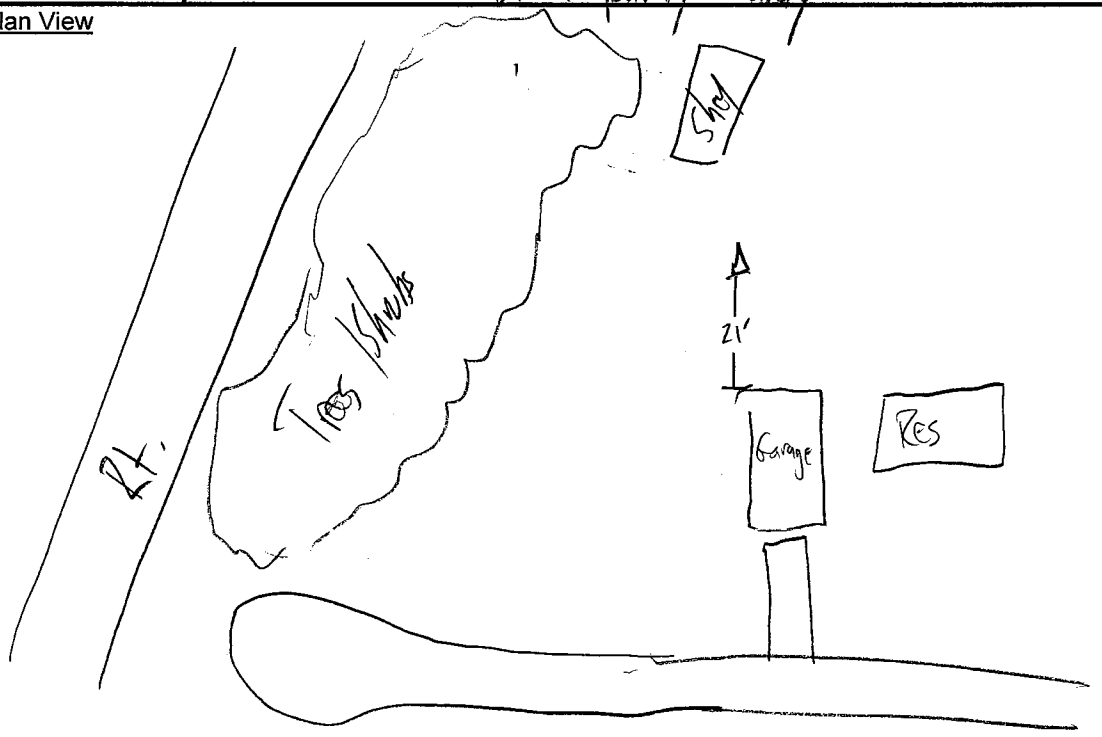
North Arrow

Site Specifics

Employee ID: BS

Atmospheric Conditions : Warm partly cloudy

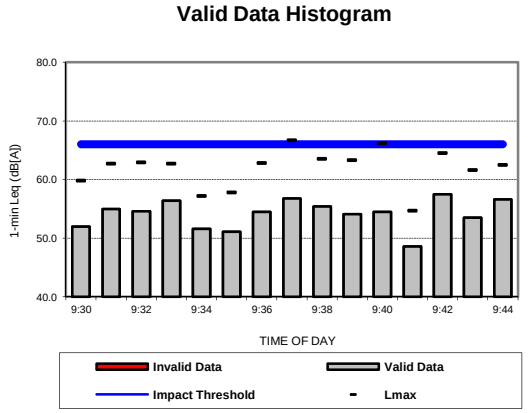
Plan View



Cross-Section

TABLE A.40 Receptor M-40 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS08: 2014-08-28 0930-0945 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
9:30	52.0	59.8	80.6	55.9	47.2	54.3	54.7	**55**
9:31	55.0	62.7	78.8	58.7	48.5			
9:32	54.6	62.9	84.9	60.0	46.4			
9:33	56.4	62.7	82.7	60.0	49.8			
9:34	51.6	57.2	74.9	54.6	46.3			
9:35	51.1	57.8	78.1	56.0	44.9	54.8		
9:36	54.5	62.8	79.1	56.7	50.0			
9:37	56.8	66.7	83.6	59.3	52.0			
9:38	55.4	63.5	82.6	59.3	49.6			
9:39	54.1	63.3	82.0	57.6	47.9			
9:40	54.5	66.2	81.6	57.5	46.2	55.0		
9:41	48.6	54.7	74.3	51.0	45.8			
9:42	57.5	64.5	81.0	60.6	52.7			
9:43	53.5	61.6	82.0	57.7	48.5			
9:44	56.6	62.5	84.2	60.0	48.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-41 Description: 70 Chilesghe gate

MONITORING INFORMATION

Notes: AU2_08_41

Off Peak

Date: Aug 28 2014

Start Time:

End Time:

Meter ID: 362590

Roadway: Chilesghegate

Cars:

MT:

HT:

Monitored Leq: 49.7

SITE SKETCH:

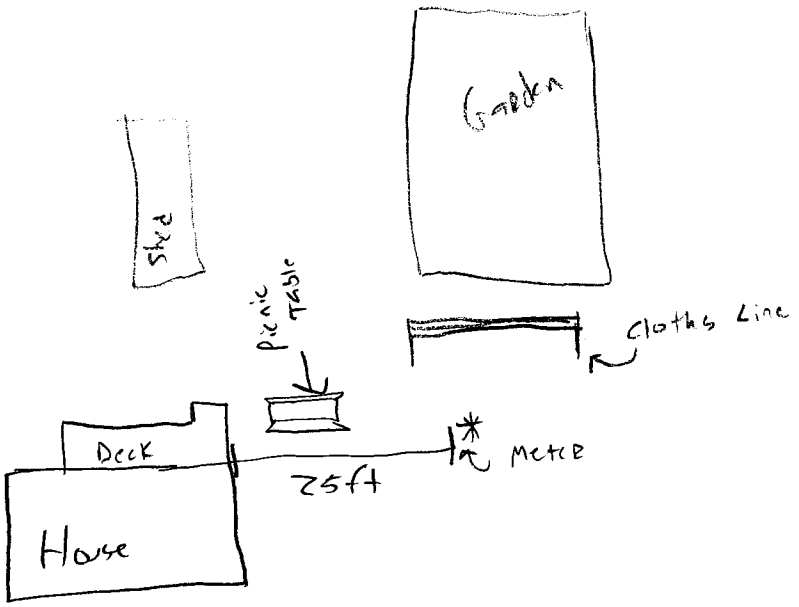
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

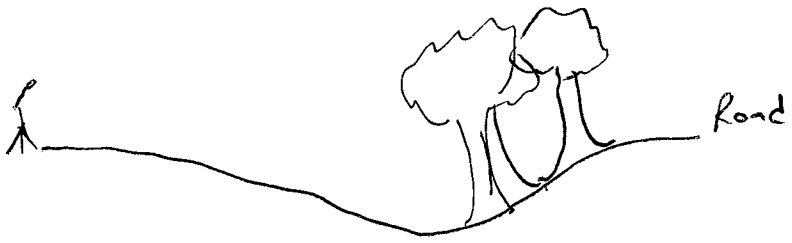
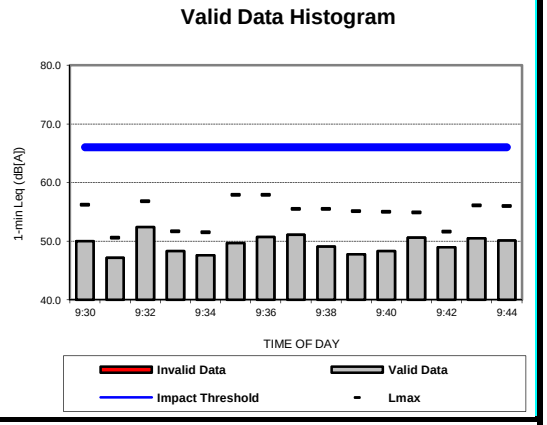


TABLE A.41 Receptor M-41 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS08: 2014-08-28 0930-0945 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
9:30	50.0	56.2	78.0	52.1	46.9	49.6	49.7	**50**
9:31	47.2	50.6	76.5	48.5	45.3			
9:32	52.4	56.8	80.1	53.8	50.3			
9:33	48.3	51.7	87.4	50.0	47.1			
9:34	47.6	51.5	73.1	48.2	46.7			
9:35	49.7	57.9	75.2	51.2	47.4	49.8		
9:36	50.7	57.9	76.1	52.7	48.1			
9:37	51.1	55.5	76.7	53.2	48.3			
9:38	49.1	55.5	87.3	51.3	47.2			
9:39	47.8	55.1	90.3	49.3	45.4			
9:40	48.3	55.0	79.0	50.6	46.2	49.8		
9:41	50.6	54.9	82.6	52.1	48.5			
9:42	49.0	51.6	75.9	50.5	47.7			
9:43	50.5	56.1	84.9	53.3	47.7			
9:44	50.1	56.0	75.9	52.3	47.2			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

08 **Site # M-** 42 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/28/2014
Start Time:
End Time:
Meter ID: 862938

Roadway:
Cars:
MT:
HT:
Monitored Leq: 41.2

SITE SKETCH:

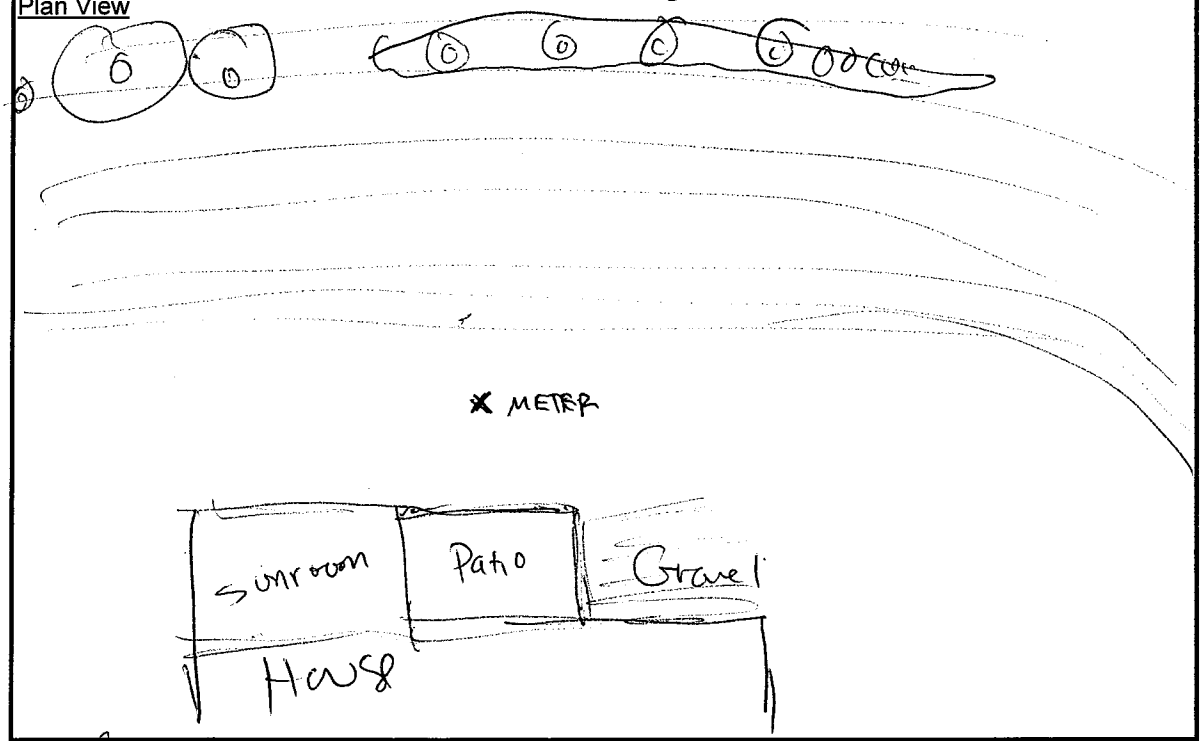
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions: Partly Cloudy

Plan View



Cross-Section

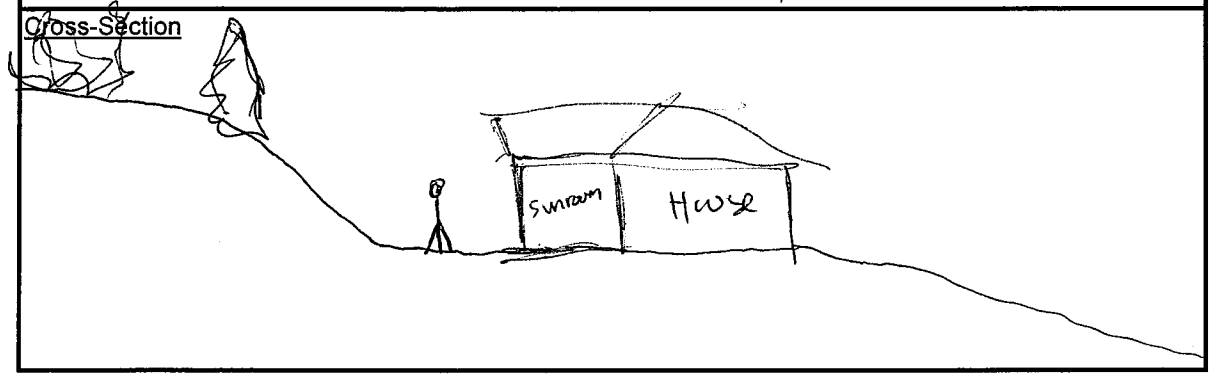
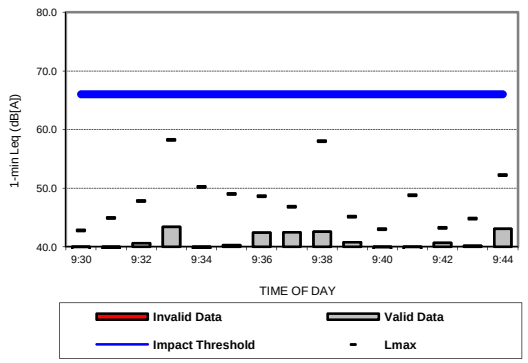


TABLE A.42 Receptor M-42 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS08: 2014-08-28 0930-0945 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
9:30	39.4	42.8	71.4	40.5	38.4	40.8	41.2	**41**
9:31	39.6	44.9	71.2	41.0	38.2			
9:32	40.6	47.8	73.9	42.2	38.6			
9:33	43.4	58.2	82.9	45.2	40.3			
9:34	39.8	50.2	69.1	40.2	38.4			
9:35	40.3	49.0	68.3	42.0	38.4	41.8		
9:36	42.4	48.6	70.8	43.4	41.3			
9:37	42.5	46.8	70.8	44.2	40.8			
9:38	42.6	58.0	82.3	44.0	40.7			
9:39	40.8	45.1	81.0	41.7	39.7			
9:40	39.5	43.0	82.0	40.5	38.0	40.8		
9:41	39.3	48.8	69.0	40.5	37.7			
9:42	40.7	43.2	72.4	41.7	39.3			
9:43	40.2	44.8	73.7	41.7	38.9			
9:44	43.1	52.2	71.9	46.0	40.2			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

10 Site # M-6A 43 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 5/28/2014

Start Time:

End Time:

Meter ID: 862937

Roadway:

Cars:

MT:

HT:

Monitored Leq: 57.9

SITE SKETCH:

North Arrow

Site Specifics

Employee ID: S Driscoll

Atmospheric Conditions : Partly Cloudy

Plan View

Cross-Section

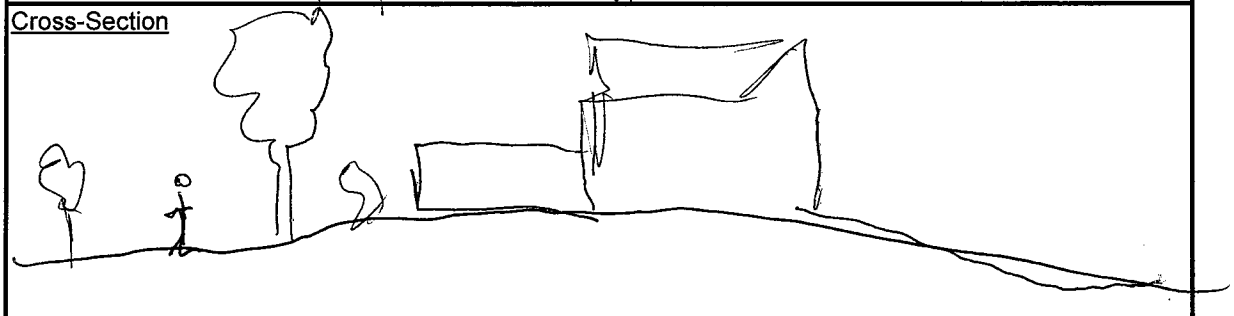
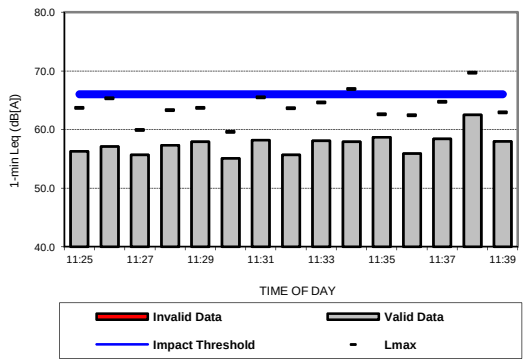


TABLE A.43 Receptor M-43 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS10: 2014-08-28 1125-1140 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
11:25	56.3	63.7	82.2	58.4	52.7	56.9	57.9	**58**
11:26	57.1	65.3	84.8	60.2	52.1			
11:27	55.7	59.9	80.3	57.5	53.2			
11:28	57.3	63.3	83.1	60.7	53.4			
11:29	57.9	63.7	85.5	61.0	53.6			
11:30	55.1	59.6	83.6	56.9	52.6	57.2		
11:31	58.2	65.5	89.8	61.6	52.7			
11:32	55.7	63.6	78.4	57.6	53.1			
11:33	58.1	64.6	82.0	61.5	54.8			
11:34	57.9	66.9	83.6	61.3	52.7			
11:35	58.7	62.6	85.0	60.7	55.4	59.3		
11:36	55.9	62.4	82.9	59.0	52.0			
11:37	58.4	64.7	85.9	61.1	54.2			
11:38	62.5	69.7	89.4	64.4	58.6			
11:39	58.0	62.9	82.5	60.8	52.2			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site 9 M- 44 **Description:** Sandhill Road

MONITORING INFORMATION

Notes: AU2_9_44

Off Peak

Date: Aug 28 2014

Start Time:

End Time:

Meter ID: 362592

Roadway: SR 147 SB

Cars: 52

MT: 5

HT: 12

Monitored Leq: 52.7

Bus 1

Mc 0

SITE SKETCH:

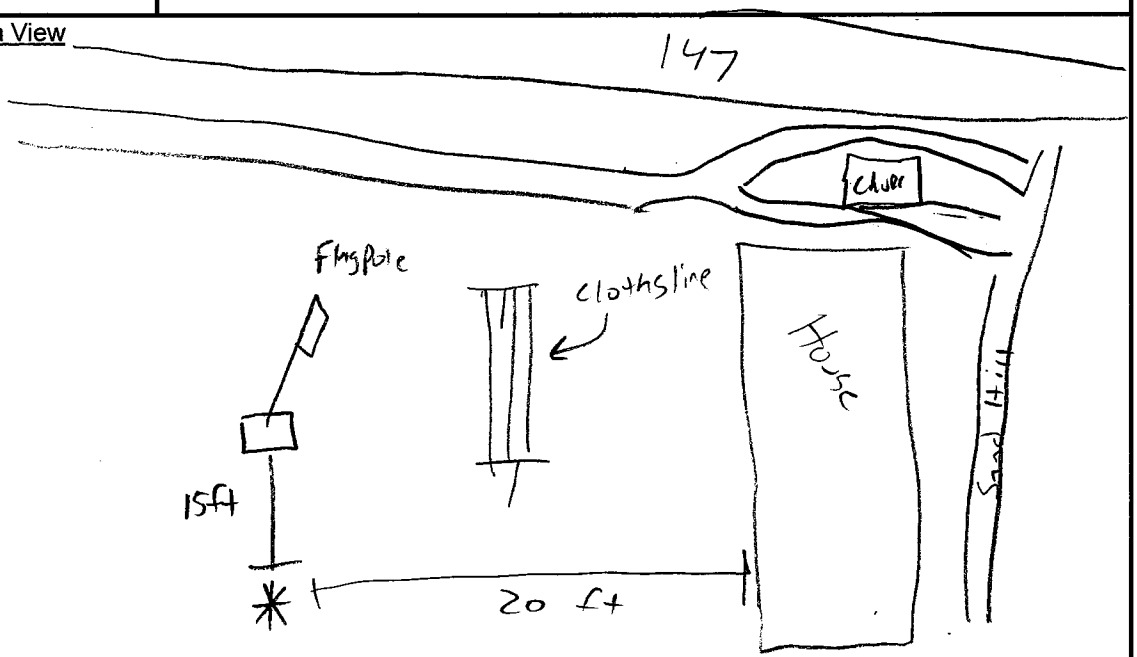
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

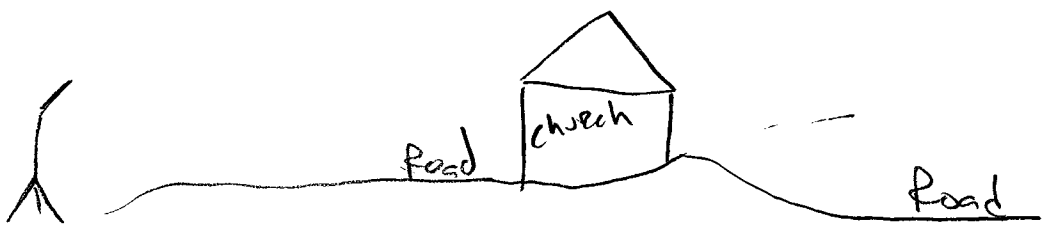
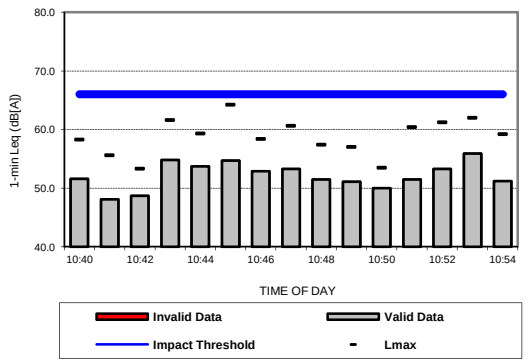


TABLE A.44 Receptor M-44 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS09: 2014-08-28 1040-1055 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:40	51.6	58.3	80.7	56.0	46.9	52.1	52.7	**53**
10:41	48.1	55.6	86.6	51.7	43.8			
10:42	48.7	53.3	84.7	50.9	41.7			
10:43	54.8	61.6	82.7	58.6	42.9			
10:44	53.7	59.3	83.1	56.6	47.5			
10:45	54.7	64.2	78.6	57.1	49.8	52.9		
10:46	52.9	58.4	79.9	55.3	49.0			
10:47	53.3	60.6	83.0	56.5	47.8			
10:48	51.5	57.4	82.1	54.2	45.3			
10:49	51.1	57.0	85.6	54.3	46.1			
10:50	50.0	53.5	87.2	51.3	47.7	52.9		
10:51	51.5	60.4	83.7	55.1	45.1			
10:52	53.3	61.2	84.1	57.2	45.1			
10:53	55.9	62.0	88.1	59.6	46.1			
10:54	51.2	59.2	82.4	54.3	46.8			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # 9 **M-** 45 **Description:** Single Family Residence

MONITORING INFORMATION

Notes: 231 Sand Hill Rd

Dog occasionally barked

Off Peak

Date: 8/28/14

Start Time:

End Time:

Meter ID: EC7937

Roadway: SR 147 NB

Cars: 82

MT: 5

HT: 25

Monitored Leq: 58.9

Moto: 0

Bus: 0

Sand Hill Rd:

A to: 2

SITE SKETCH:

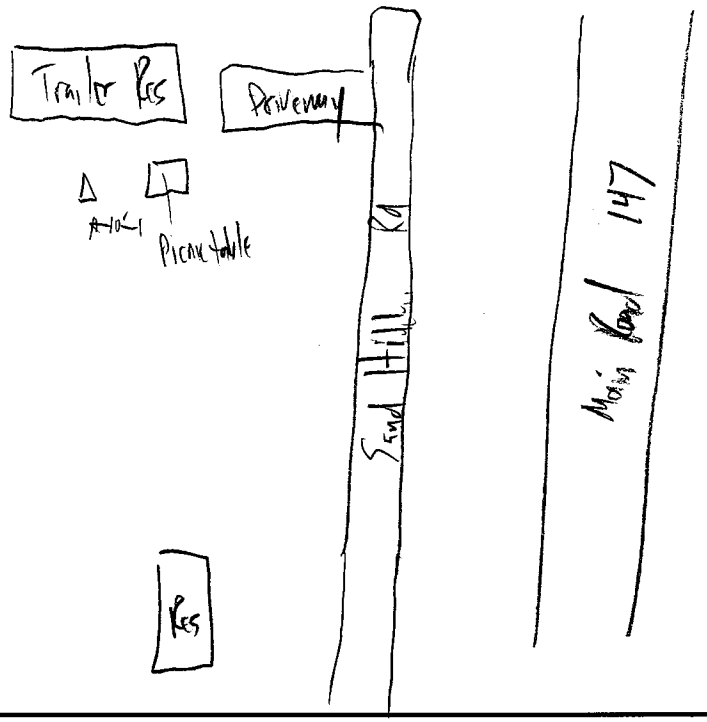
North Arrow

Site Specifics

Employee ID: BG

Atmospheric Conditions : Warm & Partly Cloudy

Plan View



Cross-Section

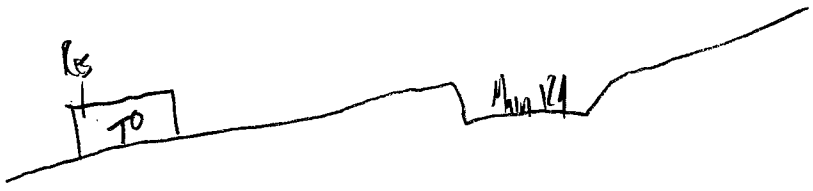
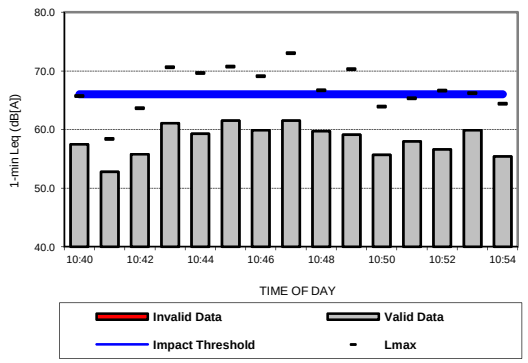


TABLE A.45 Receptor M-45 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS09: 2014-08-28 1040-1055 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:40	57.5	65.7	85.3	61.7	50.7	58.2	58.9	**59**
10:41	52.8	58.4	79.2	55.4	49.9			
10:42	55.8	63.6	83.7	59.2	49.8			
10:43	61.1	70.6	88.7	65.5	50.0			
10:44	59.3	69.6	88.7	63.2	49.4			
10:45	61.5	70.7	85.5	65.6	52.7	60.5		
10:46	59.9	69.1	87.2	64.2	51.3			
10:47	61.5	73.0	85.9	64.9	50.9			
10:48	59.7	66.7	87.1	64.0	52.0			
10:49	59.1	70.3	90.0	64.1	50.5			
10:50	55.7	63.9	82.3	58.9	50.6	57.5		
10:51	58.0	65.3	93.2	62.2	52.2			
10:52	56.6	66.6	85.8	60.8	49.2			
10:53	59.9	66.2	87.0	64.2	50.8			
10:54	55.4	64.4	81.1	58.7	50.1			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

oa **Site # M- 46** **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/28/14
Start Time:
End Time:
Meter ID: 862938

Roadway:
Cars:
MT:
HT:
Monitored Leq: 51.0

SITE SKETCH:

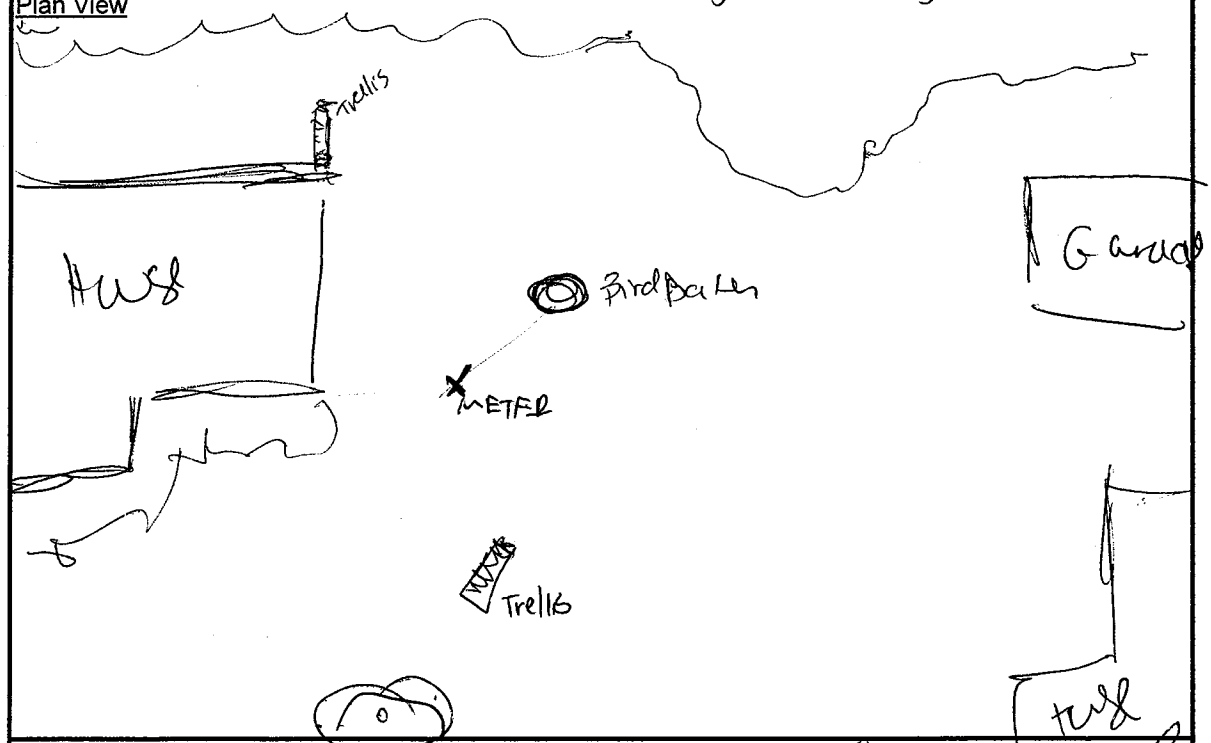
North Arrow

Site Specifics

Employee ID: B. Driscoll

Atmospheric Conditions : Partly Cloudy

Plan View



Cross-Section

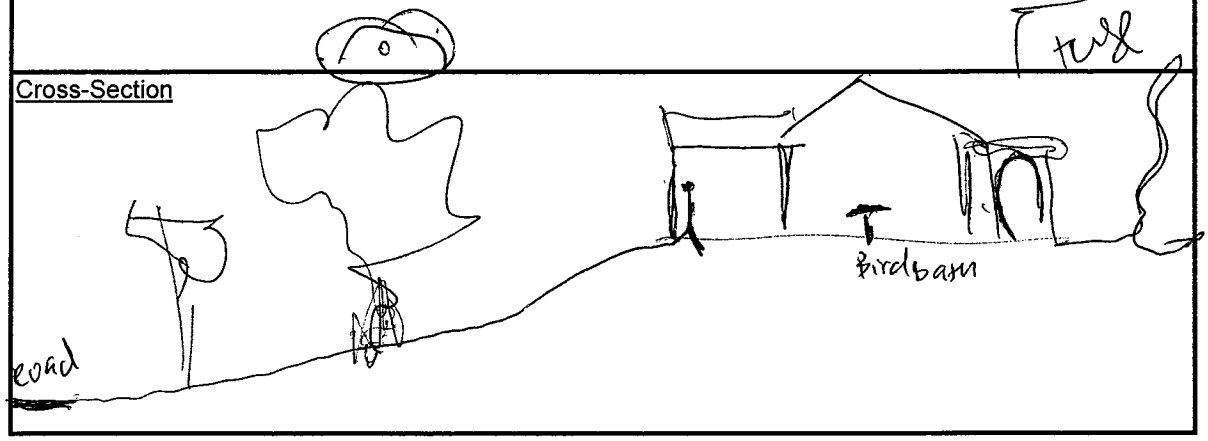
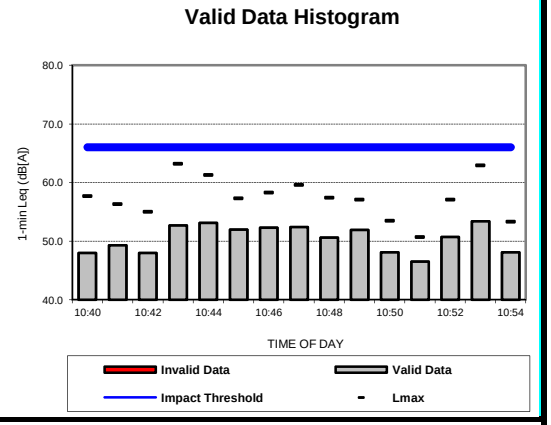


TABLE A.46 Receptor M-46 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS09: 2014-08-28 1040-1055 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:40	48.0	57.7	79.0	50.1	45.5	50.8	51.0	**51**
10:41	49.3	56.3	76.4	53.2	44.7			
10:42	48.0	55.0	78.7	50.8	44.3			
10:43	52.7	63.2	78.8	57.4	44.1			
10:44	53.1	61.3	81.3	56.2	48.0			
10:45	52.0	57.3	79.7	55.2	46.8	51.9		
10:46	52.3	58.3	79.7	55.4	46.2			
10:47	52.4	59.6	79.1	55.5	47.5			
10:48	50.6	57.4	81.8	54.1	46.3			
10:49	51.9	57.1	82.8	54.6	47.5			
10:50	48.1	53.5	76.5	50.8	45.4	50.1		
10:51	46.5	50.7	74.8	48.3	44.9			
10:52	50.7	57.1	82.6	53.3	46.8			
10:53	53.4	62.9	85.1	57.8	47.1			
10:54	48.1	53.3	73.2	50.4	45.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

09 **Site # M-** 47 **Description:**

MONITORING INFORMATION

Notes:

Off Peak

Date: 8/26/2014

Start Time:

End Time:

Meter ID: 362590

Roadway:

Cars:

MT:

HT:

Monitored Leq: 57.9

SITE SKETCH:

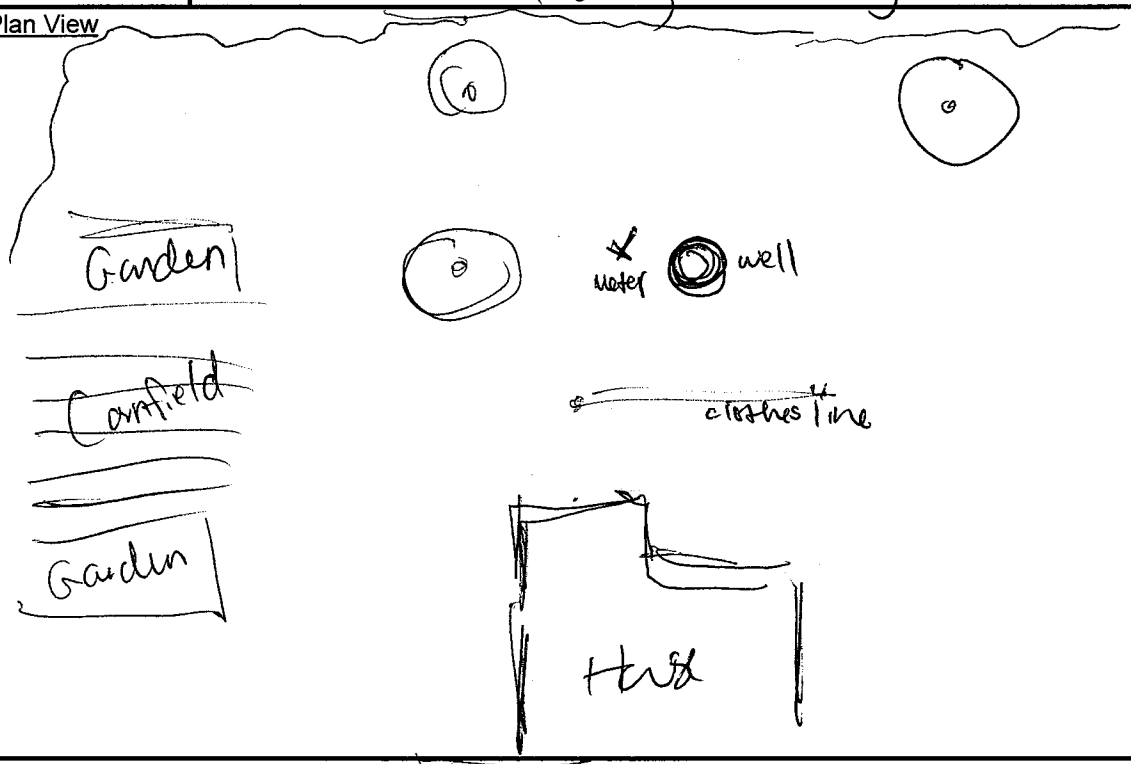
North Arrow

Site Specifics

Employee ID: S Driscoll

Atmospheric Conditions : Partly Cloudy

Plan View



Cross-Section

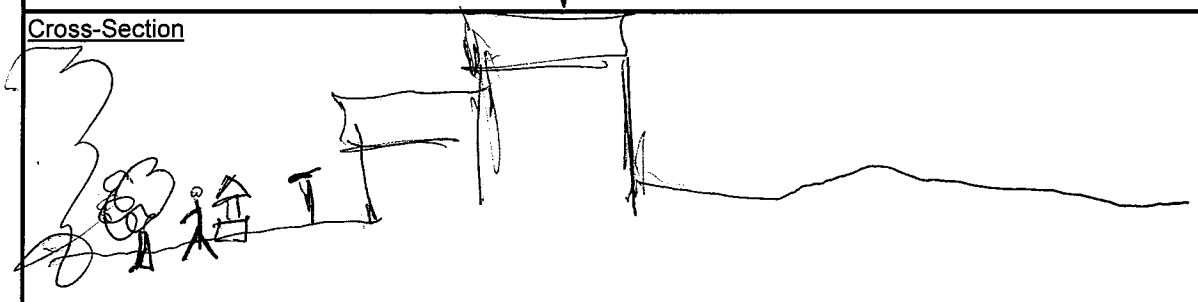
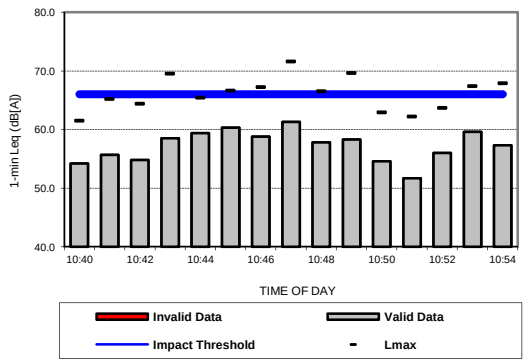


TABLE A.47 Receptor M-47 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS09: 2014-08-28 1040-1055 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
10:40	54.2	61.5	83.8	58.0	49.3	57.0	57.9	**58**
10:41	55.7	65.2	82.8	61.2	48.6			
10:42	54.8	64.4	89.7	57.8	48.3			
10:43	58.5	69.5	83.5	63.9	48.3			
10:44	59.4	65.4	87.9	63.2	52.4			
10:45	60.3	66.6	87.3	64.1	53.5	59.5		
10:46	58.8	67.2	85.3	61.9	53.2			
10:47	61.3	71.6	89.1	65.7	52.2			
10:48	57.8	66.5	92.1	63.5	50.0			
10:49	58.3	69.6	93.1	60.8	50.3			
10:50	54.6	62.9	85.1	58.2	49.3	56.6		
10:51	51.7	62.2	81.3	54.3	46.5			
10:52	56.0	63.7	86.5	59.8	50.4			
10:53	59.6	67.4	89.7	64.9	48.8			
10:54	57.3	67.9	85.1	61.6	48.3			

Valid Data Histogram



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M-48 **Description:**

MONITORING INFORMATION

Notes:
Lawnmower running next door pretty much entire time
Dog barking occasionally

Off Peak

Date: 8/26/2014
Start Time:
End Time:
Meter ID: 362590

Roadway: Park Rd
Cars: 11
MT:
HT:
Monitored Leq: 55.5

SITE SKETCH:

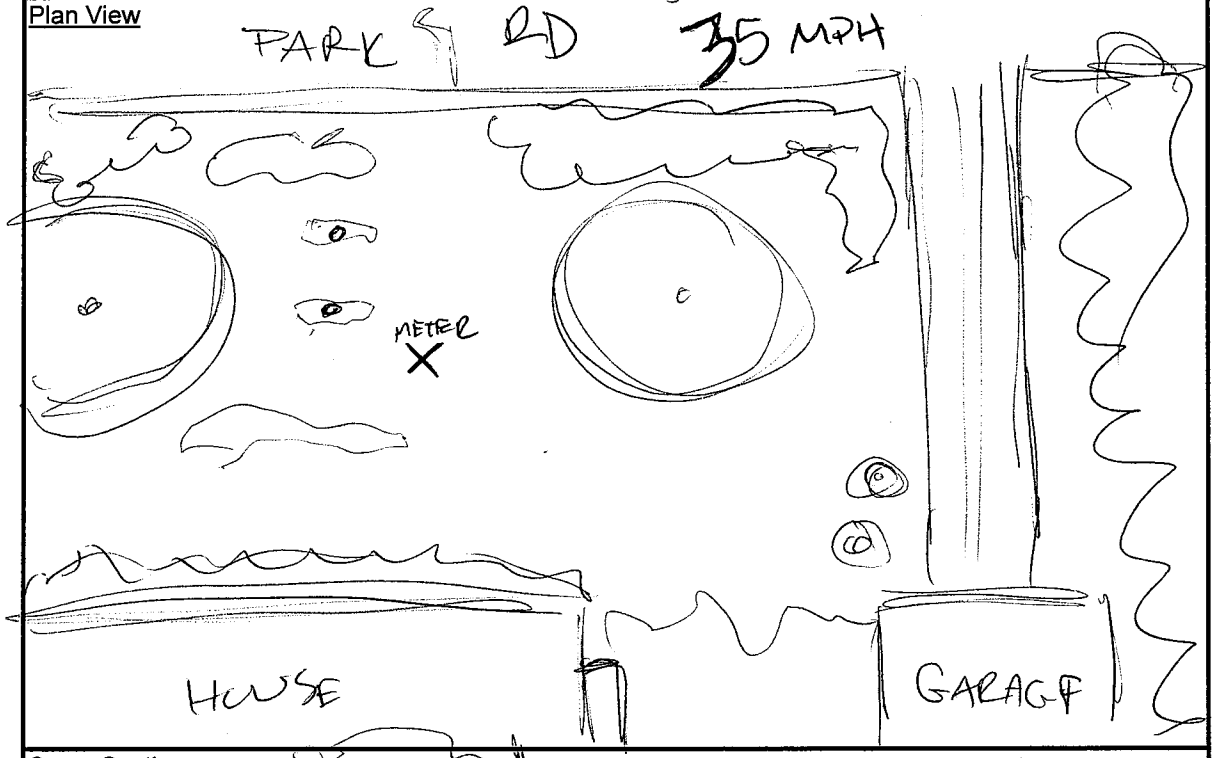
North Arrow

Site Specifics

Employee ID: S. Driscoll

Atmospheric Conditions : Sunny

Plan View



Cross-Section

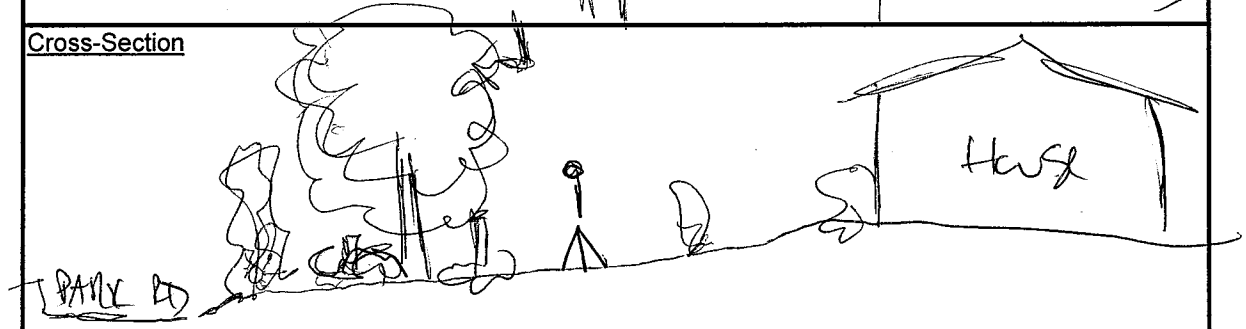
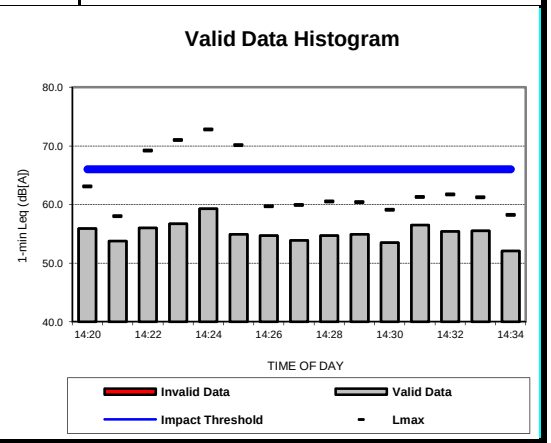


TABLE A.48 Receptor M-48 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS02: 2014-08-26 1420-1435 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
14:20	55.9	63.1	83.8	57.4	53.4	56.7	55.5	**56**
14:21	53.8	58.0	81.5	55.7	51.1			
14:22	56.0	69.2	83.7	58.8	50.1			
14:23	56.7	71.0	84.1	59.2	49.6			
14:24	59.3	72.8	88.8	63.3	53.4			
14:25	54.9	70.1	85.7	56.4	52.0	54.6		
14:26	54.7	59.7	84.1	57.0	51.6			
14:27	53.9	59.9	83.4	56.2	50.7			
14:28	54.7	60.5	84.3	57.3	50.3			
14:29	54.9	60.4	81.6	57.6	49.1			
14:30	53.5	59.1	82.3	56.2	49.1	54.9		
14:31	56.5	61.3	83.9	58.7	52.3			
14:32	55.4	61.7	84.2	58.9	49.3			
14:33	55.5	61.2	83.5	58.8	50.4			
14:34	52.1	58.2	81.7	55.3	47.7			



S.R. 0015, Section 088 - Central Susquehanna Valley Transportation Project

Short-term Noise Monitoring

Site # M- 49 **Description:** 3080 County Line Road

MONITORING INFORMATION

Notes: AUZ-02-49

Meter facing Park Rd

Mowing throughout study period → Behind & adjacent to house.

Car count on Back

Park Road is 40 MPH

Off Peak

Date: Aug 26 2014

Start Time: 2:20

End Time: 2:35

Meter ID: 362592

Roadway: Park

Cars:

MT:

HT:

Monitored Leq: 55.9

SITE SKETCH:

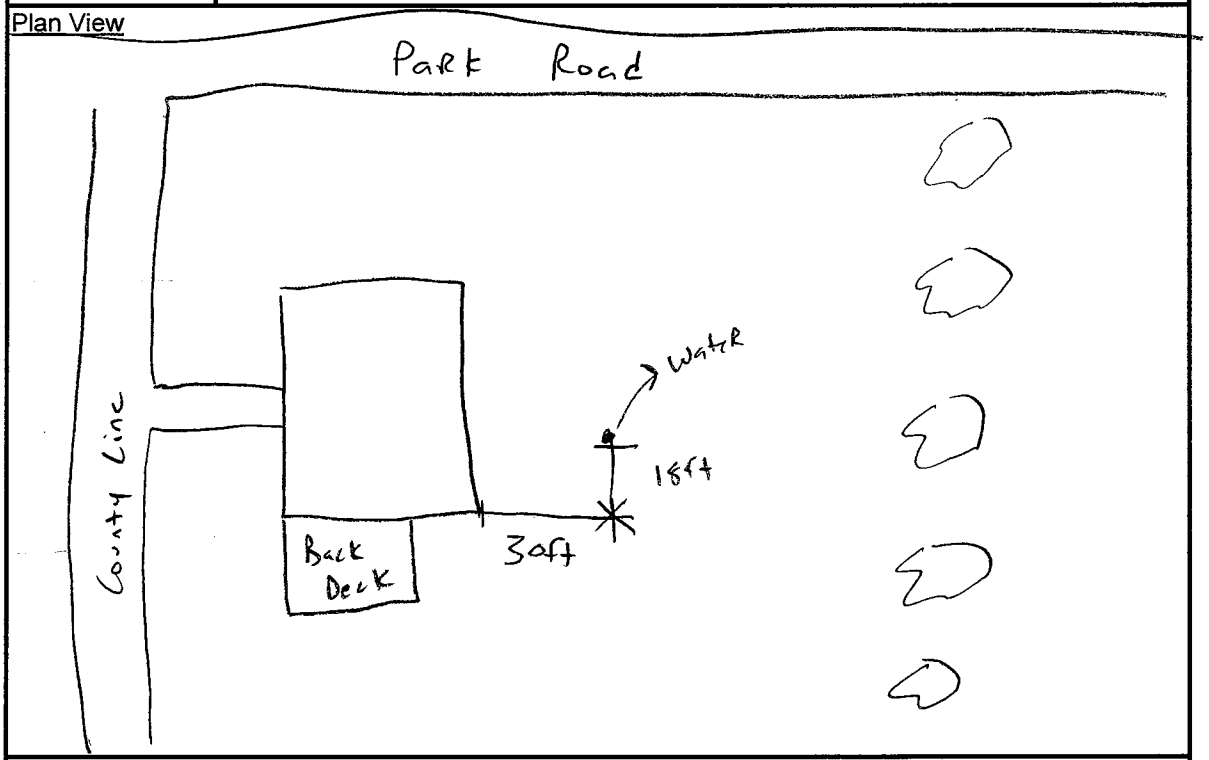
North Arrow

Site Specifics

Employee ID: MM

Atmospheric Conditions :

Plan View



Cross-Section

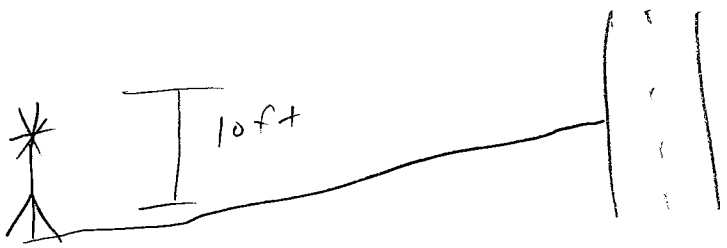
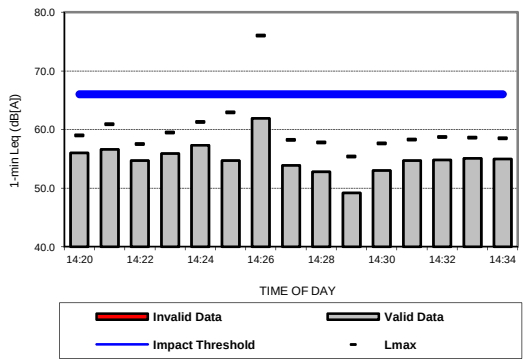


TABLE A.49 Receptor M-49 -- 15-Minute Equivalent Sound Level (15-min Leq) Calculation -- TMS02: 2014-08-26 1420-1435 Hrs.

Noise Measurement Data						Calculated Data		Traffic Volume Nosie Level
TIME	1-min Leq dB(A)	Lmax dB(A)	Lpk dB(C)	L(10.0) dB(A)	L(90.0) dB(A)	5-min Leq dB(A)	15-min Leq dB(A)	
14:20	56.0	59.0	84.6	57.1	55.0	56.2	55.9	**56**
14:21	56.6	60.9	83.9	58.7	54.0			
14:22	54.7	57.5	80.6	55.6	53.5			
14:23	55.9	59.5	83.1	57.7	53.8			
14:24	57.3	61.3	84.0	58.9	55.5			
14:25	54.7	62.9	87.0	56.4	51.6	56.7		
14:26	61.9	76.0	98.3	64.5	51.6			
14:27	53.9	58.2	82.3	55.8	50.8			
14:28	52.8	57.8	82.7	55.5	47.1			
14:29	49.2	55.4	77.3	51.5	45.2			
14:30	53.0	57.6	81.3	55.7	48.3	54.6		
14:31	54.7	58.3	82.0	56.3	52.2			
14:32	54.8	58.7	81.9	57.0	50.4			
14:33	55.1	58.6	84.4	56.7	50.5			
14:34	55.0	58.5	80.2	56.4	53.3			

Valid Data Histogram



Appendix B

Traffic Data

Winfield Interchange		2044 Peak Hr	2044 Peak Hr (HV)	2044 Class 1, 2, 3 ADT	2044 Class 4 - 13 ADT	2044 ADT	Per Classificatio											
							Bikes	Cars	2-Axle Long	Bus	2-Axle 6 Tire	3-Axle Single	4-Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	>6 Axle Mult	6 Axle Mult	>6 Axle Mult
							2.0%	69.3%	28.7%	8.11%	39.81%	6.79%	0.57%	13.77%	27.36%	0.57%	1.89%	0.57%	0.57%
South of Interchange	NB	2030	300	24366	4225	28592	476	16891	7000	343	1682	287	24	582	1156	24	80	24	24
	SB	2542	290	31718	4085	35803	619	21987	9112	331	1626	277	23	563	1118	23	77	23	23
	Total	4572	590	56085	8310	64394	1095	38879	16112	674	3308	564	47	1145	2273	47	157	47	47
North of Interchange	NB	1595	282	18493	3972	22465	361	12820	5313	322	1581	270	22	547	1087	22	75	22	22
	SB	1930	275	23310	3873	27183	455	16159	6696	314	1542	263	22	533	1060	22	73	22	22
	Total	3525	557	41803	7845	49648	816	28978	12009	636	3123	533	44	1081	2146	44	148	44	44
East of Interchange	EB	463	37	6000	521	6521	117	4159	1724	42	207	35	3	72	143	3	10	3	3
	WB	509	58	6352	817	7169	124	4403	1825	66	325	55	5	113	224	5	15	5	5
	Total	972	95	12352	1338	13690	241	8563	3548	109	533	91	8	184	366	8	25	8	8
West of Interchange	EB	1452	98	19070	1380	20451	372	13219	5478	112	549	94	8	190	378	8	26	8	8
	WB	1321	122	16887	1718	18606	330	11706	4851	139	684	117	10	237	470	10	32	10	10
	Total	2773	220	35958	3099	39056	702	24926	10330	251	1234	210	18	427	848	18	58	18	18
NB On-Ramp	EB	213	26	2634	366	3000	51	1826	757	30	146	25	2	50	100	2	7	2	2
	WB	22	12	141	169	310	3	98	41	14	67	11	1	23	46	1	3	1	1
	Total	235	38	2775	535	3310	54	1924	797	43	213	36	3	74	146	3	10	3	3
NB Off-Ramp	EB	22	4	254	56	310	5	176	73	5	22	4	0	8	15	0	1	0	0
	WB	648	52	8394	732	9127	164	5819	2411	59	291	50	4	101	200	4	14	4	4
	Total	670	56	8648	789	9437	169	5995	2484	64	314	54	4	109	216	4	15	4	4
SB On-ramp	EB	814	42	10873	592	11465	212	7537	3124	48	236	40	3	82	162	3	11	3	3
	WB	27	13	197	183	380	4	137	57	15	73	12	1	25	50	1	3	1	1
	Total	841	55	11070	775	11845	216	7674	3180	63	309	53	4	107	212	4	15	4	4
SB Off-ramp	WB	213	37	2479	521	3000	48	1718	712	42	207	35	3	72	143	3	10	3	3
	EB	16	3	183	42	225	4	127	53	3	17	3	0	6	11	0	1	0	0
	Total	229	40	2662	563	3225	52	1845	765	46	224	38	3	78	154	3	11	3	3

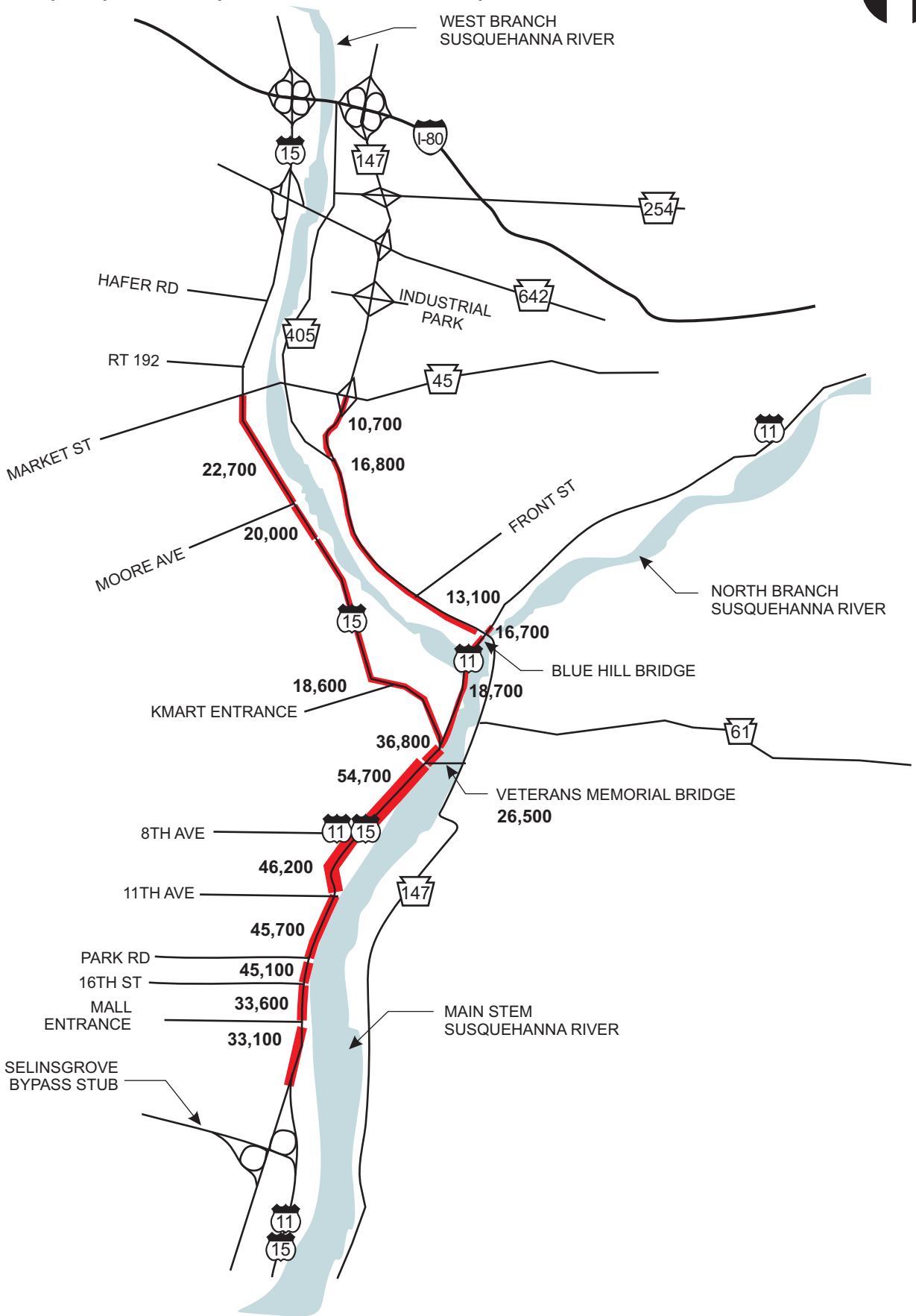
Ridge Interchange		2044 Peak Hr	2044 Peak Hr (HV)	2044 Class 1, 2, 3 ADT	2044 Class 4 - 13 ADT	2044 ADT	Per Classificatio											
							Bikes	Cars	2-Axle Long	Bus	2-Axle 6 Tire	3-Axle Single	4-Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	>6 Axle Mult	6 Axle Mult	>6 Axle Mult
							2.0%	69.3%	28.7%	8.11%	39.81%	6.79%	0.57%	13.77%	27.36%	0.57%	1.89%	0.57%	0.57%
South of Interchange	NB	1593	282	18465	3972	22437	360	12800	5305	322	1581	270	22	547	1087	22	75	22	22
	SB	1930	275	23310	3873	27183	455	16159	6696	314	1542	263	22	533	1060	22	73	22	22
	Total	3523	557	41775	7845	49620	815	28959	12001	636	3123	533	44	1081	2146	44	148	44	44
North of Interchange	NB	1586	360	17268	5070	22338	337	11970	4961	411	2018	344	29	698	1387	29	96	29	29
	SB	1718	239	20831	3366	24197	407	14440	5984	273	1340	229	19	464	921	19	64	19	19
	Total	3304	599	38099	8437	46535	744	26411	10945	685	3359	573	48	1162	2308	48	159	48	48
East of Interchange	EB	318	20	4197	282	4479	82	2909	1206	23	112	19	2	39	77	2	5	2	2
	WB	521	28	6944	394	7338	136	4814	1995	32	157	27	2	54	108	2	7	2	2
	Total	839	48	11141	676	11817	217	7723	3201	55	269	46	4	93	185	4	13	4	4
West of Interchange	EB	772	148	8789	2085	10873	172	6093	2525	169	830	142	12	287	570	12	39	12	12
	WB	770	42	10254	592	10845	200	7108	2946	48	236	40	3	82	162	3	11	3	3
	Total	1542	190	19042	2676	21718	372	13200	5470	217	1065	182	15	369	732	15	50	15	15
NB On-ramp		492	102	5493	1437	6930	107	3808	1578	117	572	98	8	198	393	8	27	8	8
NB Off-ramp		499	24	6690	338	7028	131	4638	1922	27	135	23	2	47	92	2	6	2	2
SB On-ramp	WB	458	17	6211	239	6451	121	4306	1784	19	95	16	1	33	65	1	5	1	1
	EB	285	53	3268	746	4014	64	2265	939	61	297	51	4	103	204	4	14	4	4
	Total	743	70	9479	985	10465	185	6571	2723	80	392	67	6	136	269	6	19	6	6
SB Off-ramp		531	34	7000	479	7479	137	4852	2011	39	191	33	3	66	131	3	9	3	3

** NOTE: Peak hour truck volumes based on percentages previously made during 2003 FEIS Report*
K-factor of 7.1% was used in previous 2003 FEIS Report
Truck classification percentages used is the average of 2014 ATR data

Existing Conditions Year 2014 Total Average Daily Traffic Volumes

Central Susquehanna Valley Transportation Project

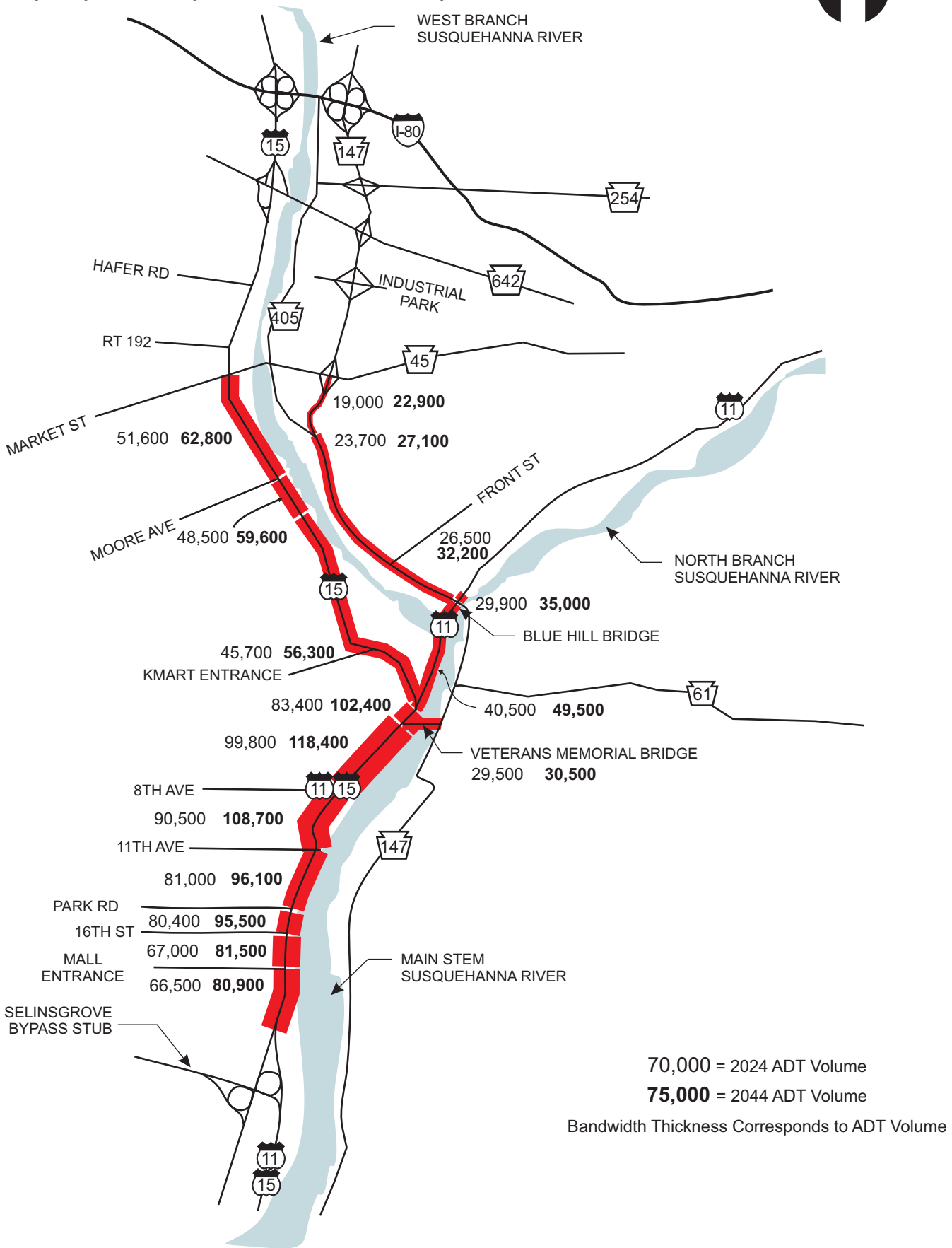
Union County, Snyder County, Northumberland County, PA



2024 and 2044 No-Build Alternative Total Average Daily Traffic Volumes

Central Susquehanna Valley Transportation Project

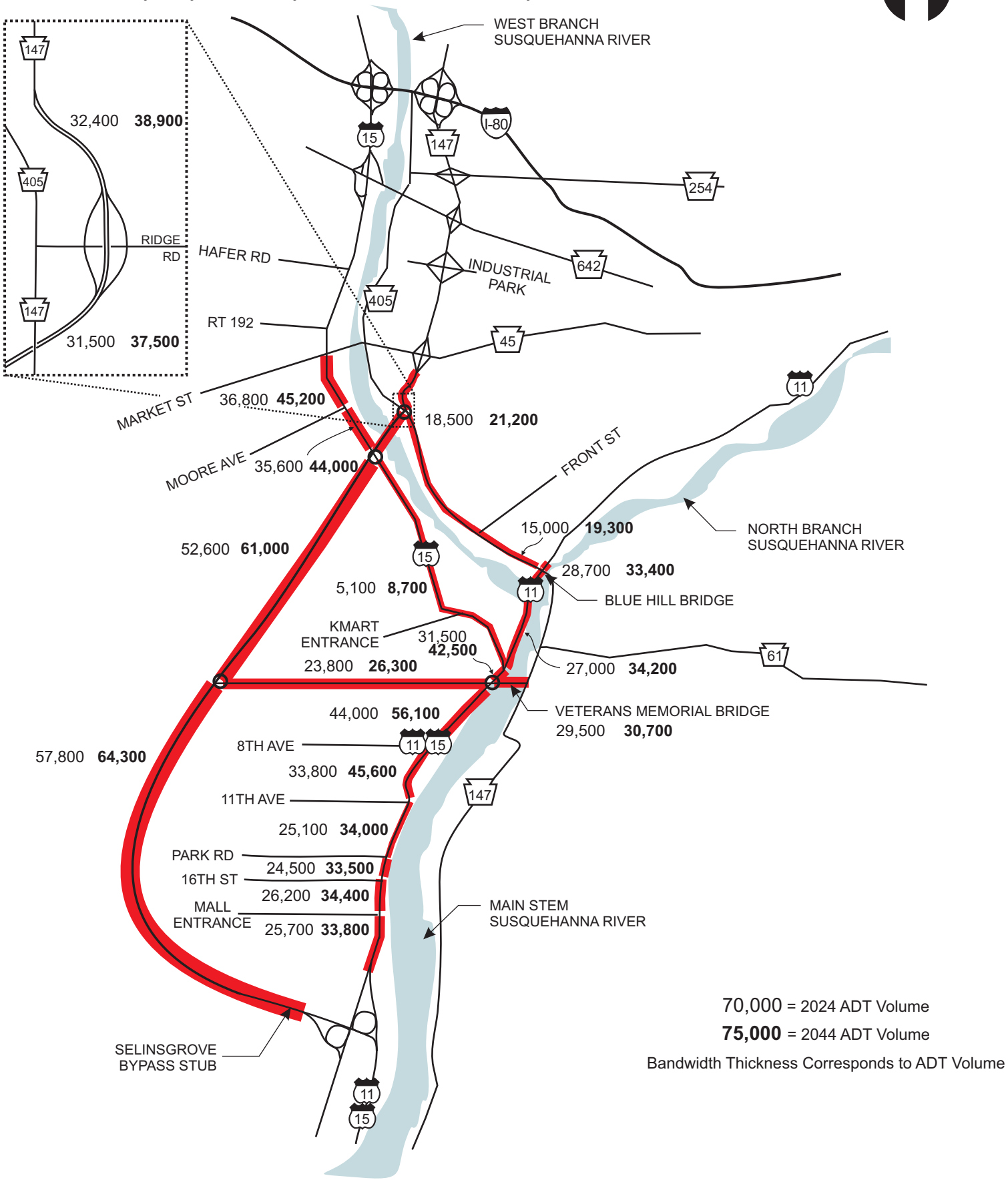
Union County, Snyder County, Northumberland County, PA



2024 and 2044 DAM-RC5 Total Average Daily Traffic Volumes

Central Susquehanna Valley Transportation Project

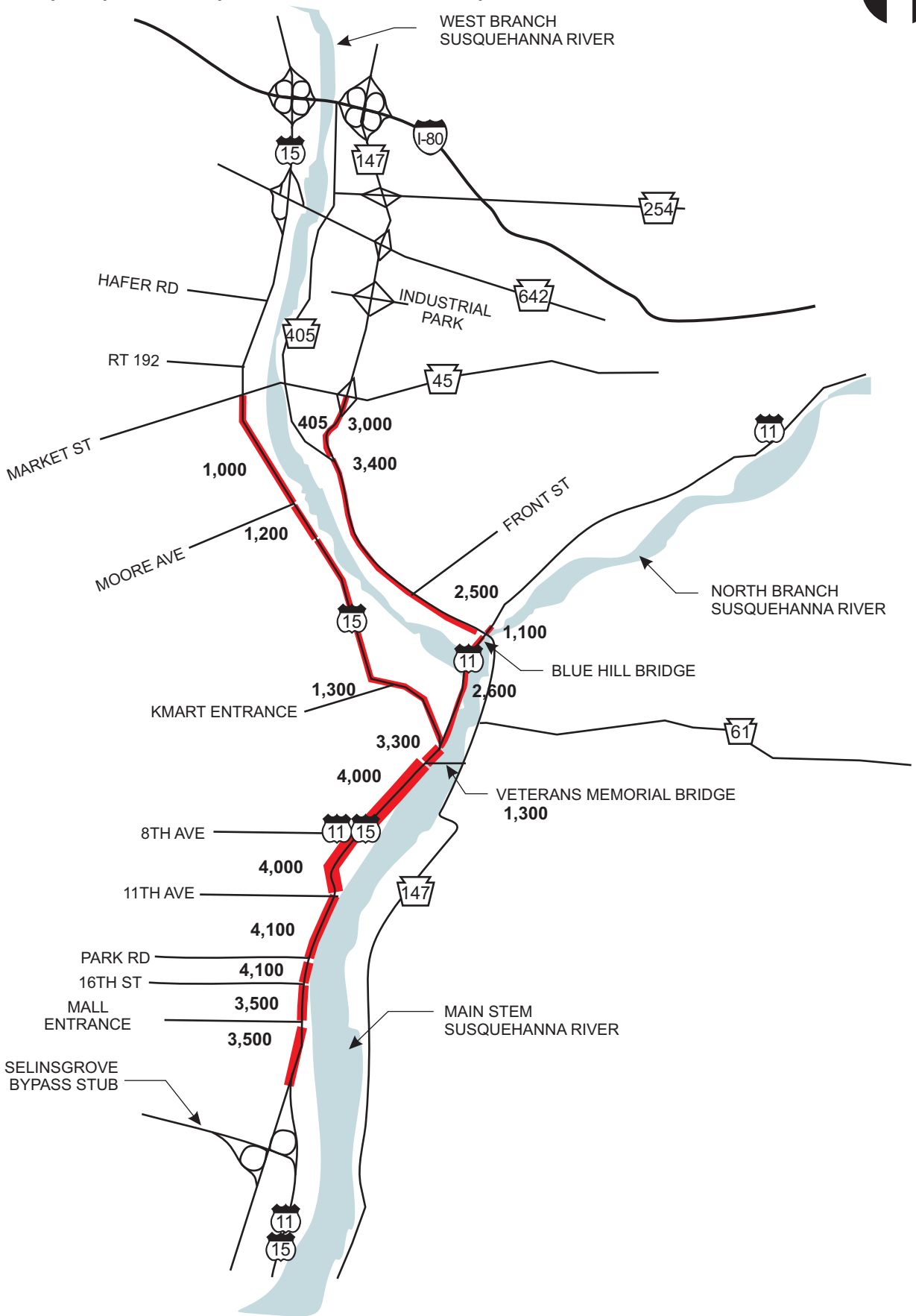
Union County, Snyder County, Northumberland County, PA



Existing Conditions Year 2014 Total Average Daily Truck Volumes

Central Susquehanna Valley Transportation Project

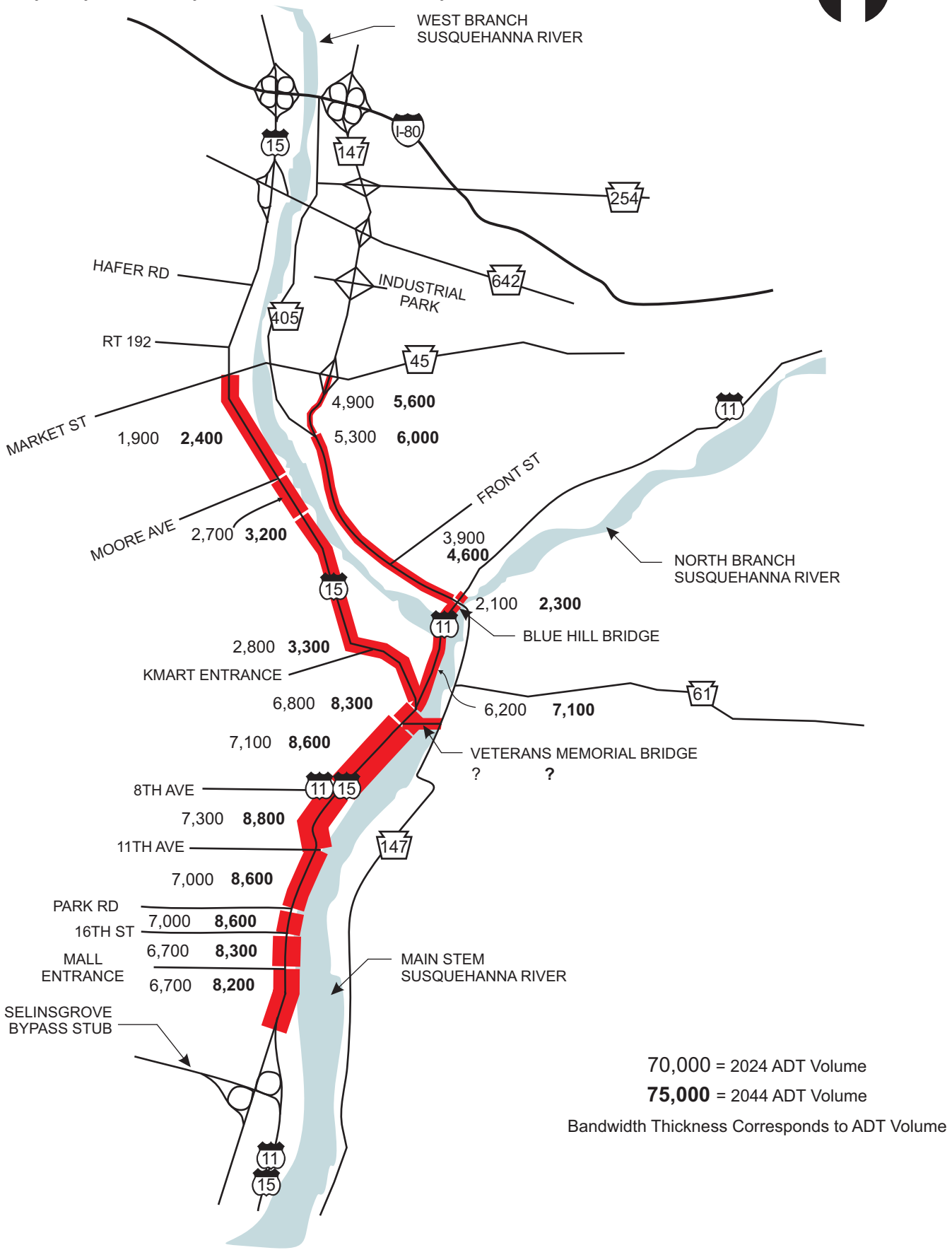
Union County, Snyder County, Northumberland County, PA



2024 and 2044 No-Build Alternative Total Average Daily Truck Volumes

Central Susquehanna Valley Transportation Project

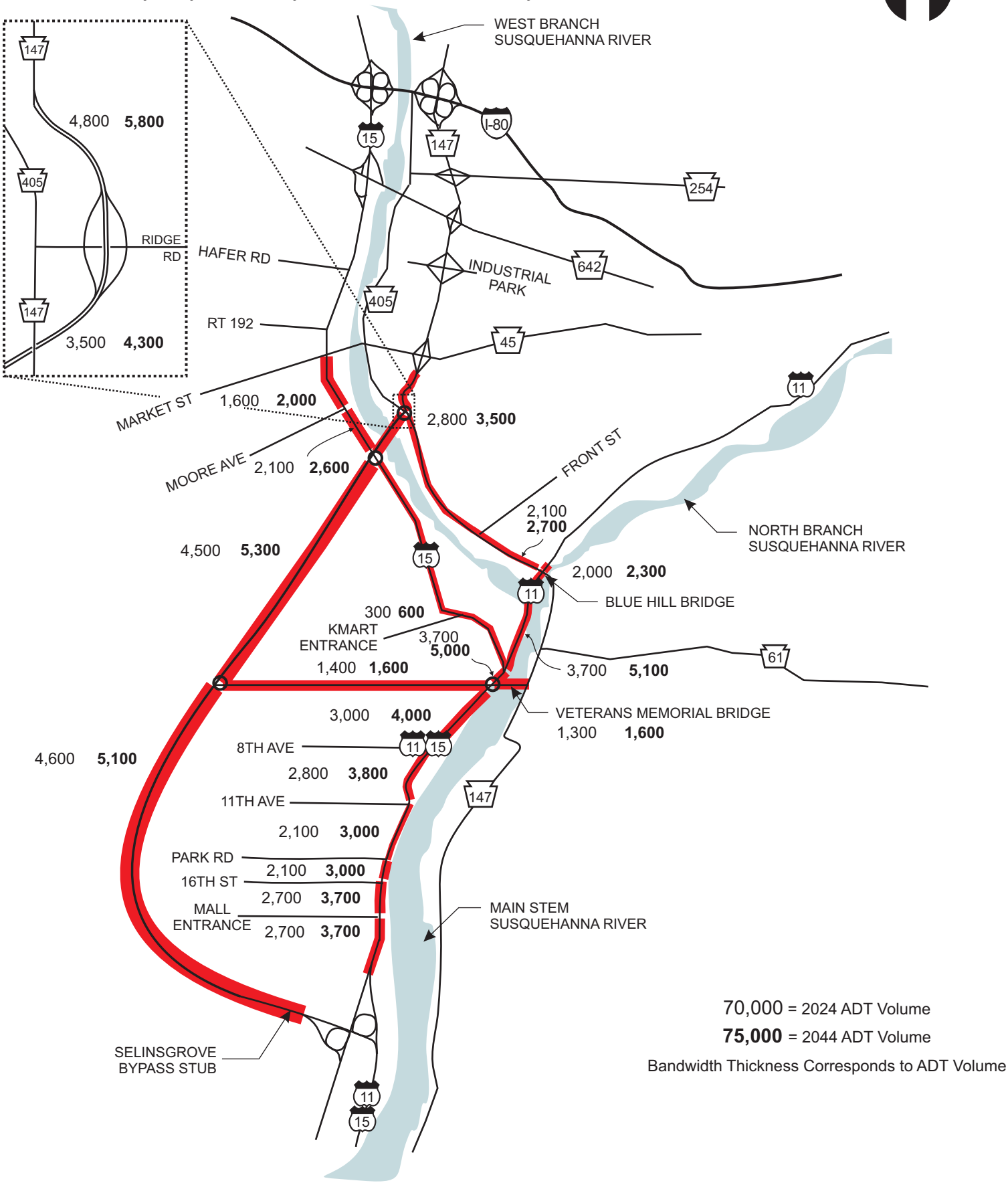
Union County, Snyder County, Northumberland County, PA



2024 and 2044 DAM-RC5 Total Average Daily Truck Volumes

Central Susquehanna Valley Transportation Project

Union County, Snyder County, Northumberland County, PA



70,000 = 2024 ADT Volume

75,000 = 2044 ADT Volume

Bandwidth Thickness Corresponds to ADT Volume

RMSRM466 ROADWAY MANAGEMENT INFORMATION SYSTEM 04/11/2014 10:35:18
LTERM: NBAUER CURRENT TRAFFIC COUNT DATA (DIRECTIONAL)

COUNTY...: 54 SNYDER | | COUNT - KEY.: 54/0015/0071/0050
STATE ROUTE: 0015 | BASE YR: 2011 | - DATE.....: 11/17/2011
SEGMENT....: 0011 |_____| - TYPE.....: MACHINE
OFFSET.....: 0000 - REF. NO...: 2011362
FT: 351 MI: 0.066

	BASE YEAR	CURRENT ESTIMATE	% OF TOTAL
TOTAL VEHICLES (ADT):	8732	8474	------
TOTAL TRUCKS (ADTT).:	803	779	------
3 AXLE W/TRL.....:	64	62	8.0
3 AXLE-MULTI AXLTRL:	353	343	44.0
6 AXLE-SINGLE TRL..:	9	9	1.1
5 AXLE-MULTI TRL...:	29	28	3.6
6 AXLE-MULTI TRL...:	6	6	0.7
7 AXLE-MULTI TRL...:	4	4	0.5
WEEKDAY TRUCKS.....:	1028	997	
18K ESAL - RIGID....:	983	1203	
- FLEXIBLE.:	679	817	

DIRECTION.....: SOUTH
DURATION (HOURS)..: 24
PERCENT TRUCKS....: 09
TRAF PATTERN GROUP: 03
DAILY - TOTAL VMT.: 559
- TRUCK VMT.: 51

----DESIGN HR VOL FACTORS-----
K: 8 D: 55 T: 7

-----TRAFFIC COUNT LIMITS-----

	CO	-SR-	SEG.	OFF.
FROM:	54	0015	0011	0000
TO..:	59	0015	0061	0570

--------PARALLEL LIMITS-------

FROM:	54	0015	0010	0000
TO..:	59	0015	0060	0570

ACTION: I (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF10 TO DISPLAY PREVIOUS CLASSES

RMSRM466 ROADWAY MANAGEMENT INFORMATION SYSTEM 04/11/2014 10:34:03
LTERM: NBAUER CURRENT TRAFFIC COUNT DATA (DIRECTIONAL)

COUNTY...: 54 SNYDER | | COUNT - KEY.: 54/0015/0071/0050
STATE ROUTE: 0015 | BASE YR: 2011 | - DATE.....: 11/17/2011
SEGMENT....: 0011 |_____| - TYPE.....: MACHINE
OFFSET.....: 0000 - REF. NO...: 2011362
FT: 351 MI: 0.066

	BASE YEAR	CURRENT ESTIMATE	% OF TOTAL
TOTAL VEHICLES (ADT):	8732	8474	------
TOTAL TRUCKS (ADTT).:	803	779	------
MOTORCYCLE.....:	0	0	0.0
CAR.....:	6532	6339	75.0
PICKUP/VAN.....:	1397	1356	16.0
----------	-----	-----	----
BUS.....:	80	78	10.0
2 AXLE-SIX TIRE....:	186	179	24.0
3 AXLE-SINGLE UNIT.:	48	46	6.0
4 AXLE-SINGLE-UNIT.:	24	24	3.0
WEEKDAY TRUCKS.....:	1028	997	
18K ESAL - RIGID....:	983	1203	
- FLEXIBLE.:	679	817	

DIRECTION.....: SOUTH
DURATION (HOURS)..: 24
PERCENT TRUCKS....: 09
TRAF PATTERN GROUP: 03
DAILY - TOTAL VMT.: 559
- TRUCK VMT.: 51

----DESIGN HR VOL FACTORS-----
K: 8 D: 55 T: 7

-----TRAFFIC COUNT LIMITS-----

	CO	-SR-	SEG.	OFF.
FROM:	54	0015	0011	0000
TO..:	59	0015	0061	0570

--------PARALLEL LIMITS-------

FROM:	54	0015	0010	0000
TO..:	59	0015	0060	0570

ACTION: I (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF11 TO DISPLAY MORE TRUCK CLASSES

RMSRM466 ROADWAY MANAGEMENT INFORMATION SYSTEM 11/10/2014 10:20:55

LTERM: NBAUER CURRENT TRAFFIC COUNT DATA (DIRECTIONAL)

COUNTY...: 49 NORTHUMBERLAND | | COUNT - KEY.: 49/0147/0620/1500

STATE ROUTE: 0147 | BASE YR: 2013 | - DATE.....: 08/14/2013

SEGMENT....: 0620 | | - TYPE.....: AXLE VOL

OFFSET.....: 0000 BASE CURRENT % OF | - REF. NO...: 2013249

FT: 2772 MI: 0.525 YEAR ESTIMATE TOTAL | DIRECTION.....: BOTH

TOTAL VEHICLES (ADT):	14905	14905	------
TOTAL TRUCKS (ADTT).:	3279	3279	------
MOTORCYCLE.....:	149	149	1.0
CAR.....:	8496	8496	57.0
PICKUP/VAN.....:	2981	2981	20.0
----------	-----	-----	----
BUS.....:	328	328	10.0
2 AXLE-SIX TIRE....:	540	540	15.0
3 AXLE-SINGLE UNIT.:	197	197	6.0
4 AXLE-SINGLE-UNIT.:	33	33	1.0
WEEKDAY TRUCKS.....:	4197	4197	
18K ESAL - RIGID....:	3878	3878	
- FLEXIBLE.:	2559	2559	

DURATION (HOURS)..: 24			
PERCENT TRUCKS....: 22			
TRAF PATTERN GROUP: 03			
DAILY - TOTAL VMT.: 7825			
- TRUCK VMT.: 1721			
----DESIGN HR VOL FACTORS-----			
K: 10 D: 55 T: 11			
-----TRAFFIC COUNT LIMITS-----			
	CO	-SR-	SEG. OFF.
FROM:	49	0147	0604 1987
TO..:	49	0147	0690 0000

ACTION: I (A B E F G H I J L Q R S V W X Y)

MESSAGES: PRESS PF11 TO DISPLAY MORE TRUCK CLASSES

RMSRM641 ROADWAY MANAGEMENT INFORMATION SYSTEM 11/10/2014 10:22:52
LTERM: NBAUER AXLE TRAFFIC HEADER INFORMATION

COUNTY NO / NAME: 49 / NORTHUMBERLAND SR 0147

DIRECTION - BOTH
SEGMENT/OFFSET - 0620 / 1500 /
DATE OF COUNT - 08 / 14 / 2013 / /
HOUR RANGE - 00 / 24 /
SPEED LIMIT - 55
LOCATION START - EIGHTH
LOCATION END - SR 0011
MUNICIPALITY - POINT
TRAFFIC ROUTE - PA147
WEATHER - FAIR
HPMS SECT. NO - / /
COUNTER NOS. - 8751 / 0000 / 0000 / /
SET BY/ENTERED - VC / PJF /
SET UP DATE - 08 / 14 / 2013 / /
RETRIEVAL DATE - 08 / 14 / 2013 / /
COMMENTS - SN27204100 FEET SOUTH OF OAK D

PREDOMINENT
BOTH DIRECTION
LENGTH..: 2772
SURFACE.: 61
LANES...: 02
DIRECTION
LENGTH..:
SURFACE.:
LANES...:

DATA ENTRY/UPDATE
USERID: BRANLEA
DATE: 09/06/2013

ACTION: I (A D E G H I J Q R S U X Y)
MESSAGES:

RMSRM648 ROADWAY MANAGEMENT INFORMATION SYSTEM 11/10/2014 10:23:17
LTERM: NBAUER AXLE SENSOR TRAFFIC COUNT SUMMARY
DIRECTION: N/E
COUNTY: 49 SR: 0147 SEGMENT: 0620 OFFSET: 1500 COUNT DATE: 08 / 14 / 2013
DIRECTION:
COUNTY: SR: SEGMENT: OFFSET: COUNT DATE: / /

	HOURS											
DIR	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
N/E	287	209	160	205	338	623	788	1048	1106	1029	1050	1085
	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	287	209	160	205	338	623	788	1048	1106	1029	1050	1085

	HOURS											
DIR	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
N/E	1078	1072	1221	1268	1223	1224	930	766	758	617	463	306
	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1078	1072	1221	1268	1223	1224	930	766	758	617	463	306

DIR	DIR FACTOR	MON.	TUES.	WED.	THURS.	FRI.	SAT.	SUN.	TOTAL
N/E	100	0	0	18854	0	0	0	0	18854
	0	0	0	0	0	0	0	0	0
TOTAL	100	0	0	18854	0	0	0	0	18854

R - RAW COUNT READY FOR CENTRAL OFFICE REVIEW

ACTION: I (A E G H I J Q R S T U X)
MESSAGES:

RMSRM647 ROADWAY MANAGEMENT INFORMATION SYSTEM 11/10/2014 10:23:10
LTERM: NBAUER AXLE SENSOR TRAFFIC WEEKEND COUNT
DIRECTION: N/E
COUNTY: 49 SR: 0147 SEGMENT: 0620 OFFSET: 1500 COUNT DATE: 08 / 14 / 2013

HOURS:	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
DATE:												
/												
SAT												
/												
SUN												
HOURLY	287	209	160	205	338	623	788	1048	1106	1029	1050	1085
TOTALS	1078	1072	1221	1268	1223	1224	930	766	758	617	463	306

DAILY TOTALS	MON.	TUES.	WED.	THURS.	FRI.	SAT.	SUN.	WEEKLY TOTAL
	0	0	18854	0	0	0	0	18854

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM646 ROADWAY MANAGEMENT INFORMATION SYSTEM 11/10/2014 10:23:03
LTERM: NBAUER AXLE SENSOR TRAFFIC WEEKDAY COUNT

DIRECTION: N/E

COUNTY: 49 SR: 0147 SEGMENT: 0620 OFFSET: 1500 COUNT DATE: 08 / 14 / 2013

HOURS:	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
DATE:												
/												
MON												
/												
TUES												
08 / 14	287	209	160	205	338	623	788	1048	1106	1029	1050	1085
WED	1078	1072	1221	1268	1223	1224	930	766	758	617	463	306
/												
THUR												
/												
FRI												

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:56:34
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 1 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	1	2	3	4	5	6	7	8	9	10
01	0	15	6	1	4	5	0	0	21	0
02	0	16	10	3	2	4	0	0	21	0
03	0	12	7	4	0	3	0	0	19	0
04	0	13	11	0	7	2	0	2	11	0
05	0	24	19	8	8	2	0	2	26	0
06	2	80	31	5	6	2	0	6	24	0
07	2	134	59	4	7	9	0	10	40	0
08	2	204	72	8	15	7	1	6	52	0
09	4	222	103	15	27	9	2	10	43	0
10	4	170	76	14	20	8	1	8	43	0
11	3	191	96	13	20	14	0	5	55	2
12	5	201	79	20	19	5	2	12	59	0
01-12	22	1282	569	95	135	70	6	61	414	2
01-12	22	1282	569	95	135	70	6	61	414	2

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:56:52
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL
COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 1 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS:	11	12	13	TOTAL
HOUR				
01	0	0	0	52
02	0	0	0	56
03	0	0	0	45
04	0	0	0	46
05	0	0	0	89
06	0	0	0	156
07	0	0	0	265
08	0	0	0	367
09	0	1	0	436
10	0	0	0	344
11	0	0	0	399
12	0	0	0	402
01-12	0	1	0	2657
01-12	0	1	0	2657

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:56:59
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 1 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	1	2	3	4	5	6	7	8	9	10
13	5	212	82	13	25	10	0	14	72	0
14	4	210	72	9	16	8	2	9	55	0
15	8	239	99	12	23	5	0	7	61	1
16	8	298	115	9	29	7	1	14	56	0
17	5	272	74	11	13	3	0	8	60	0
18	7	288	108	8	15	13	0	7	63	0
19	3	192	61	4	13	1	0	6	42	0
20	4	166	58	7	3	2	0	4	51	0
21	4	146	58	6	6	7	0	5	38	0
22	0	104	28	9	0	1	0	1	39	0
23	2	80	17	5	4	1	0	3	34	1
24	0	46	12	5	3	0	0	3	25	0
13-24	50	2253	784	98	150	58	3	81	596	2
01-24	72	3535	1353	193	285	128	9	142	1010	4

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:04
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL
COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 1 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	11	12	13	TOTAL
13	0	0	0	433
14	0	0	0	385
15	1	0	0	456
16	0	0	0	537
17	0	0	0	446
18	0	0	0	509
19	1	0	0	323
20	0	0	0	295
21	0	0	0	270
22	0	0	0	182
23	0	0	0	147
24	0	0	0	94
13-24	2	0	0	4077
01-24	2	1	0	6734

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:11
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 2 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	1	2	3	4	5	6	7	8	9	10
01	0	34	9	5	1	0	6	0	33	0
02	0	20	9	3	1	2	6	1	21	0
03	0	10	6	4	0	1	2	2	22	0
04	0	14	11	2	3	1	0	2	38	0
05	0	17	9	4	3	0	0	5	38	0
06	0	59	25	5	9	0	0	5	37	1
07	1	109	34	6	9	1	0	3	34	0
08	3	262	82	8	22	10	0	6	43	0
09	3	267	83	12	19	10	4	8	55	0
10	4	227	98	14	24	4	3	4	62	0
11	2	180	79	9	18	7	5	13	52	0
12	4	196	78	10	25	5	3	11	56	1
01-12	17	1395	523	82	134	41	29	60	491	2
01-12	17	1395	523	82	134	41	29	60	491	2

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:17
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 2 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	11	12	13	TOTAL
01	0	0	0	88
02	0	0	0	63
03	4	0	0	51
04	0	0	0	71
05	0	0	0	76
06	0	0	0	141
07	2	0	0	199
08	0	0	0	436
09	0	0	0	461
10	0	0	0	440
11	0	0	0	365
12	0	0	0	389
01-12	6	0	0	2780
01-12	6	0	0	2780

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:21
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 2 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	1	2	3	4	5	6	7	8	9	10
13	4	190	82	12	28	9	2	12	47	2
14	6	228	93	14	17	9	6	13	53	0
15	6	243	104	19	21	6	3	15	52	0
16	3	266	105	10	25	13	1	6	56	0
17	4	318	109	5	19	8	2	12	63	0
18	8	306	95	9	15	9	0	10	63	1
19	2	206	68	7	11	2	0	5	59	3
20	2	140	51	4	5	2	0	5	59	0
21	2	138	42	6	3	2	0	0	51	0
22	2	86	24	11	3	2	0	1	63	0
23	2	78	25	4	3	3	2	1	46	0
24	0	54	8	8	1	2	0	5	36	0
13-24	41	2253	806	109	151	67	16	85	648	6
01-24	58	3648	1329	191	285	108	45	145	1139	8

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM638 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:27
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION DETAIL

COUNTY: 49 COUNTY NAME: NORTHUMBERLAND DATE OF COUNT: 09 / 01 / 2009
DIR: N / E LANE: 2 SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500

CLASS: HOUR	11	12	13	TOTAL
13	0	0	0	388
14	0	0	0	439
15	0	0	0	469
16	0	0	0	485
17	0	0	0	540
18	0	0	0	516
19	0	0	0	363
20	0	0	0	268
21	0	0	0	244
22	0	0	0	192
23	0	0	0	164
24	0	0	0	114
13-24	0	0	0	4182
01-24	6	0	0	6962

ACTION: I (A E G H I J Q R S U X Y)
MESSAGES:

RMSRM639 ROADWAY MANAGEMENT INFORMATION SYSTEM 10/22/2014 10:57:32
LTERM: JOBEAVE MACHINE TRAFFIC CLASSIFICATION SUMMARY
DIR: N/E COUNTY: 49 COUNTY NAME: NORTHUMBERLAND
SR: 0147 SEGMENT: 0620 SEGMENT OFFSET: 1500
DATE OF COUNT: 09 / 01 / 2009 HOUR RANGE: 01 - 24

DIR:	COUNTY:	COUNTY NAME:					
	SR:	SEGMENT:		SEGMENT OFFSET:			
	DATE OF COUNT: / /		HOUR RANGE: -				
DIR	DIR FACTOR	1	2	3	4	5	6
N/E	100	130	7183	2682	384	570	236
	0	0	0	0	0	0	0
TOTAL	100	130	7183	2682	384	570	236
	7	8	9	10	11	12	13
N/E	54	287	2149	12	8	1	0
	0	0	0	0	0	0	0
TOTAL	54	287	2149	12	8	1	0

TOT 4-13	TOTAL(0)
3701	13696
0	0
3701	13696

R - RAW COUNT READY FOR CENTRAL OFFICE REVIEW

ACTION: I (A E G H I J Q R S T U X Y)
MESSAGES:

RMSRM466 ROADWAY MANAGEMENT INFORMATION SYSTEM 04/11/2014 10:31:29
LTERM: NBAUER CURRENT TRAFFIC COUNT DATA (DIRECTIONAL)

COUNTY...: 59 UNION | | COUNT - KEY.: 54/0015/0071/0050
STATE ROUTE: 0015 | BASE YR: 2011 | - DATE.....: 11/17/2011
SEGMENT....: 0011 |_____| - TYPE.....: MACHINE
OFFSET.....: 0000 | - REF. NO...: 2011362
FT: 1983 MI: 0.376

	BASE YEAR	CURRENT ESTIMATE	% OF TOTAL
TOTAL VEHICLES (ADT):	8732	8474	------
TOTAL TRUCKS (ADTT).:	803	779	------
3 AXLE W/TRL.....:	64	62	8.0
3 AXLE-MULTI AXLTRL:	353	343	44.0
6 AXLE-SINGLE TRL..:	9	9	1.1
5 AXLE-MULTI TRL...:	29	28	3.6
6 AXLE-MULTI TRL...:	6	6	0.7
7 AXLE-MULTI TRL...:	4	4	0.5
WEEKDAY TRUCKS.....:	1028	997	
18K ESAL - RIGID....:	983	1203	
- FLEXIBLE.:	679	817	

DIRECTION.....: SOUTH
DURATION (HOURS)..: 24
PERCENT TRUCKS....: 09
TRAF PATTERN GROUP: 04
DAILY - TOTAL VMT.: 3186
- TRUCK VMT.: 292

----DESIGN HR VOL FACTORS-----
K: 8 D: 55 T: 7

-----TRAFFIC COUNT LIMITS-----

	CO	-SR-	SEG.	OFF.
FROM:	54	0015	0011	0000
TO..:	59	0015	0061	0570

--------PARALLEL LIMITS-------

FROM:	54	0015	0010	0000
TO..:	59	0015	0060	0570

ACTION: I (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF10 TO DISPLAY PREVIOUS CLASSES

```
RMSRM466           ROADWAY MANAGEMENT INFORMATION SYSTEM  04/11/2014  10:26:57
LTERM: NBAUER     CURRENT TRAFFIC COUNT DATA   (DIRECTIONAL)
COUNTY...: 59 UNION           |                | COUNT - KEY.: 54/0015/0071/0050
STATE ROUTE: 0015             | BASE YR: 2011  |       - DATE......: 11/17/2011
SEGMENT....: 0011             |________________|       - TYPE......: MACHINE
OFFSET.....: 0000       BASE  CURRENT   % OF   |       - REF. NO...: 2011362
FT:   1983 MI:    0.376 YEAR  ESTIMATE TOTAL   | DIRECTION.........: SOUTH
 TOTAL VEHICLES (ADT):   8732    8474  ------  | DURATION (HOURS)..: 24
 TOTAL TRUCKS (ADTT).:    803     779  ------  | PERCENT TRUCKS....: 09
  MOTORCYCLE.........:      0       0    0.0   | TRAF PATTERN GROUP: 04
  CAR................:   6532    6339   75.0   | DAILY - TOTAL VMT.:    3186
  PICKUP/VAN.........:   1397    1356   16.0   |       - TRUCK VMT.:     292
 --------------------  -----   -----   ----   | ----DESIGN HR VOL FACTORS-----
  BUS................:     80      78   10.0   | K:  8       D:  55      T:  7
  2 AXLE-SIX TIRE....:    186     179   24.0   | -----TRAFFIC COUNT LIMITS-----
  3 AXLE-SINGLE UNIT.:     48      46    6.0   |        CO   -SR-   SEG.   OFF.
  4 AXLE-SINGLE-UNIT.:     24      24    3.0   | FROM:  54   0015   0011   0000
                                               | TO..:  59   0015   0061   0570
 WEEKDAY TRUCKS......:   1028     997         | --------PARALLEL LIMITS-------
 18K ESAL - RIGID....:    983    1203         | FROM:  54   0015   0010   0000
          - FLEXIBLE.:    679     817         | TO..:  59   0015   0060   0570

ACTION: I   (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF11 TO DISPLAY MORE TRUCK CLASSES
```

```
RMSRM466           ROADWAY MANAGEMENT INFORMATION SYSTEM  04/11/2014  10:30:58
LTERM: NBAUER     CURRENT TRAFFIC COUNT DATA   (DIRECTIONAL)
COUNTY...: 59 UNION           |                | COUNT - KEY.: 59/0015/0151/0130
STATE ROUTE: 0015             | BASE YR: 2012  |       - DATE......: 09/18/2012
SEGMENT....: 0071             |________________|       - TYPE......: MACHINE
OFFSET.....: 0000       BASE  CURRENT   % OF   |       - REF. NO...: 2012310
FT:   1382 MI:    0.262 YEAR  ESTIMATE TOTAL   | DIRECTION.........: SOUTH
 TOTAL VEHICLES (ADT):   7862    7764  ------  | DURATION (HOURS)..: 24
 TOTAL TRUCKS (ADTT).:    787     777  ------  | PERCENT TRUCKS....: 10
  3 AXLE W/TRL.......:     63      62    8.0   | TRAF PATTERN GROUP: 03
  3 AXLE-MULTI AXLTRL:    307     303   39.0   | DAILY - TOTAL VMT.:    2034
  6 AXLE-SINGLE TRL..:      8       8    1.0   |       - TRUCK VMT.:     203
  5 AXLE-MULTI TRL...:     22      22    2.8   | ----DESIGN HR VOL FACTORS-----
  6 AXLE-MULTI TRL...:      2       2    0.2   | K: 10       D:  60      T:  8
  7 AXLE-MULTI TRL...:      2       2    0.2   | -----TRAFFIC COUNT LIMITS-----
                                               |        CO   -SR-   SEG.   OFF.
                                               | FROM:  59   0015   0061   0570
                                               | TO..:  59   0015   0181   0000
 WEEKDAY TRUCKS......:   1007     995          | --------PARALLEL LIMITS-------
 18K ESAL - RIGID....:    925    1116          | FROM:  59   0015   0060   0570
          - FLEXIBLE.:    639     759          | TO..:  59   0015   0180   0000

ACTION: I   (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF10 TO DISPLAY PREVIOUS CLASSES
```

RMSRM466 ROADWAY MANAGEMENT INFORMATION SYSTEM 04/11/2014 10:28:08
LTERM: NBAUER CURRENT TRAFFIC COUNT DATA (DIRECTIONAL)

COUNTY...: 59 UNION | | COUNT - KEY.: 59/0015/0151/0130
STATE ROUTE: 0015 | BASE YR: 2012 | - DATE.....: 09/18/2012
SEGMENT....: 0071 |_____| - TYPE.....: MACHINE
OFFSET.....: 0000 | - REF. NO...: 2012310
FT: 1382 MI: 0.262

	BASE YEAR	CURRENT ESTIMATE	% OF TOTAL
TOTAL VEHICLES (ADT):	7862	7764	------
TOTAL TRUCKS (ADTT).:	787	777	------
MOTORCYCLE.....:	16	16	0.2
CAR.....:	5722	5651	73.0
PICKUP/VAN.....:	1337	1320	17.0
----------	-----	-----	----
BUS.....:	94	93	12.0
2 AXLE-SIX TIRE....:	227	223	29.0
3 AXLE-SINGLE UNIT.:	31	31	4.0
4 AXLE-SINGLE-UNIT.:	31	31	4.0
WEEKDAY TRUCKS.....:	1007	995	
18K ESAL - RIGID....:	925	1116	
- FLEXIBLE.:	639	759	

DURATION (HOURS)..: 24
PERCENT TRUCKS....: 10
TRAF PATTERN GROUP: 03
DAILY - TOTAL VMT.: 2034
- TRUCK VMT.: 203

----DESIGN HR VOL FACTORS-----
K: 10 D: 60 T: 8

-----TRAFFIC COUNT LIMITS-----

	CO	-SR-	SEG.	OFF.
FROM:	59	0015	0061	0570
TO..:	59	0015	0181	0000

--------PARALLEL LIMITS-------

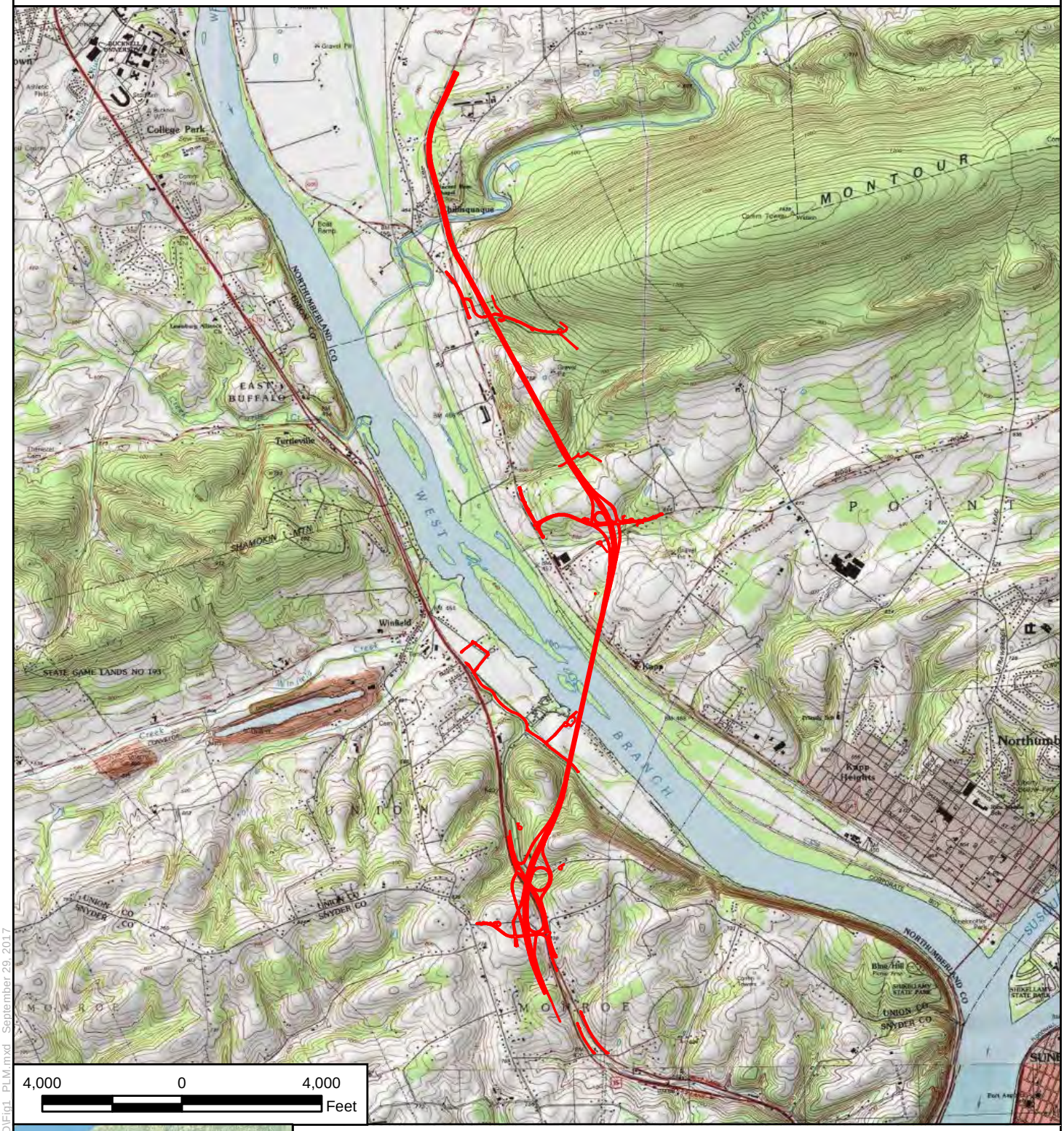
FROM:	59	0015	0060	0570
TO..:	59	0015	0180	0000

ACTION: I (A B E F G H I J L Q R S V W X Y)
MESSAGES: PRESS PF11 TO DISPLAY MORE TRUCK CLASSES

Appendix C

Figures

Figure 1
Project Location Map
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania



Map Source: © 2011 National Geographic Society; Lewisburg (1973), Northumberland (1973), and Sunbury (1973), Pennsylvania Quadrangles

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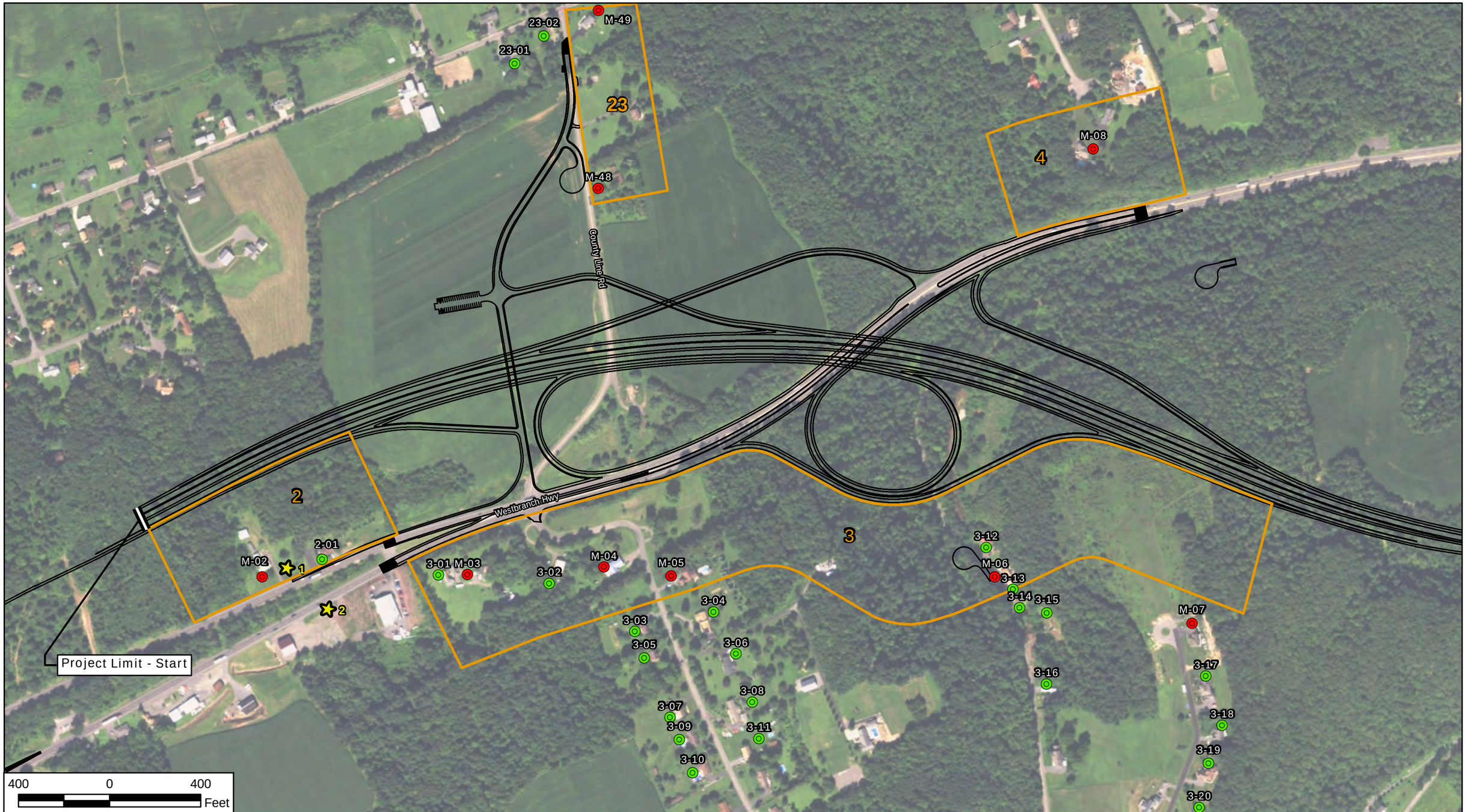

X:\Projects\P927\GIS\MXD\Fig2_NoiseMonWorkPlan_NEW.mxd
9/29/2017 12:42:38 PM

Figure 2A
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

Source: NAIP USDA Farm Service Agency 7/18/2013

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Figure 2B
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

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Figure 2C
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

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Figure 2D
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

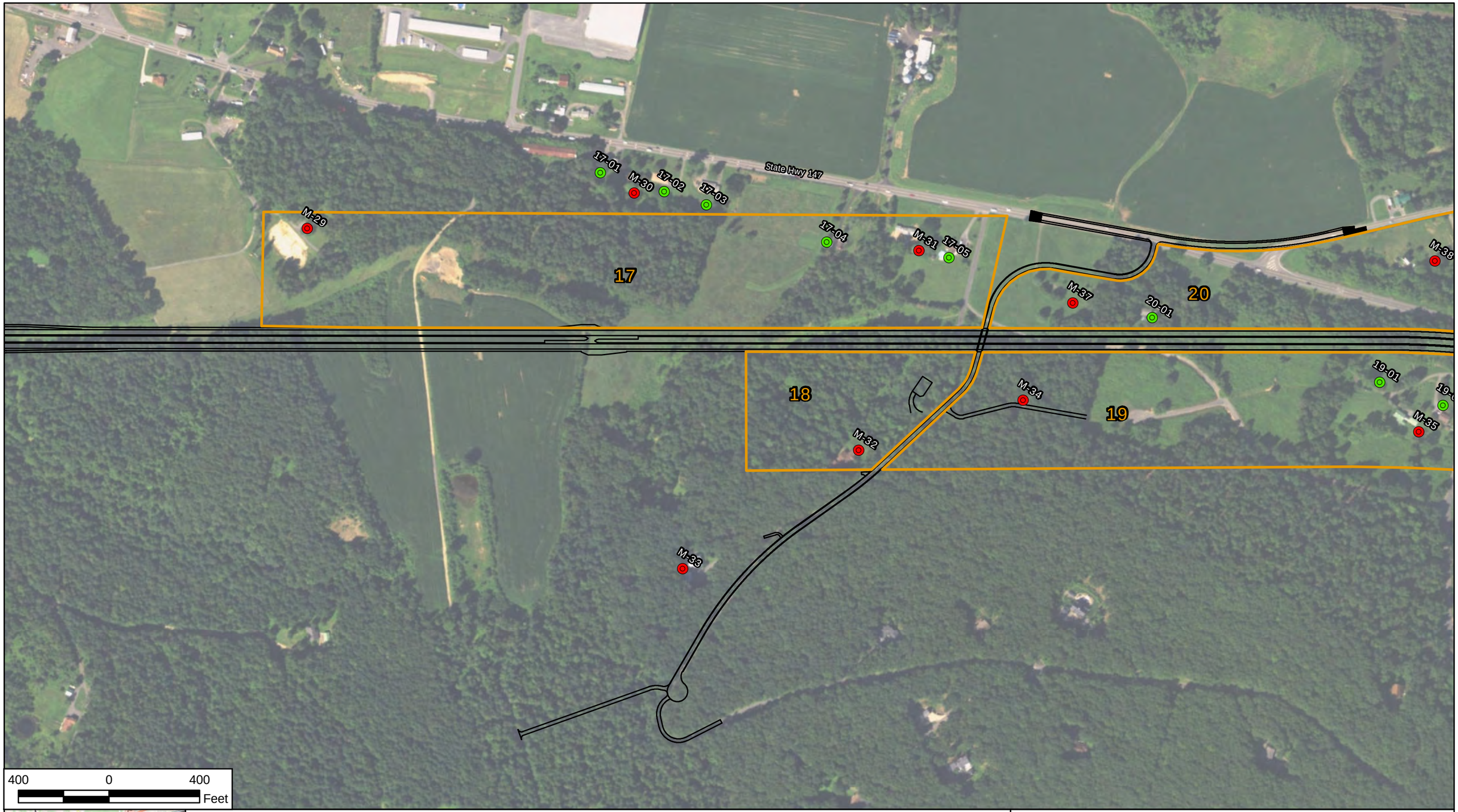

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Figure 2E
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

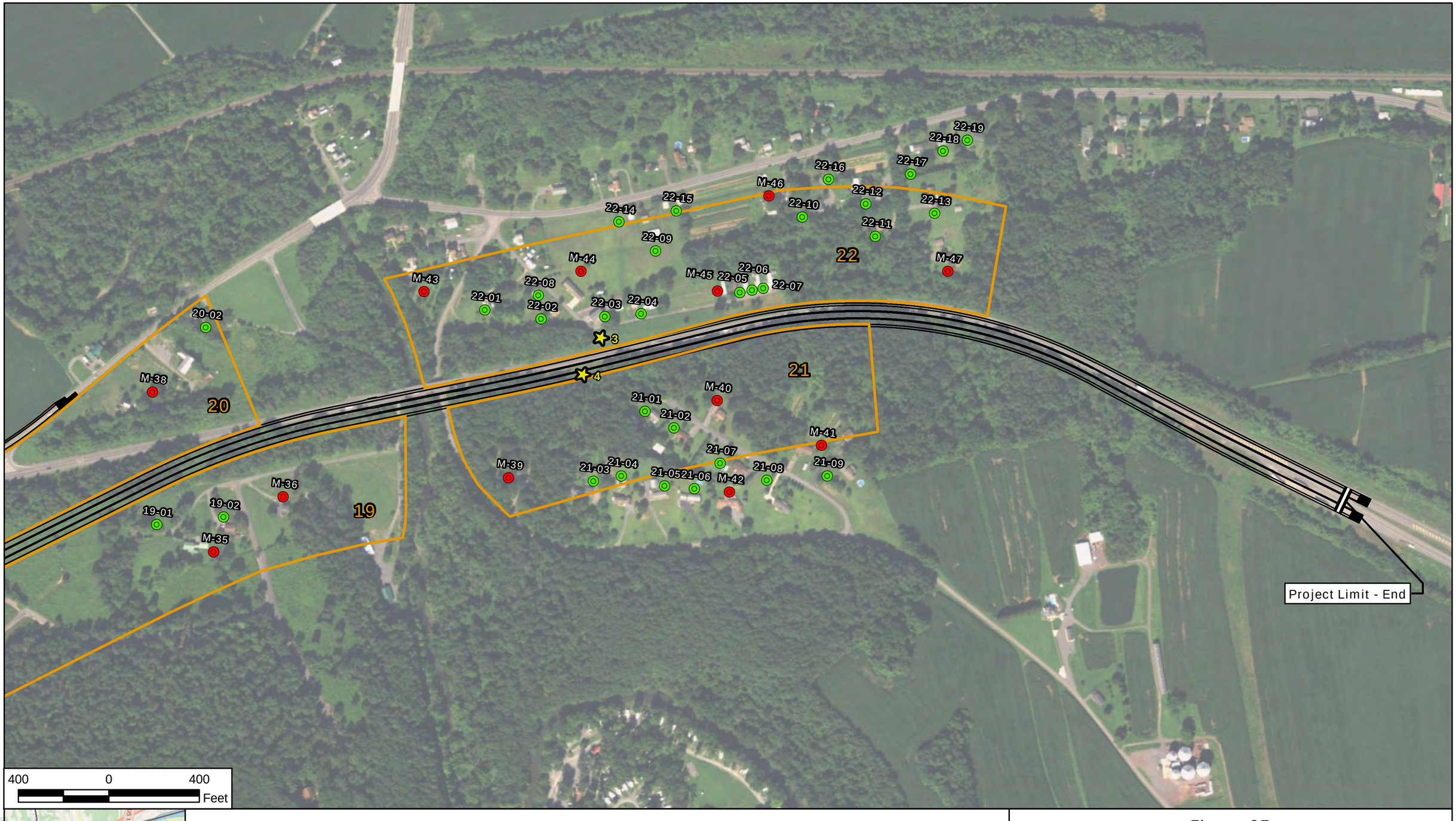

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Figure 2F
Noise Study Areas
S.R. 0015, Section 088
Central Susquehanna Valley Transportation Project Northern Section
Union and Northumberland Counties, Pennsylvania

Appendix D

Warranted, Feasible, and Reasonable Worksheets

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 2
Noise Wall Identification (i.e., Wall 1)	NSA 2 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	2
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	**X**	**Yes**		**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?		**Yes**	**X**	**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	2			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	0%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	15,001			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	0			
c. SF/BR = 2a/2b	15,001			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? ___ Yes X No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier extending 1,400 feet with an average height of 10.7 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

PennDOT Engineering District 3-0 — 10-30-17 Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016 Date

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

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

Date	4/28/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 3
Noise Wall Identification (i.e., Wall 1)	NSA 3 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	10
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?		**Yes**	**X**	**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	**X**	**Yes**		**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	10			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	90%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	84,005			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	9			
c. SF/BR = 2a/2b	9,334			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? X Yes ___ No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 3,400 feet with an average height of 24.7 feet was identified tobe Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

[signature] 10-30-17

PennDOT Engineering District 3-0 Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company 4/28/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 5
Noise Wall Identification (i.e., Wall 1)	NSA 5 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	24
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?		**Yes**	**X**	**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	**X**	**Yes**		**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	24			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	4%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	33,072			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	1			
c. SF/BR = 2a/2b	33,072			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

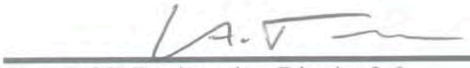
Is the Noise Wall FEASIBLE? ____ Yes X No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 3,216 feet with an average height of 10.3 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction. See attached ERU calculations for the River Edge RV camp and marina.

Responsible/Qualified Individuals Making the Above Decisions



PennDOT Engineering District 3-0 — 10-30-17 Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016 Date

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

NSA 5: Equivalent Residential Unit Value Calculation

		Seasonal Campground	Residence (BASE)
A	Average Event Attendance		
B	Average Time Used by Each Person Per Event		
C	Average Number of Events Per Event Day		
D	Capacity of the Site		
E	Average Use Factor		
F	Hours Available Per Day		
G	Average Time Used by Each Person Per Day (Hours)	15.00	15.00
H	Persons Using Per Day	78.12	2.48
I	Person-Hours Per Day (A x B x C) or (G x H)	***1,171.80***	***37.20***
J	Days Used Per Year	270	365
K	Person-Hours Used Per Year (I x J)	***316,386.00***	***13,578.00***
L	Equivalent Residential Units (ERU) = K / 13,578*	***23.3***	***1***
M	Grid Points Within Overall Land Use Activity Area	***41***	
N	Apply Specific Site's ERU Value to this Number of Points Within 130' Grid		
O	Retain ERU Value of 1 for the Following Number of Points Within 130' Grid		
P	Apply This Value Equally to Each Grid Point in 130' Grid	***0.57***	

* Base Value representative of a typical residence in Pennsylvania

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 6
Noise Wall Identification (i.e., Wall 1)	NSA 6 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	6
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?		**Yes**	**X**	**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	**X**	**Yes**		**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	6			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	67%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	29,280			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	4			
c. SF/BR = 2a/2b	7,320			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 3,024 feet with an average height of 9.7 feet was identified to be Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

LAT — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 7
Noise Wall Identification (i.e., Wall 1)	NSA 7 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	6
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

X	**Yes**		**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	6			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	17%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	19,152			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	1			
c. SF/BR = 2a/2b	19,152			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? ____ Yes X No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,344 feet with an average height of 14.3 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

PennDOT Engineering District 3-0 — 10-30-17 Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016 Date

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 8
Noise Wall Identification (i.e., Wall 1)	NSA 8 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	1
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	**X**	**Yes**		**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?		**Yes**	**X**	**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	1			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	0%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	14,316			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	0			
c. SF/BR = 2a/2b	14,316			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? ____ Yes X No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,081 feet with an average height of 13.2 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

PennDOT Engineering District 3-0 — 10-30-17 Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016 Date

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 9
Noise Wall Identification (i.e., Wall 1)	NSA 9 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	6
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

X	**Yes**		**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	6			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	67%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	44,256			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	4			
c. SF/BR = 2a/2b	11,064			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No

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

a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? X Yes ___ No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 2,688 feet with an average height of 16.4 feet was identified to be Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

C.A.T — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 12
Noise Wall Identification (i.e., Wall 1)	N/A

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	4
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

	Yes	**X**	**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	4			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	0%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?		Yes	X	No
3. Can the noise wall be constructed without causing a safety problem?		Yes	X	No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?		Yes	X	No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	0			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	0			
c. SF/BR = 2a/2b	0			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

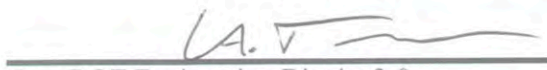
Is the Noise Wall FEASIBLE? ___ Yes X No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

All impacts identified for NSA 12 originate from the existing S.R. 0147 roadway, and not as a result of the proposed roadways. No barrier could be designed that would not restrict the necessary direct driveway access between the impacted properties and the S.R. 0147 roadway. A barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions



PennDOT Engineering District 3-0

10-30-17
Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company

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

3/25/2016
Date

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 14
Noise Wall Identification (i.e., Wall 1)	NSA 14 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	2
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?		**Yes**	**X**	**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	**X**	**Yes**		**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units			
a. Total number of impacted receptor units:		2	
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:		0%	
c. Is the percentage 50 or greater?	Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	Yes	X	No
3. Can the noise wall be constructed without causing a safety problem?	Yes	X	No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	Yes	X	No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	Yes	X	No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	Yes	X	No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	Yes	X	No

Reasonableness

1. Community Desires Related to the Barrier		N/A	
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise	Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation			
a. Area (SF) of the proposed noise wall		31,679	
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)		0	
c. SF/BR = 2a/2b		31,679	
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.			
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"	Yes	X	No

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

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

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

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

N/A

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? ___ Yes X No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,776 feet with an average height of 17.8 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

A.T — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 17
Noise Wall Identification (i.e., Wall 1)	NSA 17 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	4
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

X	**Yes**		**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	4			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	0%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	32,833			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	0			
c. SF/BR = 2a/2b	32,833			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? ____ Yes X No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 2,736 feet with an average height of 12.0 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

L.A.T — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 18
Noise Wall Identification (i.e., Wall 1)	NSA 18 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	1
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?		**Yes**	**X**	**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	**X**	**Yes**		**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

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

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	19,392			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	2			
c. SF/BR = 2a/2b	9,696			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No

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

a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,008 feet with an average height of 19.2 feet was identified to be Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

PennDOT Engineering District 3-0

10-30-17
Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company

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

3/25/2016
Date

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 19
Noise Wall Identification (i.e., Wall 1)	NSA 19 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	4
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

X	**Yes**		**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	4			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	75%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	41,519			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	4			
c. SF/BR = 2a/2b	10,380			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? X Yes ___ No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,920 feet with an average height of 21.6 feet was identified to be Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

C.A. F — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 20
Noise Wall Identification (i.e., Wall 1)	NSA 20 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)

2. Total number of impacted receptor units in community

Category A units impacted	0
Category B units impacted	3
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation

a. Date community was permitted (for new developments or developments planned for or under construction)	N/A
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A

c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."

X	**Yes**		**No**

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.

a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?

X	**Yes**		**No**

b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?

X	**Yes**		**No**

c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?

	Yes	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	3			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	33%			
c. Is the percentage 50 or greater?		Yes	X	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	27,552			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	1			
c. SF/BR = 2a/2b	27,552			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?		Yes	X	No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ___ No

Is the Noise Wall FEASIBLE? ___ Yes X No

Is the Noise Wall REASONABLE? ___ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,248 feet with an average height of 22.1 feet was identified to not be Feasible under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

L.A.T. — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

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

Date	3/25/2016
Project Name	Project
County	Union and Northumberland
S.R., Section	S.R. 0015, Section 088
Community Name and/or NSA #	NSA 22
Noise Wall Identification (i.e., Wall 1)	NSA 22 Optimized Barrier

General

1. Type of project (new location, reconstruction, etc.):	Type I (new roadway)
2. Total number of impacted receptor units in community	
Category A units impacted	0
Category B units impacted	6
Category C units impacted	0
Category D units impacted (if interior analysis required)	0
Category E units impacted	0

Warranted

1. Community Documentation				
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A			
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):	N/A			
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	**X**	**Yes**		**No**
2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.				
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	**X**	**Yes**		**No**
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?		**Yes**	**X**	**No**
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?		**Yes**	**X**	**No**

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	6			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	83%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier	N/A			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise		Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	24,672			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	6			
c. SF/BR = 2a/2b	4,112			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?		Yes	X	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No
b. Does the noise wall provide an insertion loss of at least 7 dB(A) for more receptors than required under 3a.while still conforming to the MaxSF/BR value of 2,000 and a "point of diminishing returns"		Yes	X	No

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? ____ Yes X No

Additional Reasons for Decision:

An optimized barrier system extending 1,824 feet with an average height of 13.5 feet was identified to be Feasible, but not Reasonable under the criteria established by PennDOT and FHWA within Publication 24. This barrier is not recommended for construction.

Responsible/Qualified Individuals Making the Above Decisions

C.A. T — 10-30-17

PennDOT Engineering District 3-0 — Date

Frederick E. Schiller, Noise Specialist, A.D. Marble & Company — 3/25/2016

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

Appendix E

List of Preparers

LIST OF PREPARERS

Fred Schiller	**Noise Specialist**
Education:	B.S., Business Marketing & Management (pending) A.S., General Education
Professional Experience:	11 years
Role:	Highway Traffic Noise Analysis – discipline lead
Scott Siegwart	**Senior Environmental Scientist**
Education:	B.S., Civil Engineering A.S., Civil Engineering Technology A.S., Mechanical Drafting and Design
Professional Experience:	24 years
Role:	Highway Traffic Noise Analysis – technical review
Matt Rodenberger	**GIS Technician**
Education:	B.S., Liberal Studies, Minor in Business GIS and Geography and Planning
Professional Experience:	1 year
Role:	Report figure preparation
Brian Doyle	**Civil Engineer Designer**
Education:	B.S., Civil Engineering
Professional Experience:	6 years
Role:	Traffic Noise Model digitization
Colleen Meiswich	**Senior Project Manager**
Education:	M.S., Community and Regional Planning B.S., Biology and Environmental Science
Professional Experience:	16 years
Role:	Project management