PENNSYLVANIA TURNPIKE TOTAL RECONSTRUCTION PROJECT MILEPOST 320 TO 326

CHESTER AND MONTGOMERY COUNTIES, PENNSYLVANIA

NOISE IMPACT ANALYSIS REPORT

PTC REF. NO. 05-045-RD4C

HMMH REPORT NO. 301940

AUGUST 28, 2007

Submitted to:

PENNSYLVANIA TURNPIKE COMMISSION
POST OFFICE BOX 67676
HARRISBURG, PENNSYLVANIA 17106-7676

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1. EXECUTIVE SUMMARY

This report describes the methodology and presents the findings of the traffic noise study conducted for the full-depth reconstruction project from Milepost 320 to 326 of the Pennsylvania Turnpike in Chester and Montgomery Counties, Pennsylvania. The full-depth reconstruction project will convert the existing four-lane roadway with a 10-foot median to a six-lane typical section with a 26-foot median. The purpose of the traffic noise study is (1) to determine if project-related noise impacts will occur and (2) to 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 Federal Highway Administration (FHWA) and Pennsylvania Department of Transportation (PennDOT) criteria as utilized by the Pennsylvania Turnpike Commission (PTC).

For this evaluation, the project area was divided into 14 Noise Study Areas (NSAs). In the design year (2035), loudest-hour noise levels at impacted receptor units were computed to range from 66 to 77 dBA, L_{eq} (Appendix B provides a summary of the noise descriptors used in this report and Table 5 provides computed loudest-hour noise levels). Based upon the FHWA and PennDOT criteria described in Section 3.1 of this report, noise impacts were computed to occur within all NSAs. A total of 618 receptor units, including most first-row residences and some residences beyond the first row, are projected to be exposed to loudest-hour noise impacts during the design year.

Noise levels could be reduced through the construction of noise barriers and/or berms. Table 1 provides a summary of noise barriers that were considered within each of the 14 NSAs. Recommended noise barriers would need to meet the FHWA and PennDOT criteria described in Section 3.1.

Based on studies conducted to date, noise barriers in 11 of the NSAs (NSA-N1, NSA-N5, NSA-N6, NSA-S1, NSA-S2, NSA-S3, NSA-S4, NSA-S5, NSA-S6, NSA-S7, and NSA-S8) were found to be warranted, feasible, and reasonable and therefore are recommended for further consideration. The recommended noise barriers would range in height from approximately 12 to 16 feet and would have a total length of approximately 37,300 feet. The barriers would benefit approximately 1,006 receptor units and would have a total cost of approximately $13,148,000, based on a unit cost of $25 per square foot[1]. If it subsequently develops during the project's final design phase that conditions have changed, these barriers may no longer be recommended. A final decision on each recommendation will be made upon completion of the project design and the public involvement processes.

Due to the presence of noise-sensitive land use on both sides of the Turnpike throughout the majority of the project area, it is recommended that all noise barriers be constructed with sound-absorptive materials on the side facing the Turnpike. In locations with noise barriers directly across the Turnpike from one another, sound-absorptive materials will reduce the degradation of each barrier's effectiveness that may be caused by multiple reflections of sound between the barriers. In locations where a noise barrier will be constructed on only one side of the Turnpike, sound-absorptive materials will reduce potential increases in noise levels at residences on the opposite side of the Turnpike caused by reflected traffic noise.

[1] PennDOT Publication No. 24 provides for the use of a cost index factor of $25.00 per square foot for calculation of noise barrier reasonableness (PennDOT Pub. 24, Section 3.3.3.1, May 2007). Actual construction costs are expected to be higher. See Section 3.1.3 of this report for further information on reasonableness criteria.

Table 1. Summary of Noise Abatement Analysis

Noise Study Area	Warrants Noise Abatement Consideration?	Noise Barrier Feasible?	Approx. Barrier Length[1] (feet)	Average Barrier Height (feet)	Barrier Cost[1] (x 1,000)	Number of Benefited Receptor Units[2]	Cost per Benefited Receptor Unit[1] (x 1,000)	Noise Barrier Reasonable?
NSA-N1	Yes	Yes	815	16	$325	7	$46.5	Yes
NSA-N2	Yes	Yes	3,375	18	$1,518	4	$379.5	No
NSA-N3	Yes	Yes	5,260	18	$2,367	14	$169.1	No
NSA-N4	Yes	Yes	3,670	16	$1,467	16	$91.7	No
NSA-N5	Yes	Yes	1,430	12	$430	Valley Forge National Park	NA	Yes
NSA-N6	Yes	Yes	4,760	14	$1,667	73	$22.8	Yes
NSA-S1	Yes	Yes	7,740	14	$2,710	55	$49.3	Yes
NSA-S2	Yes	Yes	2,200	14	$770	7 + Vanguard and Crossroads Schools	NA	Yes
NSA-S3	Yes	Yes	2,435	16	$973	45	$21.6	Yes
NSA-S4	Yes	Yes	1,930	14	$676	126	$5.4	Yes
NSA-S5	Yes	Yes	2,530	14	$886	278	$3.2	Yes
NSA-S6	Yes	Yes	4,590	14	$1,607	194	$8.3	Yes
NSA-S7	Yes	Yes	6,765	14	$2,368	49	$48.3	Yes
NSA-S8	Yes	Yes	2,105	14	$736	172	$4.3	Yes
TOTALS:	--	--	37,300[3]	--	$13,148[3]	1,006[3]	--	--

Notes:
1. Approximate barrier lengths and costs are from FHWA Traffic Noise Model (TNM) output. Results shown in table have been rounded.
2. Impacted receptor units with at least 3 dBA of noise reduction and/or non-impacted receptor units with at least 5 dBA of noise reduction. Assumes sound absorptive barriers.
3. Totals include only the 11 noise barriers found to be warranted, feasible, and reasonable.

Source: HMMH, 2007.

2. INTRODUCTION

This report describes the methodology and presents the findings of the traffic noise study conducted for the full-depth reconstruction project from Milepost 320 to 326 of the Pennsylvania Turnpike in Chester and Montgomery Counties, Pennsylvania. The Pennsylvania Turnpike Commission retained Harris Miller Miller & Hanson Inc. (HMMH) to conduct the traffic noise study under PTC Contract 05-045-RD4C. HMMH was assisted by Straughan Environmental Services, Inc. (SES). The full-depth reconstruction project will convert the existing four-lane roadway with a 10-foot median to a six-lane typical section with a 26-foot median. Figure 1 shows the project location.

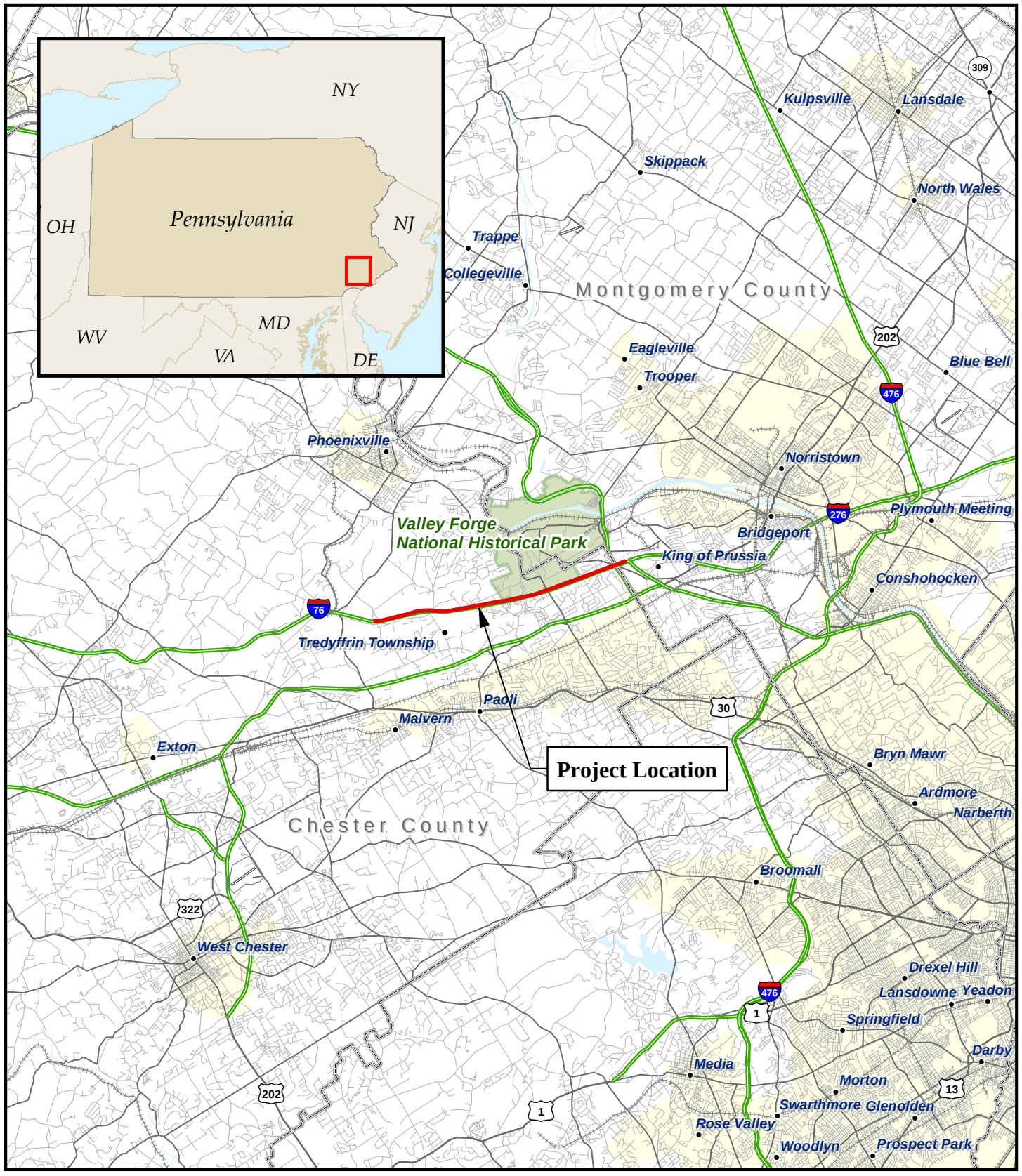
The purpose of the traffic noise study is (1) to determine if project-related noise impacts will occur and (2) to determine whether noise abatement for affected areas in the form of noise barriers or other mitigation measures would be warranted, feasible, and reasonable, based upon FHWA and PennDOT criteria as utilized by the PTC.

This traffic noise impact analysis report includes the following:

- Section 1 (Executive Summary) of this report provides a summary of the findings and the recommendations of the traffic noise study;
- Section 2 (Introduction) provides an overall introduction to the traffic noise study;
- Section 3 (Methodology) describes the methodology and the traffic noise prediction model used in the study;
- Section 4 (Existing Highway Traffic Noise Environment) identifies and describes each Noise Study Area (NSA) included in the study and also describes the noise measurements conducted as part of the study;
- Section 5 (Future Highway Traffic Noise Environment) describes the noise modeling validation procedure and provides noise modeling results;
- Section 6 (Highway Traffic Noise Consideration and Mitigation Alternatives) describes noise mitigation alternatives;
- Section 7 (Construction Noise Consideration and Mitigation Alternatives) identifies and discusses construction noise impacts and possible mitigation alternatives and recommendations; and
- Section 8 (Public Involvement Process) provides a discussion of public involvement efforts.

In addition, Appendices A through E provide the following information:

- Appendix A provides the warranted, feasible and reasonable worksheets completed for each noise barrier that was considered.
- Appendix B provides a description of the noise metrics used in this report.
- Appendix C provides the traffic data used in the traffic noise prediction model.
- Appendix D contains documentation from the field measurements, including field sketches, log sheets and traffic counts for all measurement sites.
- Appendix E provides a summary of the preliminary noise barrier analysis conducted for each NSA, including computed loudest-hour sound levels and noise reductions for various barrier options considered.



N
W
E
S

0 2 4 6 Miles

Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Project Location Map

Figure 1

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3. METHODOLOGY

This section of the report describes the methodology used in this study.

3.1 Traffic Noise Study Guidelines and Criteria

This evaluation was conducted in accordance with general guidelines established by FHWA in Title 23 CFR Part 772[2], and by specific criteria provided by PennDOT Publication No. 24[3]. The study involved a three-phased approach, as described in Publication No. 24:

1. Do the sensitive receptors *warrant* Highway Traffic Noise abatement consideration?
2. Is it *feasible* to provide Highway Traffic Noise Abatement from an engineering and acoustical perspective?
3. Is it *reasonable* from a cost/benefit, maintainability, and land use conformity consideration to provide Highway Traffic Noise Abatement?[4]

3.1.1 Warranted Criteria

Title 23 CFR 772 describes highway noise impacts as "impacts which occur when the predicted traffic noise levels (for the design year) approach or exceed the noise abatement criteria or when the predicted noise levels substantially exceed the existing noise levels."

Table 2 summarizes the FHWA noise abatement criteria (NAC). FHWA requires that primary consideration in abating traffic noise be given to exterior activities. This abatement is usually required where frequent human use occurs and therefore lowered noise levels would be beneficial. The exterior criterion level for such outdoor areas, including residences (Category B), is 67 dBA L_{eq}. The interior criterion (Category E) is used only where no exterior activities occur on the premises, or where such activities are removed from or shielded from the roadway noise. Noise impact is assessed where noise levels "approach or exceed" the NAC during the loudest hour of the day. Many state DOTs, including PennDOT, define "approach" to mean when the loudest-hour L_{eq} equals one decibel less than the NAC. Therefore, noise impact occurs where noise levels equal or exceed 66 dBA L_{eq} for exterior residential land use.

Noise impacts also may occur if predicted future noise levels substantially exceed existing noise levels. PennDOT considers an increase of 10 decibels or more above existing levels to be a substantial increase. Receptors that satisfy either of these two criteria (approach or exceed the NAC or experience a substantial increase), warrant further consideration of highway traffic noise abatement.

[2] Federal Highway Administration. 23 CFR Part 772: *Procedures for Abatement of Highway Noise and Construction Noise*.
[3] Pennsylvania Department of Transportation. *Publication No. 24, Project Level Highway Traffic Noise Handbook.* May 2007.
[4] Ibid., Section 1.2.1.3.

Table 2. FHWA Noise Abatement Criteria

Land Use	Criterion
Category A: Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose	57 dBA Leq Exterior
Category B: Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, churches, schools, libraries, and hospitals	67 dBA Leq Exterior
Category C: Cemeteries, commercial areas, industrial areas, office buildings, and other developed lands, properties or activities not included in Categories A or B above	72 dBA Leq Exterior
Category D: Undeveloped lands, including roadside facilities and dispersed recreation	No limit
Category E: Motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. (The interior criterion only applies when there are no exterior activities to be affected by traffic noise.)	52 dBA Leq Interior

Source: FHWA, 23 CFR 772.

3.1.2 Feasibility Criteria

When evaluating noise barriers in areas where such consideration has been shown to be warranted, Publication No. 24 requires consideration of the following seven acoustical and engineering parameters. For the proposed noise barrier to be considered "feasible," the first two parameters must be receive a "yes" answer and the remaining five parameters must receive a "no" answer.

1. Can a highway traffic noise reduction of at least 5 dBA be achieved at the majority of the impacted receptor units (i.e., 50% or greater)?
2. Can the noise barrier be designed and physically constructed at the proposed location?
3. Will placement of the noise barrier cause a safety problem?
4. Will placement of the noise barrier restrict access to vehicular or pedestrian travel?
5. Will placement of the noise barrier make it inaccessible for maintenance?
6. Will the noise barrier impact utilities or will the utilities impact the noise barrier?
7. Will the noise barrier impact drainage or will the drainage impact the noise barrier?[5]

3.1.3 Reasonableness Criteria

After the results of the noise analysis have determined that a feasible noise barrier is achievable, the barrier must be shown to be of "reasonable" cost. Publication No. 24 establishes the allowable upper limit for cost reasonableness as $50,000 per benefited receptor unit, based on a noise barrier unit cost of $25.00 per square foot. The unit cost "includes the cost of the noise barrier panels only and does not include the cost of post, foundations, right-of-way, or grading."[6]

[5] Ibid., Section 3.3.2.
[6] Ibid., Section 3.3.3.1.

The cost of the noise barrier should then be divided by the number of benefited receptor units where noise mitigation was determined to be feasible to determine the cost per receptor unit.

An *impacted receptor* is eligible to be included in the reasonableness cost analysis if it receives a minimum 3 dBA noise reduction as a result of the proposed noise barrier.

A *non-impacted receptor* that receives a minimum 5 dBA noise reduction will be considered a *benefited* receptor unit and is eligible to be included in the reasonableness cost analysis.[7]

3.2 Traffic Noise Prediction Model

All traffic noise calculations for this project were performed using the FHWA Traffic Noise Model[8] (TNM), which originally was released by FHWA in April 1998 for use on Federal-aid highway noise projects. The most current version of FHWA TNM (version 2.5, released for use by FHWA in April 2004) was used on this project.

TNM separately calculates the noise contribution of each roadway segment at a given receiver. For each roadway segment, the noise from each vehicle type is computed from the reference energy-mean emission level, and adjusted for vehicle volume, speed, grade, roadway segment length, and source-to-receiver distance. Further adjustments needed to accurately model the sound propagation from source to receiver include shielding provided by rows of buildings, the effects of different ground types, source and receiver elevations, and the effects of any intervening noise barriers. The program sums the noise contributions of each vehicle type for a given roadway segment at the receiver. TNM then repeats this process for all roadway segments, summing their contributions to generate the predicted noise level at each receiver.

TNM incorporates sound emissions and sound-propagation algorithms, based in theory on accepted international standards and field-checked along U.S. highways. TNM takes into account:

- Vehicle classifications, volumes and speeds.
- Attenuation due to ground reflections off a large selection of ground types.
- Effects of roadway edges and other edges between ground of different types.
- Attenuation over noise walls, including their interaction with reflections from the ground.
- Attenuation over earth berms and similar intervening hills/terrain.
- Attenuation over/through rows of buildings.
- Attenuation through dense foliage.
- Combined emission/speed effects of accelerating, full-throttle traffic on on-ramps and near stop signs, traffic signals, and toll barriers.
- Combined emission/speed effects of decelerating, full-throttle vehicles on upgrades and subsequent effects as these vehicles later regain speed.
- Multiple reflections of sound between parallel noise barriers or retaining walls.

[7] Ibid., Section 3.3.3.3.
[8] Anderson, G.S., C.S.Y. Lee, G.G. Fleming, and C.W. Menge, *FHWA Traffic Noise Model, Version 1.0 User's Guide*. Federal Highway Administration Report No. FHWA-PD-96-009, January 1998.

3.3 Loudest-Hour Computations

Following validation and refinement of the noise model, TNM was used to compute loudest-hour noise levels at a total of 420 representative prediction sites, or receivers, distributed throughout 14 NSAs. The study-area geometry, including roadway and receiver coordinates and elevations, was obtained from engineering drawings and aerial photographs provided by the PTC. Traffic data for the loudest-hour computations for both existing and future conditions were provided by the PTC. Appendix C of this report provides additional details, including modeled traffic volumes and speeds.

3.4 Noise Abatement Analysis

Noise abatement analysis was conducted in areas meeting the warranted criteria described in Section 3.1.1 with the objectives of determining whether such abatement could meet the feasibility and reasonableness criteria described in Section 3.1.2 and Section 3.1.3. This analysis determined the preferred alignment, approximate end points, and the approximate average height of each proposed noise barrier. Although this analysis was conducted using the full TNM with the full set of prediction sites for each NSA, the barrier design was conducted at a preliminary level. Specifically, ranges of barrier heights were evaluated in two-foot increments with the noise barrier assumed to be of constant height for its entire length. In general, noise barriers were evaluated for feasibility and reasonableness with constant heights of 10, 12, 14, 16, 18, and 20 feet above ground elevation to efficiently determine the average barrier height required to meet the design goals.

For any recommended noise barriers, further acoustical and engineering design would be necessary prior to construction.

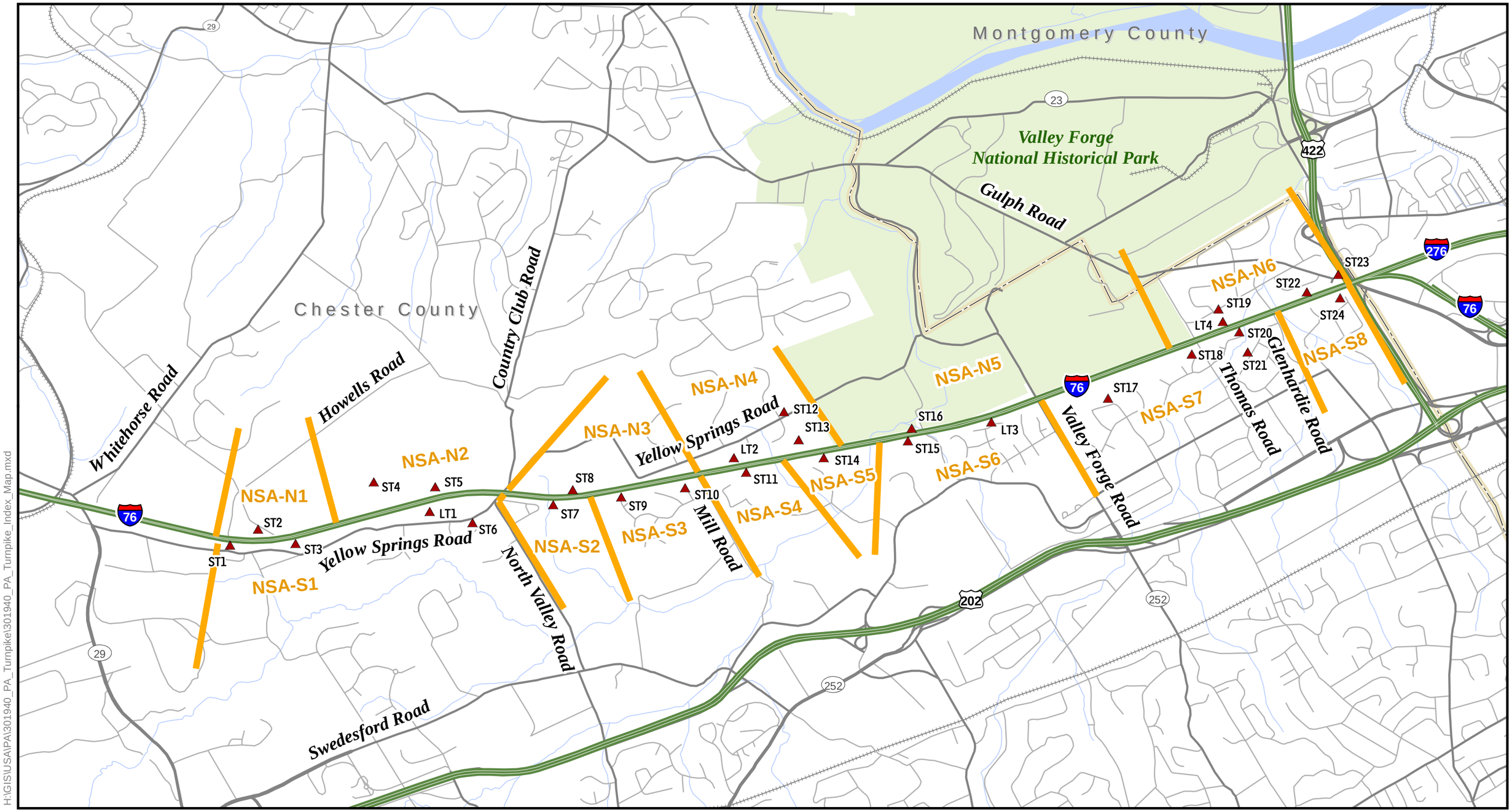
4. EXISTING HIGHWAY TRAFFIC NOISE ENVIRONMENT (MONITORED DATA)

4.1 Identification of Noise Study Areas (NSAs)

PennDOT Publication No. 24 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."[9]

Following this guidance, and based on a field review conducted on December 14, 2006, HMMH divided the project area into 14 NSAs. The NSAs include six areas north of the Turnpike (numbered NSA-N1 through NSA-N6 from west to east) and eight areas south of the Turnpike (numbered NSA-S1 through NSA-S8 from west to east). Figure 2 shows the limits of the 14 NSAs and each one is described below.

[9] PennDOT Publication No. 24. Section 2.2.



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Measurement Site Locations

Noise Study Area Boundaries

0 0.5 1 1.5 Miles

Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Study Areas & Measurement Sites

Figure 2

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4.1.1 NSAs North of Turnpike

- **NSA-N1** extends from approximately 400 feet west of Howells Road (Sta. 1070) east to Sta. 1102, a distance of approximately 3,200 feet. This NSA includes several single-family homes located off of Howells Road, Green Lane, and Old Sentinel Trail. Although the Turnpike passes over Howells Road, the area to the east of the overpass, including the southern end of Green Lane, rises steeply above the Turnpike.
- **NSA-N2** extends from Sta. 1102 east to the point where Yellow Springs Road passes beneath the Turnpike (Sta. 1150), a distance of approximately 4,800 feet. This NSA includes first-row homes along White Deer Trail and homes set farther back from the Turnpike (over 1,000 feet) on Chautauqua Trail and Horseshoe Trail. Both the homes on White Deer Trail and those set farther back overlook the Turnpike from a hillside.
- **NSA-N3** runs from the Yellow Springs Road overpass (Sta. 1150) east to the Mill Road bridge over the Turnpike (Sta. 1201), a distance of approximately 5,100 feet. This NSA includes single-family homes along Yellow Springs Road, Rochambeau Drive, and Wellspring Lane, including one horse farm/stable. In general, the terrain in this area rises away from the Turnpike.
- **NSA-N4** extends east from Mill Road (Sta. 1201) for a distance of approximately 4,100 feet to Valley Forge National Park (Sta. 1242). This area includes single-family homes along Yellow Springs Road and on Rose Cottage Lane, Covered Bridge Road, Welsh Valley Road, and General Alexander Drive. The terrain in this area rises from the Turnpike.
- **NSA-N5** includes Valley Forge National Park's frontage along the Turnpike and extends for approximately 9,000 feet from Sta. 1242 to Sta. 1332. Noise-sensitive areas of the Park in close proximity to the Turnpike include Lafayette's Quarters (near Sta. 1260, west of Wilson Road) and the Whittle residence, immediately east of Wilson Road (near Sta. 1266). Although portions of the Turnpike in this area are on fill, the terrain generally rises to the north away from the Turnpike.
- **NSA-N6** runs from Sta. 1332, about 800 feet west of Thomas Road, east to US 422 (Sta. 1383), a distance of approximately 5,100 feet. This NSA includes single-family homes along Thomas Road, Richards Road, Stephens Drive, Weedon Road, Glenhardie Road, Worthington Road, and Gulph Road. West of Glenhardie Road, the area includes Trout Creek and is relatively low-lying in relation to the Turnpike. Near the east end of the NSA, the Turnpike rises on an embankment leading to the overpass above US 422.

4.1.2 NSAs South of Turnpike

- **NSA-S1** extends from approximately 300 feet west of Howells Road (Sta. 1071), east to the Turnpike bridge over Yellow Springs Road (Sta. 1148+50), a distance of approximately 7,750 feet. Land use west of this NSA to the project limit consists of commercial properties both north and south of Yellow Springs Road. Immediately west of Howells Road, the NSA includes several single-family and multi-family residences interspersed with commercial properties on the north side of Yellow Springs Road. East of Howells Road, the area includes single-family homes along both the north and south sides of Yellow Springs Road and also along Saint Johns Road, Indian Run Road, Salem Way, Salem Court, Standiford Drive, and the west side of North Valley Road. Throughout this area, the terrain generally slopes upward from adjacent residences north towards the Turnpike.

- **NSA-S2** runs from the Yellow Springs Road overpass (Sta. 1148+50) east to Sta. 1174, a distance of approximately 2,550 feet. This area includes several single-family homes on the east side of North Valley Road in addition to the Vanguard School and the Crossroads School. The Vanguard School is a non-profit, state-licensed, academic day school that is one of 30 Pennsylvania Approved Private Schools (APS) for Special Education, selected by the Pennsylvania Department of Education (PDE). Approximately 230 pre-kindergarten through Grade 12 students attend classes at the 28-acre campus adjacent to the south side of the Turnpike.[10] The Crossroads School is a small, private, non-profit coeducational school for youngsters aged 5 to 15 whose learning profiles indicates average or above academic potential, but who process language differently and as a result have difficulty in conventional schools. Up to 118 kindergarten through Grade 8 students attend the Crossroads School. The two schools share a gymnasium, playing field, full ropes course and multipurpose room.[11] The Turnpike is located at the top of an embankment throughout this area.

- **NSA-S3** extends eastward from Sta. 1174 to the point where Mill Road passes over the Turnpike. (Sta. 1202), a distance of approximately 2,800 feet. This NSA includes single-family homes on several cul de sacs ending near the Turnpike including Hawkweed Way, Larkspur Way, Thistle Way, and Adler Lane. The topography varies throughout the NSA with the Turnpike on fill in some portions and depressed in others.

- **NSA-S4** includes the area between Mill Road (Sta. 1202) and the stream (tributary to Valley Creek) near Sta. 1224, a distance of approximately 2,200 feet. The area includes single-family homes on Armstrong Court and Burgoyne Court, multi-family residences on Sturbridge Lane and Main Street, and one two-family home at the east end of the NSA. The topography varies throughout the NSA with the Turnpike on fill in some portions and depressed in others.

- **NSA-S5** runs from the stream (tributary to Valley Creek) near Sta. 1224 east to Valley Creek (Sta. 1250), a distance of approximately 2,600 feet. This NSA includes multi-family residences within the Chesterbrook Community on Washington Place, Yorktown Place, Eagles Ridge Drive, Valley Stream Circle, and Valley Stream Lane. The topography varies throughout the NSA with the Turnpike on fill in some portions and depressed in others.

- **NSA-S6** extends eastward from Valley Creek (Sta. 1250) to the Valley Forge Road overpass above the Turnpike (Sta. 1295), a distance of approximately 4,500 feet. West of Wilson Road, this area includes multi-family residences and townhouses within the Chesterbrook Community on Iroquois Court, Sullivans Bridge Road, Applehouse Pond Drive, Springhouse Pond Drive, Kettlehouse Pond Drive, and Millhouse Pond Drive. The closest residences to the Turnpike in this area are located up an embankment from the roadway. East of Wilson Road, the NSA includes single-family homes on Morgan Lane, Lafayette Lane, Salomon Lane, and Franklin Lane. In general, the Turnpike is located in a shallow cut section relative to the residences in this area.

- **NSA-S7** extends from Valley Forge Road (Sta. 1296) east to the point where the Turnpike crosses above Glenhardie Road (Sta. 1364), a distance of approximately 6,800 feet. The Valley Forge Service Plaza is located immediately east of the Valley Forge Road overpass between the Turnpike and single-family homes on Potter Lane, Stirling Drive, and Anthony Wayne Drive. Between the Service Plaza and Thomas Road, single-family homes are located along several cul de sacs off of Red Coat Lane including Woodford Drive, Bradford Lane, Pulaski Lane, and Lexington Lane. East of Thomas Road, the NSA includes single-family homes on Park Ridge

[10] http://www.vanguardschool-pa.org/About%20Vanguard/vanguard_facts.php (August 6, 2007).
[11] http://www.thecrossroadsschool.net/ (August 8, 2007).

Drive, Park Ridge Terrace, and Colonel Dewees Road. In general, the Turnpike is at-grade or in a shallow cut west of Thomas Road and on fill east of Thomas Road.

- **NSA-S8** runs eastward from Glenhardie Road (Sta. 1364) to US 422 (Sta. 1383), a distance of approximately 1,900 feet. This NSA includes multi-family residences on Drummer's Lane within the Glenhardie Community and also, immediately east of Glenhardie Road, the Glenhardie Country Club golf course. The Turnpike is elevated on fill throughout this area. An existing noise barrier along the west side of US 422 is located along the eastern end of the NSA.

4.2 Monitored Highway Traffic Noise Results

The existing noise environment within the study area was documented with measurements at 28 noise-sensitive sites, including four long-term sites and 24 short-term sites, conducted from January 30 to February 1, 2007 (see Figure 2). At least one measurement was conducted in each of the 14 NSAs.

All noise measurements were conducted with either Larson Davis Model 820 or 870 sound level meters. All of the sound level meters were ANSI Precision (Type 1) instruments with calibrations traceable to the National Institute of Standards and Technology (NIST). In addition, the sound level meters were field calibrated before and after each measurement with acoustical calibrators traceable to the NIST.

The purpose of the measurements was three-fold. The first objective was to document existing sound levels within the study area; the second goal was to document the 24-hour pattern of noise levels to assist in determining the loudest hour of the day; and the third goal was to obtain measurement data that would allow "validation" of the traffic-noise prediction modeling for these particular barrier areas and thus provide increased confidence in the modeling. Section 5.1 describes the validation procedure in more detail.

4.2.1 Long-term Measurements

Long-term measurements of at least 48 hours duration were conducted at a total of four residential sites distributed in four NSAs:

- Site LT1 was located in the backyard of 2015 Yellow Springs in NSA-S1 from 4:00 PM on January 30 until 4:00 PM on February 1.
- Site LT2 was located adjacent to the backyard pool area at 940 Yellow Springs Road in NSA-N4 from 3:00 PM on January 30 until 3:00 PM on February 1.
- Site LT3 was located in the backyard of 251 Lafayette Lane in NSA-S6 from 2:00 PM on January 30 until 2:00 PM on February 1.
- Site LT4 was located behind the backyard pool area at 578 Richards Road in NSA N6 from 1:00 PM on January 30 until 4:00 PM on February 1.

The objectives of the long-term measurements were to:

- Identify the loudest-hour of the day at representative locations where Turnpike traffic dominated noise levels.
- Help document existing noise levels and provide information on the 24-hour pattern of noise levels throughout the day and night.

The four long-term measurement sites were selected according to the following requirements:

- *Provide geographical representation within the study area.* Locations were selected throughout the study area (west to east) and also on both the north and south sides of the Turnpike.
- *Determine Turnpike-influenced loudest hour.* All long-term sites were at first-row locations on the unshielded sides of buildings to ensure that Turnpike traffic dominated noise levels and that non-Turnpike noise sources would not influence determination of the loudest hour.
- *Represent noise-sensitive land uses within the assessment area.* All long-term sites were located in residential areas. Additional short-term measurements were conducted at other noise sensitive locations such as the Vanguard School and Valley Forge National Park.

For each site, these procedures were followed:

- The noise monitors were programmed to collect hourly sound level data including equivalent sound level (L_{eq}) and statistical descriptors (L_n). The hourly L_{eq} data were be used to identify loudest-hour conditions. The L_n data were used primarily for diagnostic purposes.
- The noise monitors were field calibrated before and after each long-term measurement.
- A long-term site log (see Appendix D) was completed for each measurement site.
- Photographs were taken of each measurement site showing the microphone location relative to the Turnpike, adjacent land use, and shielding features such as terrain, bridge parapets, and buildings.
- Following the field measurements, interval data were transferred to a spreadsheet to be tabulated and graphed.

The results of the long-term measurements were used to determine the daily cycle of fluctuations in noise levels and to assist in identifying the loudest hour of the day.

Figure 3 through Figure 10 show the measured hourly noise levels at the four long-term sites (the horizontal axis of each graph shows the hours of the day in 24-hour "military" time). For each site, two graphs showing contiguous 24-hour intervals are provided. Each graph includes the following noise descriptors for each one-hour interval: L_{eq}, L_1, L_{10}, L_{33}, L_{50}, and L_{90}. The hourly L_{eq} is the most common descriptor for measuring traffic noise levels and is used in most highway noise-barrier analyses. PennDOT Publication No. 24 requires the use of L_{eq} for traffic noise studies[12]. The noise descriptors with numerical subscripts are statistical descriptors, which represent a noise level that is exceeded a certain percentage of the time.

The statistical descriptors provide useful additional information about the fluctuating sound level during the measurement period. For example, L_1 is the noise level exceeded for one percent of the measurement hour -- that is, the fluctuating sound level is louder than the L_1 for only 36 seconds out of the hour. Therefore, the L_1 is nearly the highest sound level that occurred during the measurement period. In contrast, the L_{90}, which often is considered to represent the "background" sound level, is the sound level exceeded 90% of the time. The L_{33}, the noise level exceeded 33% of the hour, is often approximately equal to the hourly L_{eq} at locations dominated by traffic noise. For nearly all of the one-hour periods, the L_{33} at each of the long-term sites was approximately equal to the hourly L_{eq}. This is an indication that highway traffic was the dominant source of noise at each of the long-term sites.

[12] PennDOT Publication No. 24, Section 3.3.1, Table 1.

4.2.2 Short-term Measurements

Short-term measurements, of 20 to 30 minutes duration, were made at 24 noise-sensitive sites on January 31 and February 1, 2007. Figure 2 shows the locations of the noise measurement sites and Table 3 provides a summary of the measurement results.

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

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

The short-term measurement sites were selected according to 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:
    1. Distance to the Turnpike.
    2. Absence or presence of shielding (e.g., first-row vs. second-row receptors).
    3. Roadway/receiver geometry (e.g., Turnpike depressed or on-fill, receptors on hillside overlooking Turnpike, presence of entrance/exit ramps, etc.).
    4. Influence of other 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, set back the same distance from the Turnpike 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.
- *Conduct additional measurements at 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 1 instruments with calibrations traceable to NIST.
- The sound level meters were field calibrated before and after each short-term measurement.
- Measurements were conducted for a 20-minute to 30-minute period. Individual one-minute L_{eq}s were recorded so that periods including events not representative of the ambient noise environment or not traffic-related could be separated or excluded. Specifically, minutes that include such events were logged, and those with events not representative of the ambient environment eliminated. Minutes with representative events not related to traffic were separated, and the total measurement period L_{eq} determined both with and without the minutes that included

these events. By comparing the two totals, the significance of non-traffic events (such as aircraft operations) to the overall noise level was determined for the measurement period.

- A short-term site data sheet (see Appendix D) was completed for each measurement site.
- Weather data including wind speed and direction, temperature, and relative humidity were recorded during each measurement period.
- 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. A traffic volume count data sheet and speed data sheet (see Appendix D) were completed for each short-term measurement (in some cases one traffic volume and/or speed data sheet applied to more than one short-term noise measurement).
- No short-term measurements were conducted during periods of 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 mainline Turnpike pavement was wet.
- Photographs were taken of each measurement site showing the microphone location relative to the Turnpike, adjacent land use, and shielding features such as terrain, bridge parapets, and buildings.

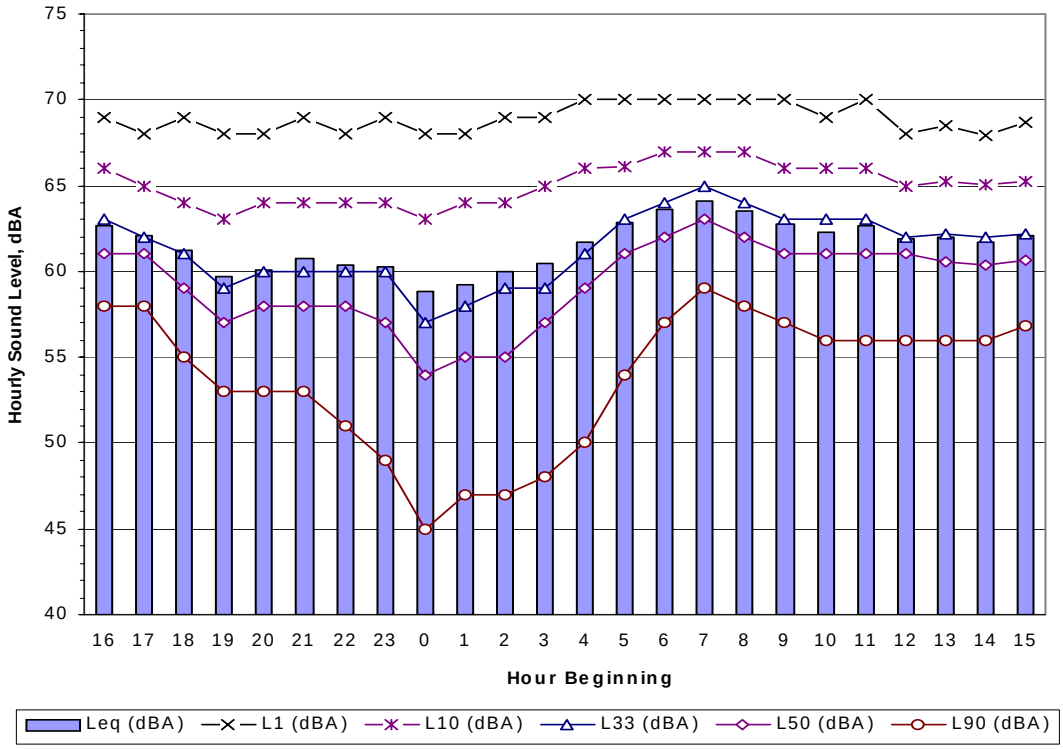

Figure 3. LT1, 2015 Yellow Springs Road, January 30-31, 2007

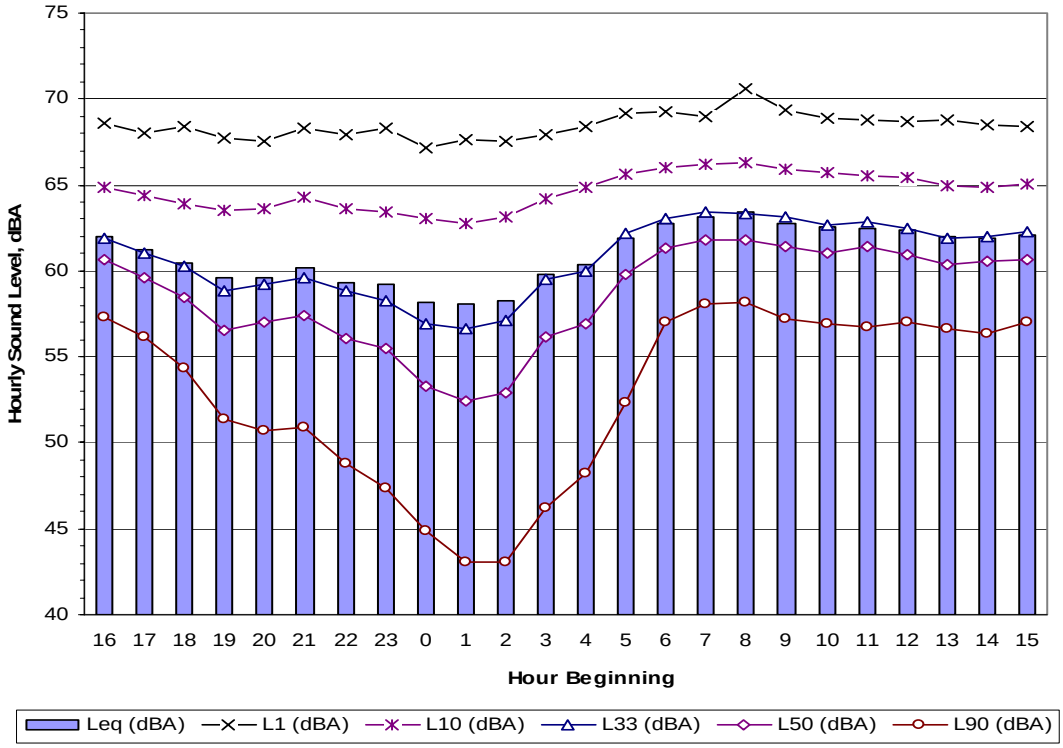

Figure 4. LT1, 2015 Yellow Springs Road, January 31-February 1, 2007

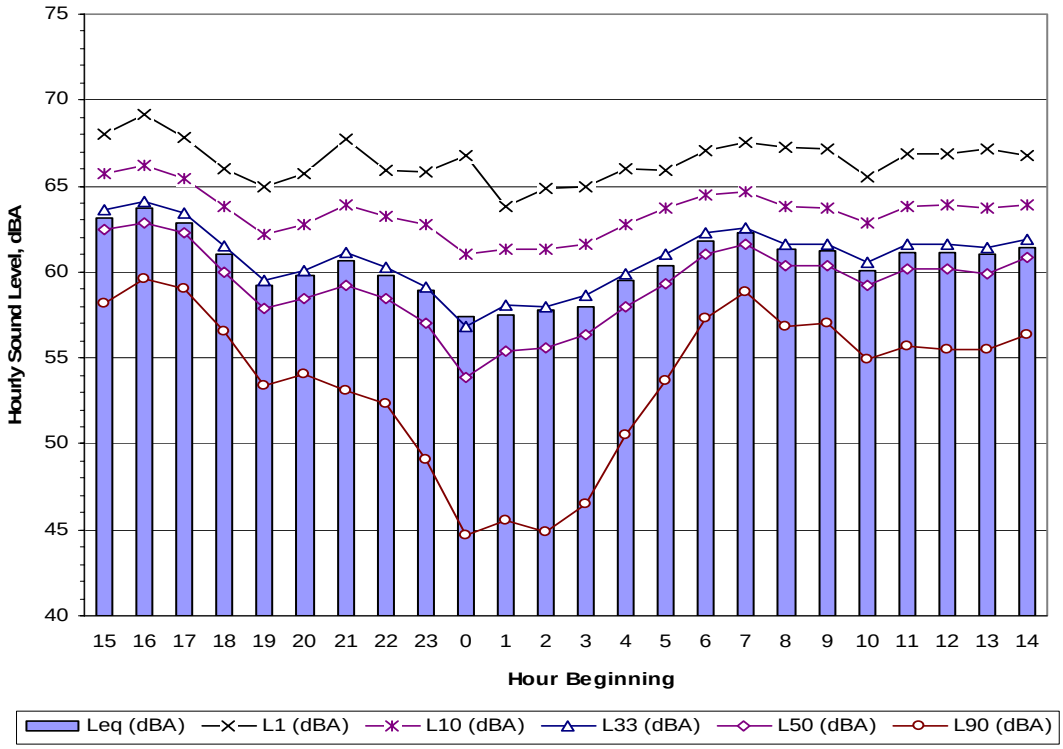

Figure 5. LT2, 940 Yellow Springs Road, January 30-31, 2007

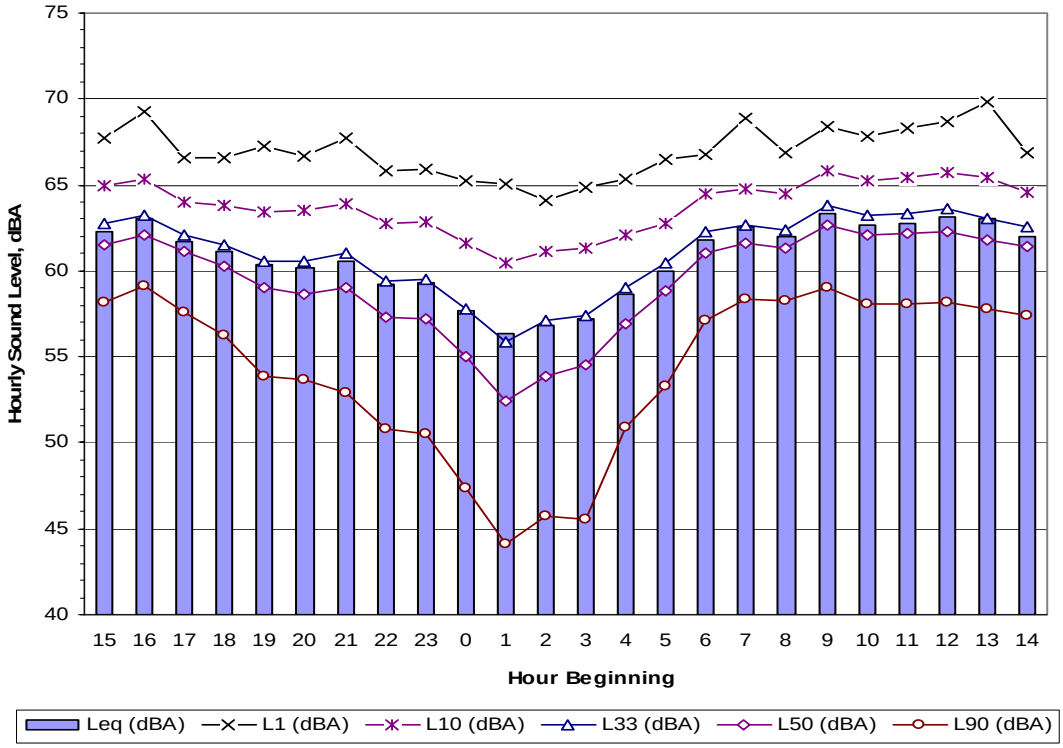

Figure 6. LT2, 940 Yellow Springs Road, January 31-February 1, 2007

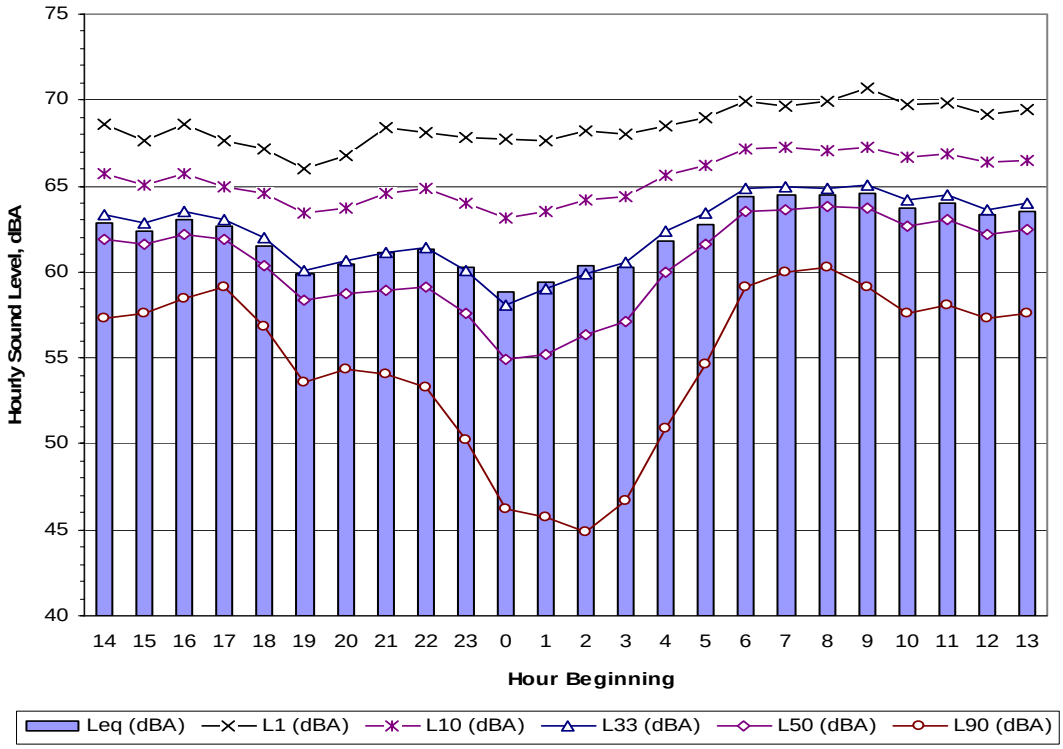

Figure 7. LT3, 251 Lafayette Lane, January 30-31, 2007

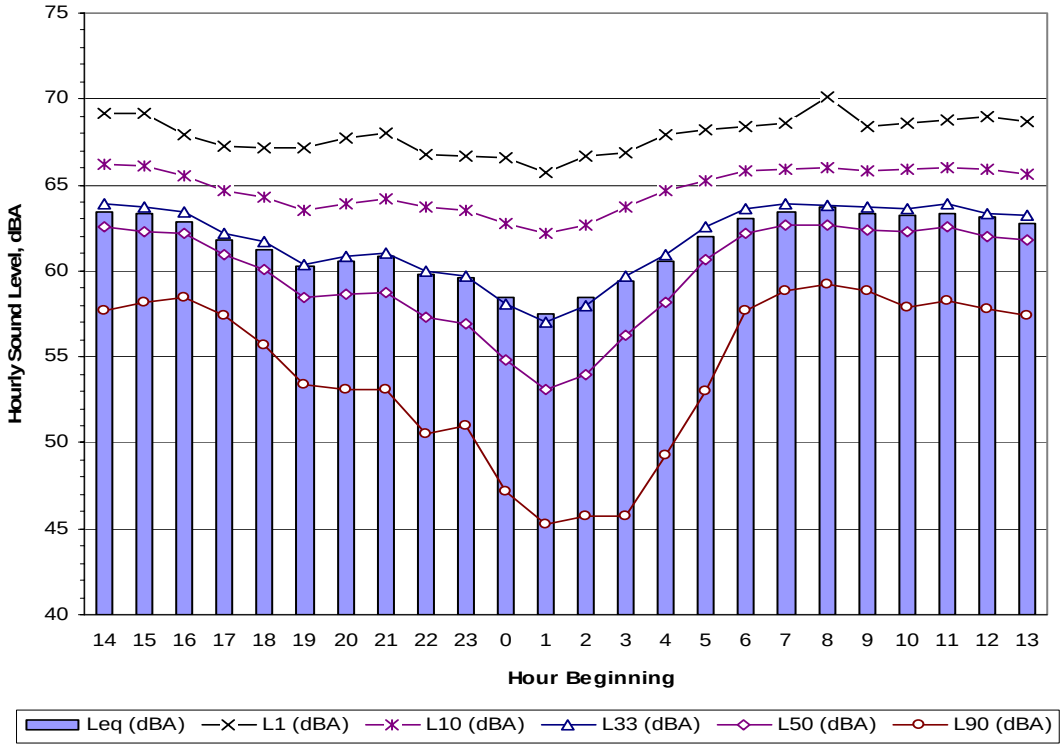

Figure 8. LT3, 251 Lafayette Lane, January 31-February 1, 2007

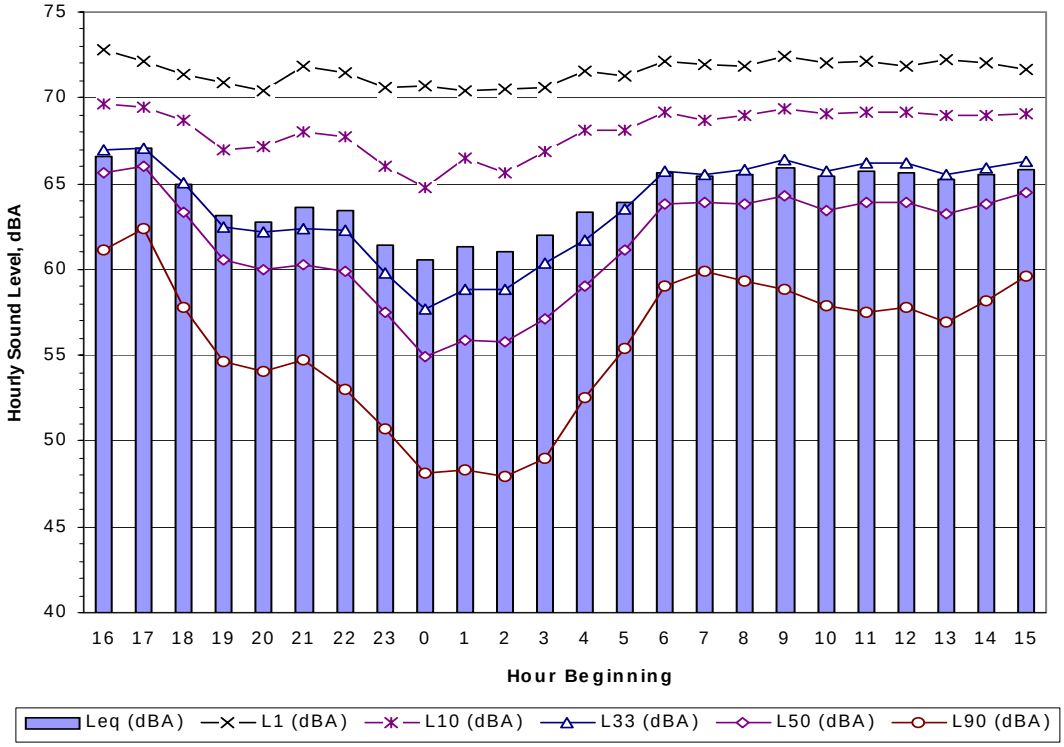

Figure 9. LT4, 578 Richards Road, January 30-31, 2007

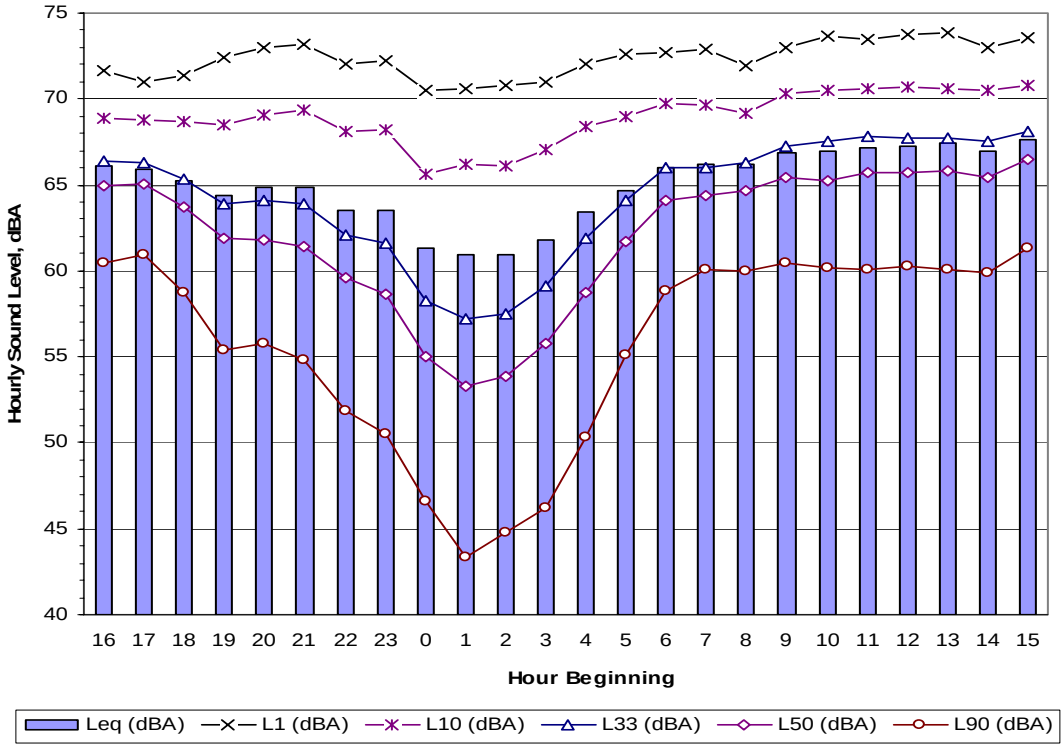

Figure 10. LT4, 578 Richards Road, January 31-February 1, 2007

Table 3. Summary of Short-term Noise Measurement Results

Site No.	NSA	Site Address/Description[1]	Date	Time (24-hour)	Measured L_{eq} (dBA)
ST1	S1	2445-2443 Yellow Springs Road 1st row, SFH, back yard	1/31/07	10:00 to 10:30	61
ST2	N1	2030 Green Lane 1st row, SFH, back yard	1/31/07	11:03 to 11:33	64
ST3	S1	2305 Yellow Springs Road 1st row, SFH, back yard	1/31/07	11:53 to 12:23	65
ST4	N2	1990 Chautauqua Trail 1st row (set back), SFH, back yard	1/31/07	15:49 to 16:19	50
ST5	N2	1889 White Deer Trail 1st row, SFH, front yard	1/31/07	14:59 to 15:29	62
ST6	S1	1923 Standiford Drive 2nd row, SFH, back yard	1/31/07	14:09 to 14:39	54
ST 7	S2	1777 North Valley Road, The Vanguard School 1st row, outdoor use area/picnic tables	2/1/07	08:58 to 09:28	66
ST 8	N3	1919 Wellspring Lane 1st row, SFH, back yard	2/1/07	09:49 to 10:19	64
ST 9	S3	1809 Hawkweed Way 1st row, SFH, back yard	2/1/07	14:20 to 14:40	61
ST10	S3	1708 Adler Lane 1st row, SFH, back yard	2/1/07	13:34 to 14:04	62
ST11	S4	29 Main Street 1st row, MFH (townhouse), back yard/deck	2/1/07	11:35 to 12:05	64
ST12	N4	1906 General Alexander Way 3rd row, SFH, side yard	2/1/07	10:40 to 11:00	58
ST13	N4	1853 Covered Bridge Lane 1st row, SFH, back yard	2/1/07	11:20 to 11:50	63
ST14	S5	1213 Eagles Ridge Drive 1st row, MFH, outdoor use area	2/1/07	10:39 to 11:09	67
ST15	S6	307 Applehouse Pond Drive 1st row, MFH (townhouse), back yard/deck	2/1/07	09:49 to 10:11	68
ST16	N5	Lafayette's Quarters, Valley Forge National Park	2/1/07	09:08 to 09:28	65
ST17	S7	1465 Anthony Wayne Drive 1st row, SFH, back yard	1/31/07	17:03 to 17:23	55
ST18	S7	1497 Lexington Lane 1st row, SFH, back yard	1/31/07	16:01 to 16:21	62
ST19	N6	1503 Stevens Drive 2nd row, SFH, front yard	1/31/07	12:03 to 12:33	57
ST20	S7	587 Park Ridge Drive 1st row, SFH, back yard	1/31/07	14:33 to 14:54	66
ST21	S7	591 Col. Dewees Drive 3rd row, SFH, back yard	1/31/07	15:16 to 15:36	56
ST22	N6	780 Worthington Road 1st row, SFH, back yard	1/31/07	11:04 to 11:34	67
ST23	N6	799 Gulph Road 1st row, SFH, back yard	2/1/07	15:05 to 15:35	69
ST24	S8	Glenhardie Condominiums 1st row, MFH, outdoor use area	2/1/07	15:13 to 15:33	63

[1]SFH = single-family home, MFH = multi-family housing, 1st row = adjacent to mainline, 2nd row = 1 row of intervening buildings, etc.

Source: HMMH, 2007.

5. FUTURE HIGHWAY TRAFFIC NOISE ENVIRONMENT (EXISTING AND FUTURE MODELED)

5.1 Validation of Noise Modeling

Although TNM has been shown to be quite accurate for most situations, the modeling for a specific project area typically is "validated" by comparison of computed results with measured noise data. PennDOT Publication No. 24 describes the purpose of modeling validation and describes the procedure.[13] To help accomplish the modeling validation, simultaneous traffic counts and noise measurements were conducted during the 24 short-term measurements described in Section 4.2.2. The traffic counts included cars (including pickup trucks), medium trucks (six tires, two axles), and heavy trucks (three or more axles), by direction. Following the measurements, the traffic counts were normalized to hourly volumes and used as input to the noise prediction model. Based on a comparison of measured and computed sound levels, minor refinements were made to the TNM model. Typically these included adjustments to noise propagation and shielding assumptions including TNM parameters such as terrain lines and building rows.

Table 4 presents the measured and computed noise levels for all 24 short-term measurement sites following refinement of the noise modeling. Note that the measured and computed sound levels do not necessarily represent loudest-hour conditions. The table indicates that the sound levels computed by TNM at the measurement sites ranged from approximately four decibels higher to two decibels lower than the measured sound levels. The average difference between the calculated hourly L_{eq} and the measured L_{eq} was approximately 2 dB with a standard deviation of less than 2 dB.

PennDOT Publication No. 24, Section 2.5.3.3 states that "if the difference between the [measured and computed] values is less than +/- 3 dB(A), this is an indication that the model is within the accepted level of accuracy." Of the 24 validation sites, only one site had a difference greater than 3 dB and the average across all sites was less than 3 dB. This demonstrated agreement between measured and computed sound levels provides a high level of confidence in TNM's computations throughout the study area. In addition, the bias towards a slight overprediction of approximately 2 dB implies that the noise model is appropriately conservative and would tend to slightly overpredict, rather than underpredict, noise impacts.

5.2 Loudest-Hour Computations

Following refinement and validation of the noise model, TNM was used to compute loudest-hour noise levels at a total of 420 representative prediction sites, or receivers, distributed throughout the 14 NSAs (28 of the prediction sites also were measurement sites). Most prediction sites were outdoor, ground-floor locations. However, in some cases, sound levels were computed at second-floor and third-floor outdoor balconies when these were judged to be the primary outdoor use areas for multi-family buildings. Figure 11 shows the locations of all prediction sites. The sound propagation and shielding assumptions used in the loudest-hour predictions were similar to those developed during the noise model validation. Section 3.2 of this report describes the TNM model and Section 5.1 describes the validation procedure.

Table 5 provides the loudest-hour sound levels computed for existing (2007) and future (2035) conditions. The table is organized by NSA, starting with NSAs north of the Turnpike from west to east and followed by NSAs south of the Turnpike, also from west to east. For each prediction site, the table provides the number of receptor units represented by the prediction site and the loudest-hour sound levels

[13] Ibid., Section 2.5.3.

for both existing and future conditions. The site numbers shown in the table correspond to the labels shown on Figure 11.

Table 4. Measured vs. Computed Sound Levels

Site No.	NSA	Address/Location	Hourly L_{eq} (dBA) [1]		Calculated *minus* Measured L_{eq} (dB)
			Measured	Calculated With Traffic Counted During Measurement	
ST1	S1	2445-2443 Yellow Springs Road	61	64	3
ST2	N1	2030 Green Lane	64	66	2
ST3	S1	2305 Yellow Springs Road	65	66	1
ST4	N2	1990 Chautauqua Trail	50	52	2
ST5	N2	1889 White Deer Trail	62	64	2
ST6	S1	1923 Standiford Drive	54	56	2
ST 7	S2	1777 North Valley Road, The Vanguard School	66	67	1
ST 8	N3	1919 Wellspring Lane	64	65	1
ST 9	S3	1809 Hawkweed Way	61	60	-1
ST10	S3	1708 Adler Lane	62	65	3
ST11	S4	29 Main Street	64	65	1
ST12	N4	1906 General Alexander Way	58	56	-2
ST13	N4	1853 Covered Bridge Lane	63	64	1
ST14	S5	1213 Eagles Ridge Drive	67	70	3
ST15	S6	307 Applehouse Pond Drive	68	70	2
ST16	N5	Lafayette's Quarters, Valley Forge National Park	65	67	2
ST17	S7	1465 Anthony Wayne Drive	55	55	0
ST18	S7	1497 Lexington Lane	62	66	4
ST19	N6	1503 Stevens Drive	57	60	3
ST20	S7	587 Park Ridge Drive	66	68	2
ST21	S7	591 Col. Dewees Drive	56	56	0
ST22	N6	780 Worthington Road	67	70	3
ST23	N6	799 Gulph Road	69	72	3
ST24	S8	Glenhardie Condominiums	63	66	3
Average Difference:					2

[1]Note that measured and computed sound levels do not necessarily represent loudest-hour conditions.

Source: HMMH, 2007.

Table 5. Computed 2007 and 2035 Loudest-Hour Sound Levels

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-N1	N1_01	1	71	73	+2
NSA-N1	N1_02	2	72	74	+2
NSA-N1	N1_03	1	71	73	+2
NSA-N1	N1_04_ST2[2]	1	68	71	+3
NSA-N1	N1_05	1	64	66	+2
NSA-N1	N1_06	1	68	70	+2
NSA-N1	N1_07	1	64	66	+2
NSA-N1	N1_08	1	64	66	+2
NSA-N2	N2_01	1	71	73	+2
NSA-N2	N2_02	1	65	67	+2
NSA-N2	N2_03_ST5[2]	1	65	68	+3
NSA-N2	N2_04	1	68	70	+2
NSA-N2	N2_05	1	67	69	+2
NSA-N2	N2_06_ST4[2]	1	56	59	+3
NSA-N2	N2_07	1	57	60	+3
NSA-N2	N2_08	1	53	56	+3
NSA-N2	N2_09	4	56	60	+4
NSA-N2	N2_10	1	63	66	+3
NSA-N2	N2_11	1	61	63	+2
NSA-N3	N3_01	1	71	73	+2
NSA-N3	N3_02	1	71	73	+2
NSA-N3	N3_03_ST8[2]	1	72	74	+2
NSA-N3	N3_04	1	66	69	+3
NSA-N3	N3_05	1	62	65	+3
NSA-N3	N3_06	1	63	66	+3
NSA-N3	N3_07	1	64	65	+1
NSA-N3	N3_08	1	64	66	+2
NSA-N3	N3_09	1	60	63	+3
NSA-N3	N3_10	1	65	66	+1
NSA-N3	N3_11	2	62	65	+3
NSA-N3	N3_12	2	61	63	+2
NSA-N4	N4_01	1	71	72	+1
NSA-N4	N4_02	1	70	72	+2
NSA-N4	N4_03_LT2[2]	1	69	71	+2
NSA-N4	N4_04	1	73	74	+1
NSA-N4	N4_05_ST13[2]	3	65	67	+2
NSA-N4	N4_06	1	62	65	+3
NSA-N4	N4_07	5	64	66	+2
NSA-N4	N4_08	2	61	64	+3
NSA-N4	N4_09	2	62	65	+3
NSA-N4	N4_10	2	62	64	+2
NSA-N4	N4_11	2	58	60	+2
NSA-N4	N4_12	1	56	59	+3
NSA-N4	N4_13	1	58	61	+3

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-N4	N4_14	1	57	59	+2
NSA-N4	N4_15_ST12[2]	4	59	62	+3
NSA-N5	N5_01_ST16[2]	0	68	73	+5
NSA-N5	N5_02	0	72	73	+1
NSA-N5	N5_P1	0	73	75	+2
NSA-N5	N5_P2	0	66	68	+2
NSA-N5	N5_P3	0	60	62	+2
NSA-N5	N5_P4	0	69	70	+1
NSA-N5	N5_P5	0	66	68	+2
NSA-N5	N5_P6	0	60	63	+3
NSA-N5	N5_P7	0	57	59	+2
NSA-N5	N5_P8	0	57	59	+2
NSA-N6	N6_01	1	64	65	+1
NSA-N6	N6_02	1	71	73	+2
NSA-N6	N6_03	3	69	71	+2
NSA-N6	N6_04_LT4[2]	4	68	70	+2
NSA-N6	N6_05	3	66	68	+2
NSA-N6	N6_06	1	66	66	0
NSA-N6	N6_07	2	64	65	+1
NSA-N6	N6_08	1	70	70	0
NSA-N6	N6_09	1	65	66	+1
NSA-N6	N6_10	1	67	68	+1
NSA-N6	N6_11	2	69	68	-1
NSA-N6	N6_12_ST22[2]	3	72	73	+1
NSA-N6	N6_13	3	71	71	0
NSA-N6	N6_14	1	70	72	+2
NSA-N6	N6_15_ST23[2]	1	70	67	-3
NSA-N6	N6_16	2	59	61	+2
NSA-N6	N6_17	4	63	65	+2
NSA-N6	N6_18_ST19[2]	4	63	64	+1
NSA-N6	N6_19	2	63	64	+1
NSA-N6	N6_20	2	62	63	+1
NSA-N6	N6_21	2	61	62	+1
NSA-N6	N6_22	6	65	66	+1
NSA-N6	N6_23	2	64	65	+1
NSA-N6	N6_24	1	66	66	0
NSA-N6	N6_25	3	64	65	+1
NSA-N6	N6_26	3	60	62	+2
NSA-N6	N6_27	3	63	65	+2
NSA-N6	N6_28	4	60	62	+2
NSA-N6	N6_29	3	58	60	+2
NSA-N6	N6_30	4	59	61	+2
NSA-N6	N6_31	4	61	60	-1
NSA-S1	S1_01	2	66	66	0
NSA-S1	S1_02_ST1[2]	3	67	68	+1
NSA-S1	S1_03	6	66	67	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S1	S1_04	1	67	68	+1
NSA-S1	S1_05	1	66	68	+2
NSA-S1	S1_06	1	67	68	+1
NSA-S1	S1_07_ST3[2]	1	68	70	+2
NSA-S1	S1_08	1	64	65	+1
NSA-S1	S1_09	1	65	66	+1
NSA-S1	S1_10	1	66	68	+2
NSA-S1	S1_11	1	70	71	+1
NSA-S1	S1_12	4	67	69	+2
NSA-S1	S1_13	1	67	69	+2
NSA-S1	S1_14	1	66	67	+1
NSA-S1	S1_15_LT1[2]	3	66	66	0
NSA-S1	S1_16	5	63	64	+1
NSA-S1	S1_17	1	69	69	0
NSA-S1	S1_18	1	58	59	+1
NSA-S1	S1_19	2	67	69	+2
NSA-S1	S1_20	4	62	63	+1
NSA-S1	S1_21	2	64	65	+1
NSA-S1	S1_22	1	61	63	+2
NSA-S1	S1_23	1	65	67	+2
NSA-S1	S1_24	1	65	67	+2
NSA-S1	S1_25	2	64	65	+1
NSA-S1	S1_26	2	63	65	+2
NSA-S1	S1_27	1	63	65	+2
NSA-S1	S1_28	2	60	62	+2
NSA-S1	S1_29	2	62	63	+1
NSA-S1	S1_30	2	58	60	+2
NSA-S1	S1_31	1	59	61	+2
NSA-S1	S1_32_ST6[2]	5	60	61	+1
NSA-S1	S1_33	1	64	64	0
NSA-S1	S1_34	2	60	61	+1
NSA-S1	S1_35	1	58	60	+2
NSA-S1	S1_36	2	59	61	+2
NSA-S1	S1_37	2	57	59	+2
NSA-S1	S1_38	6	57	58	+1
NSA-S1	S1_39	1	60	61	+1
NSA-S2	S2_01	1	67	67	0
NSA-S2	S2_02_ST7[2]	0	69	70	+1
NSA-S2	S2_03	0	65	67	+2
NSA-S2	S2_04	1	63	63	0
NSA-S2	S2_05	1	61	62	+1
NSA-S2	S2_06	1	56	58	+2
NSA-S2	S2_07	3	55	57	+2
NSA-S2	S2_08	1	53	55	+2
NSA-S2	S2_09	0	58	59	+1
NSA-S2	S2_10	0	61	62	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S3	S3_01	1	63	65	+2
NSA-S3	S3_02_ST9[2]	2	66	69	+3
NSA-S3	S3_03	2	68	70	+2
NSA-S3	S3_04	1	67	69	+2
NSA-S3	S3_05	1	67	69	+2
NSA-S3	S3_06	4	62	64	+2
NSA-S3	S3_07	1	62	64	+2
NSA-S3	S3_08_ST10[2]	1	67	68	+1
NSA-S3	S3_09	2	73	75	+2
NSA-S3	S3_10	2	59	61	+2
NSA-S3	S3_11	1	63	64	+1
NSA-S3	S3_12	3	63	65	+2
NSA-S3	S3_13	3	61	63	+2
NSA-S3	S3_14	3	60	61	+1
NSA-S3	S3_15	2	63	64	+1
NSA-S3	S3_16	1	66	67	+1
NSA-S3	S3_17	3	57	59	+2
NSA-S3	S3_18	2	62	63	+1
NSA-S3	S3_19	4	63	64	+1
NSA-S3	S3_20	2	56	57	+1
NSA-S3	S3_21	3	55	57	+2
NSA-S3	S3_22	3	60	62	+2
NSA-S3	S3_23	2	60	62	+2
NSA-S3	S3_24	5	54	56	+2
NSA-S4	S4_01	2	74	76	+2
NSA-S4	S4_02	2	72	73	+1
NSA-S4	S4_03	1	74	75	+1
NSA-S4	S4_04	3	75	77	+2
NSA-S4	S4_05_ST11[2]	10	68	70	+2
NSA-S4	S4_06	6	75	77	+2
NSA-S4	S4_07	2	74	76	+2
NSA-S4	S4_08	2	64	65	+1
NSA-S4	S4_09	1	66	68	+2
NSA-S4	S4_10	2	69	70	+1
NSA-S4	S4_11	6	70	71	+1
NSA-S4	S4_12	14	64	66	+2
NSA-S4	S4_13	6	61	64	+3
NSA-S4	S4_14	3	58	59	+1
NSA-S4	S4_15	2	60	62	+2
NSA-S4	S4_16	6	61	63	+2
NSA-S4	S4_17	6	60	61	+1
NSA-S4	S4_18	3	54	55	+1
NSA-S4	S4_19	4	58	60	+2
NSA-S4	S4_20	11	65	67	+2
NSA-S4	S4_21	13	61	62	+1
NSA-S4	S4_22	5	62	64	+2

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S4	S4_23	9	58	60	+2
NSA-S4	S4_24	6	59	60	+1
NSA-S4	S4_25	6	61	63	+2
NSA-S5	S5_01, 1st floor	2	70	71	+1
NSA-S5	S5_01, 2nd floor	2	73	75	+2
NSA-S5	S5_02, 1st floor	2	72	73	+1
NSA-S5	S5_02, 2nd floor	2	73	75	+2
NSA-S5	S5_03, 1st floor	2	71	73	+2
NSA-S5	S5_03, 2nd floor	2	72	75	+3
NSA-S5	S5_03, 3rd floor	2	73	76	+3
NSA-S5	S5_04, 1st floor	2	69	71	+2
NSA-S5	S5_04, 2nd floor	2	71	75	+4
NSA-S5	S5_05, 1st floor	2	64	66	+2
NSA-S5	S5_05, 2nd floor	2	66	69	+3
NSA-S5	S5_06, 1st floor	2	70	72	+2
NSA-S5	S5_06, 2nd floor	2	71	74	+3
NSA-S5	S5_07, 1st floor	5	68	69	+1
NSA-S5	S5_07, 2nd floor	5	72	74	+2
NSA-S5	S5_08, 1st floor	5	71	72	+1
NSA-S5	S5_08, 2nd floor	5	72	74	+2
NSA-S5	S5_09, 1st floor	4	70	72	+2
NSA-S5	S5_09, 2nd floor	4	74	76	+2
NSA-S5	S5_10, 1st floor	5	70	71	+1
NSA-S5	S5_10, 2nd floor	5	73	75	+2
NSA-S5	S5_11, 1st floor	6	68	69	+1
NSA-S5	S5_11, 2nd floor	6	71	73	+2
NSA-S5	S5_12, 1st floor	2	64	65	+1
NSA-S5	S5_12, 2nd floor	2	68	70	+2
NSA-S5	S5_13, 1st floor	2	67	66	-1
NSA-S5	S5_13, 2nd floor	2	70	72	+2
NSA-S5	S5_14, 1st floor	2	59	61	+2
NSA-S5	S5_14, 2nd floor	2	63	65	+2
NSA-S5	S5_14, 3rd floor	2	68	70	+2
NSA-S5	S5_15, 1st floor	2	62	64	+2
NSA-S5	S5_15, 2nd floor	2	66	68	+2
NSA-S5	S5_15, 3rd floor	2	68	70	+2
NSA-S5	S5_16, 1st floor	2	60	62	+2
NSA-S5	S5_16, 2nd floor	2	64	66	+2
NSA-S5	S5_17, 1st floor	2	67	69	+2
NSA-S5	S5_17, 2nd floor	2	69	71	+2
NSA-S5	S5_18, 1st floor	5	66	67	+1
NSA-S5	S5_18, 2nd floor	5	71	72	+1
NSA-S5	S5_19, 1st floor	6	68	68	0
NSA-S5	S5_19, 2nd floor	6	70	72	+2
NSA-S5	S5_20, 1st floor	5	66	68	+2
NSA-S5	S5_20, 2nd floor	5	71	72	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S5	S5_21, 1st floor	5	60	61	+1
NSA-S5	S5_21, 2nd floor	5	68	70	+2
NSA-S5	S5_22, 1st floor	4	59	60	+1
NSA-S5	S5_22, 2nd floor	4	67	69	+2
NSA-S5	S5_23, 1st floor	6	62	63	+1
NSA-S5	S5_23, 2nd floor	6	67	68	+1
NSA-S5	S5_24, 1st floor	2	60	61	+1
NSA-S5	S5_24, 2nd floor	2	65	66	+1
NSA-S5	S5_24, 3rd floor	2	68	70	+2
NSA-S5	S5_25, 1st floor	2	64	65	+1
NSA-S5	S5_25, 2nd floor	2	68	70	+2
NSA-S5	S5_25, 3rd floor	2	69	71	+2
NSA-S5	S5_26, 1st floor	2	59	59	0
NSA-S5	S5_26, 2nd floor	2	62	63	+1
NSA-S5	S5_27, 1st floor	2	62	62	0
NSA-S5	S5_27, 2nd floor	2	66	68	+2
NSA-S5	S5_28, 1st floor	2	60	61	+1
NSA-S5	S5_28, 2nd floor	2	65	66	+1
NSA-S5	S5_29, 1st floor	2	58	59	+1
NSA-S5	S5_29, 2nd floor	2	63	64	+1
NSA-S5	S5_29, 3rd floor	2	65	67	+2
NSA-S5	S5_30, 1st floor	2	58	59	+1
NSA-S5	S5_30, 2nd floor	2	62	64	+2
NSA-S5	S5_30, 3rd floor	2	64	66	+2
NSA-S5	S5_31, 1st floor	2	58	60	+2
NSA-S5	S5_31, 2nd floor	2	64	65	+1
NSA-S5	S5_31, 3rd floor	2	65	67	+2
NSA-S5	S5_32, 1st floor	2	58	60	+2
NSA-S5	S5_32, 2nd floor	2	63	65	+2
NSA-S5	S5_32, 3rd floor	2	67	69	+2
NSA-S5	S5_33, 1st floor	5	61	63	+2
NSA-S5	S5_33, 2nd floor	5	66	67	+1
NSA-S5	S5_34, 1st floor	5	64	65	+1
NSA-S5	S5_34, 2nd floor	5	67	69	+2
NSA-S5	S5_35, 1st floor	6	59	60	+1
NSA-S5	S5_35, 2nd floor	6	64	65	+1
NSA-S5	S5_36, 1st floor	6	64	66	+2
NSA-S5	S5_36, 2nd floor	6	67	68	+1
NSA-S5	S5_37, 1st floor	6	61	62	+1
NSA-S5	S5_37, 2nd floor	6	67	68	+1
NSA-S5	S5_38, 1st floor	4	63	64	+1
NSA-S5	S5_38, 2nd floor	4	66	68	+2
NSA-S5	S5_39, 1st floor	5	60	61	+1
NSA-S5	S5_39, 2nd floor	5	64	65	+1
NSA-S5	S5_40_ST14[2]	0	72	74	+2
NSA-S6	S6_01	3	73	74	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S6	S6_02	11	73	75	+2
NSA-S6	S6_03	6	73	75	+2
NSA-S6	S6_04_ST15[2]	4	71	75	+4
NSA-S6	S6_05	3	65	68	+3
NSA-S6	S6_06	4	71	74	+3
NSA-S6	S6_07	5	68	71	+3
NSA-S6	S6_08	5	72	74	+2
NSA-S6	S6_09	1	74	76	+2
NSA-S6	S6_10	2	71	72	+1
NSA-S6	S6_11	2	70	73	+3
NSA-S6	S6_12	2	70	74	+4
NSA-S6	S6_13_LT3[2]	3	71	74	+3
NSA-S6	S6_14	3	71	72	+1
NSA-S6	S6_15	2	71	72	+1
NSA-S6	S6_16	2	75	77	+2
NSA-S6	S6_17	1	68	68	0
NSA-S6	S6_18	2	64	66	+2
NSA-S6	S6_19	7	70	72	+2
NSA-S6	S6_20	12	65	66	+1
NSA-S6	S6_21	6	61	63	+2
NSA-S6	S6_22	4	64	67	+3
NSA-S6	S6_23	7	59	60	+1
NSA-S6	S6_24	8	63	65	+2
NSA-S6	S6_25	3	63	66	+3
NSA-S6	S6_26	6	69	71	+2
NSA-S6	S6_27	3	64	66	+2
NSA-S6	S6_28	4	61	62	+1
NSA-S6	S6_29	3	62	63	+1
NSA-S6	S6_30	1	60	61	+1
NSA-S6	S6_31	2	65	65	0
NSA-S6	S6_32	4	59	60	+1
NSA-S6	S6_33	1	60	63	+3
NSA-S6	S6_34	4	64	66	+2
NSA-S6	S6_35	11	55	57	+2
NSA-S6	S6_36	16	55	57	+2
NSA-S6	S6_37	4	60	62	+2
NSA-S6	S6_38	7	58	60	+2
NSA-S6	S6_39	4	59	60	+1
NSA-S6	S6_40	4	57	58	+1
NSA-S6	S6_41	1	60	62	+2
NSA-S6	S6_42	6	62	63	+1
NSA-S6	S6_43	12	60	62	+2
NSA-S6	S6_44	7	58	60	+2
NSA-S6	S6_45	16	60	62	+2
NSA-S6	S6_46	6	63	65	+2
NSA-S6	S6_47	2	55	57	+2

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S6	S6_48	6	54	56	+2
NSA-S6	S6_49	2	53	53	0
NSA-S6	S6_50	11	54	56	+2
NSA-S7	S7_01	0	60	61	+1
NSA-S7	S7_02	2	64	66	+2
NSA-S7	S7_03_ST17[2]	6	58	60	+2
NSA-S7	S7_04	2	61	64	+3
NSA-S7	S7_05	2	64	66	+2
NSA-S7	S7_06	3	65	68	+3
NSA-S7	S7_07_ST18[2]	1	67	69	+2
NSA-S7	S7_08	1	70	72	+2
NSA-S7	S7_09	1	60	62	+2
NSA-S7	S7_10	2	65	67	+2
NSA-S7	S7_11	1	74	76	+2
NSA-S7	S7_12	2	73	74	+1
NSA-S7	S7_13_ST20[2]	2	70	71	+1
NSA-S7	S7_14	1	70	70	0
NSA-S7	S7_15	1	68	69	+1
NSA-S7	S7_16	2	66	68	+2
NSA-S7	S7_17	2	71	72	+1
NSA-S7	S7_18	2	74	76	+2
NSA-S7	S7_19	1	75	77	+2
NSA-S7	S7_20	2	56	57	+1
NSA-S7	S7_21	3	55	56	+1
NSA-S7	S7_22	2	53	55	+2
NSA-S7	S7_23	1	56	57	+1
NSA-S7	S7_24	1	57	58	+1
NSA-S7	S7_25	1	55	56	+1
NSA-S7	S7_26	1	55	57	+2
NSA-S7	S7_27	2	63	65	+2
NSA-S7	S7_28	4	65	66	+1
NSA-S7	S7_29	3	67	69	+2
NSA-S7	S7_30	1	68	70	+2
NSA-S7	S7_31	2	53	55	+2
NSA-S7	S7_32	2	53	54	+1
NSA-S7	S7_33	2	51	52	+1
NSA-S7	S7_34	2	55	57	+2
NSA-S7	S7_35	3	55	57	+2
NSA-S7	S7_36	3	57	59	+2
NSA-S7	S7_37	4	56	58	+2
NSA-S7	S7_38_ST21[2]	3	58	60	+2
NSA-S7	S7_39	2	64	66	+2
NSA-S7	S7_40	4	52	54	+2
NSA-S7	S7_41	5	62	64	+2
NSA-S8	S8_01, 1st floor	3	65	67	+2
NSA-S8	S8_01, 2nd floor	4	68	69	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S8	S8_01, 3rd floor	4	71	73	+2
NSA-S8	S8_02, 1st floor	4	64	66	+2
NSA-S8	S8_02, 2nd floor	4	66	68	+2
NSA-S8	S8_02, 3rd floor	4	71	73	+2
NSA-S8	S8_03, 1st floor	4	63	65	+2
NSA-S8	S8_03, 2nd floor	4	67	68	+1
NSA-S8	S8_03, 3rd floor	4	70	72	+2
NSA-S8	S8_04, 1st floor	3	66	68	+2
NSA-S8	S8_04, 2nd floor	4	68	70	+2
NSA-S8	S8_04, 3rd floor	4	71	73	+2
NSA-S8	S8_05, 1st floor	3	64	66	+2
NSA-S8	S8_05, 2nd floor	4	67	68	+1
NSA-S8	S8_05, 3rd floor	4	70	72	+2
NSA-S8	S8_06, 1st floor	3	65	67	+2
NSA-S8	S8_06, 2nd floor	4	68	69	+1
NSA-S8	S8_06, 3rd floor	4	70	72	+2
NSA-S8	S8_07, 1st floor	3	64	67	+3
NSA-S8	S8_07, 2nd floor	4	66	68	+2
NSA-S8	S8_07, 3rd floor	4	69	72	+3
NSA-S8	S8_08, 1st floor	2	63	66	+3
NSA-S8	S8_08, 2nd floor	4	65	68	+3
NSA-S8	S8_08, 3rd floor	4	69	71	+2
NSA-S8	S8_09	1	60	63	+3
NSA-S8	S8_10	0	61	63	+2
NSA-S8	S8_11	0	69	70	+1
NSA-S8	S8_12, 1st floor	4	58	60	+2
NSA-S8	S8_12, 2nd floor	4	61	63	+2
NSA-S8	S8_12, 3rd floor	4	64	66	+2
NSA-S8	S8_13, 1st floor	3	58	60	+2
NSA-S8	S8_13, 2nd floor	4	61	63	+2
NSA-S8	S8_13, 3rd floor	4	64	66	+2
NSA-S8	S8_14, 1st floor	4	61	63	+2
NSA-S8	S8_14, 2nd floor	4	65	66	+1
NSA-S8	S8_14, 3rd floor	4	68	69	+1
NSA-S8	S8_15, 1st floor	4	59	61	+2
NSA-S8	S8_15, 2nd floor	4	63	64	+1
NSA-S8	S8_15, 3rd floor	4	64	66	+2
NSA-S8	S8_16, 1st floor	4	61	62	+1
NSA-S8	S8_16, 2nd floor	4	64	66	+2
NSA-S8	S8_16, 3rd floor	4	68	69	+1
NSA-S8	S8_17, 1st floor	3	57	59	+2
NSA-S8	S8_17, 2nd floor	4	60	61	+1
NSA-S8	S8_17, 3rd floor	3	63	64	+1
NSA-S8	S8_18, 1st floor	2	59	61	+2
NSA-S8	S8_18, 2nd floor	4	62	65	+3
NSA-S8	S8_18, 3rd floor	4	64	65	+1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]		
			Existing (2007)	Future (2035)	Change (2007 to 2035)
NSA-S8	S8_19, 1st floor	3	61	63	+2
NSA-S8	S8_19, 2nd floor	3	64	65	+1
NSA-S8	S8_19, 3rd floor	4	66	68	+2
NSA-S8	S8_20, 1st floor	4	58	61	+3
NSA-S8	S8_20, 2nd floor	3	61	63	+2
NSA-S8	S8_20, 3rd floor	4	65	67	+2
NSA-S8	S8_21	0	66	70	+4
NSA-S8	S8_22_ST24[2]	0	68	69	+1

1. Loudest-hour sound levels indicating noise impacts are shown in **bold**.
2. Measurement and prediction site.

Source: HMMH, 2007.

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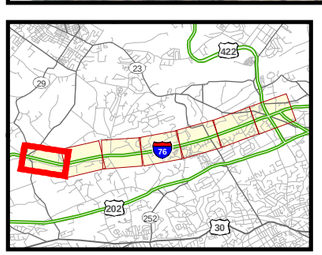

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0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
- Benefited Prediction Site

Noise Barriers:

- Recommended for Further Consideration
- Not Recommended for Further Consideration
- Existing

** Receptor represents dwelling units on multiple floors (not all floors may be benefited; see Table 7 for details)*

Pennsylvania Turnpike

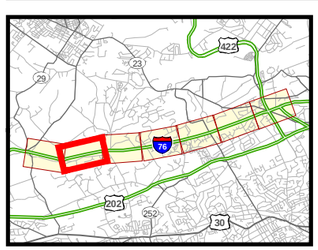
Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

Figure 11

HARRIS MILLER MILLER & HANSON INC.



Sheet 2 of 7

0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
- Benefited Prediction Site

Noise Barriers:

- Recommended for Further Consideration
- Not Recommended for Further Consideration
- Existing

** Receptor represents dwelling units on multiple floors (not all floors may be benefited; see Table 7 for details)*

Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

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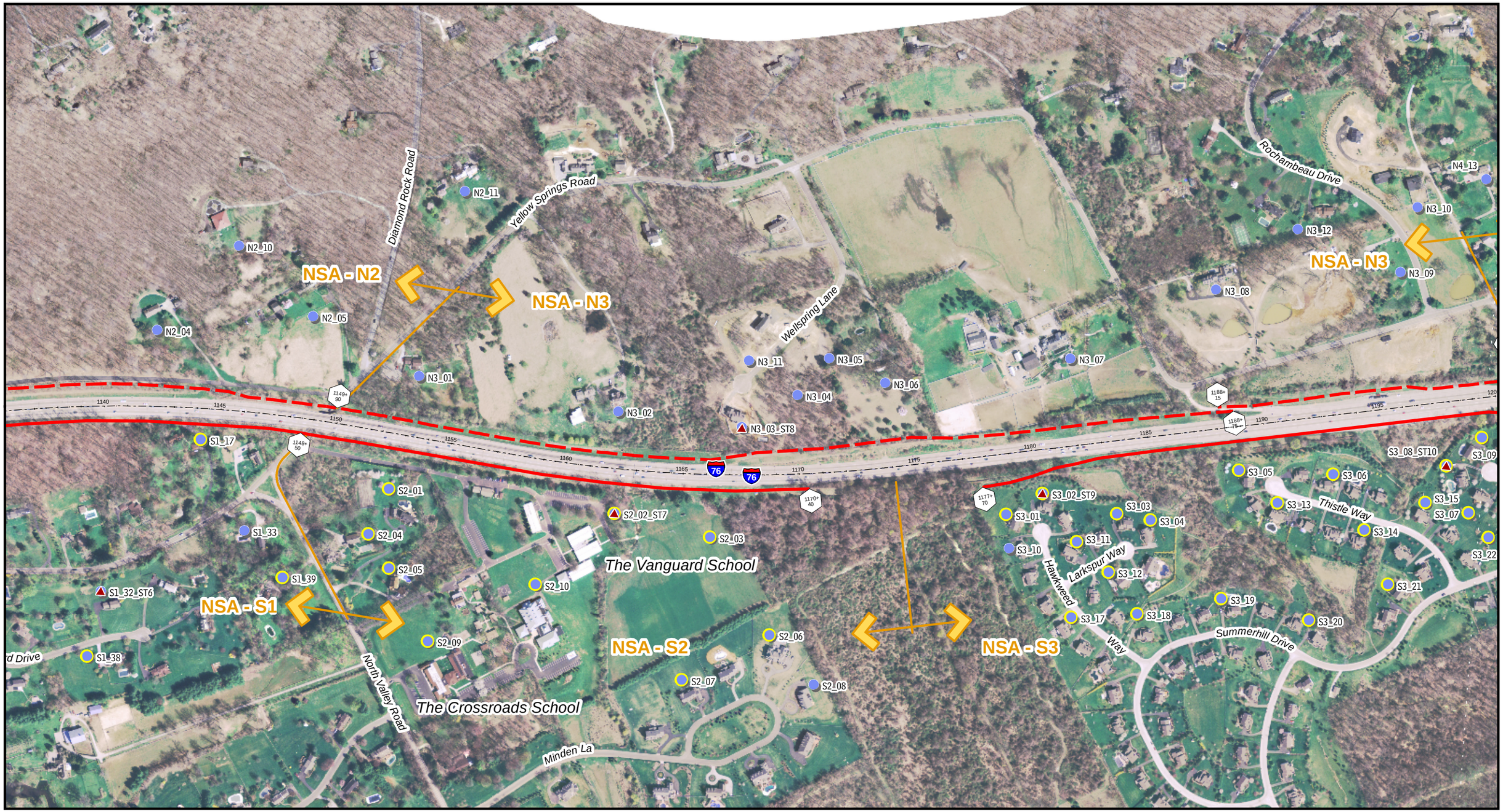

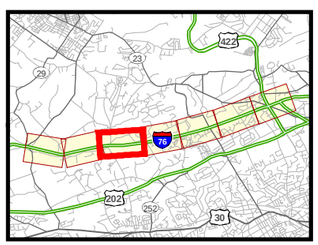

Sheet 3 of 7

0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
- Benefited Prediction Site

Noise Barriers:

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- Not Recommended for Further Consideration
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Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

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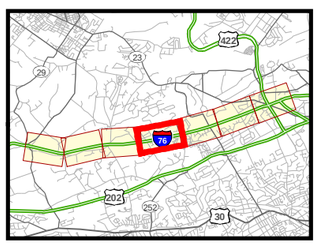

Sheet 4 of 7

0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
- Benefited Prediction Site

Noise Barriers:

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Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

Figure 11

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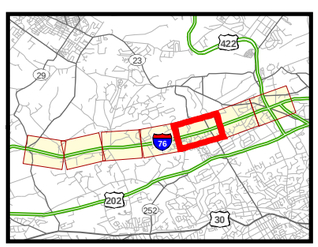

Sheet 5 of 7

0 400 800 Feet

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Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

Figure 11

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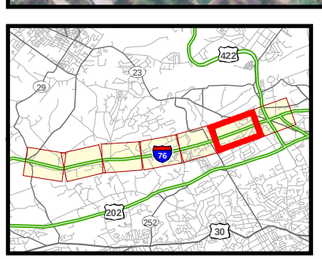

Sheet 6 of 7

0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
- Benefited Prediction Site

Noise Barriers:

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- Existing

** Receptor represents dwelling units on multiple floors (not all floors may be benefited; see Table 7 for details)*

PENNA TURN-PIKE

Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

Figure 11

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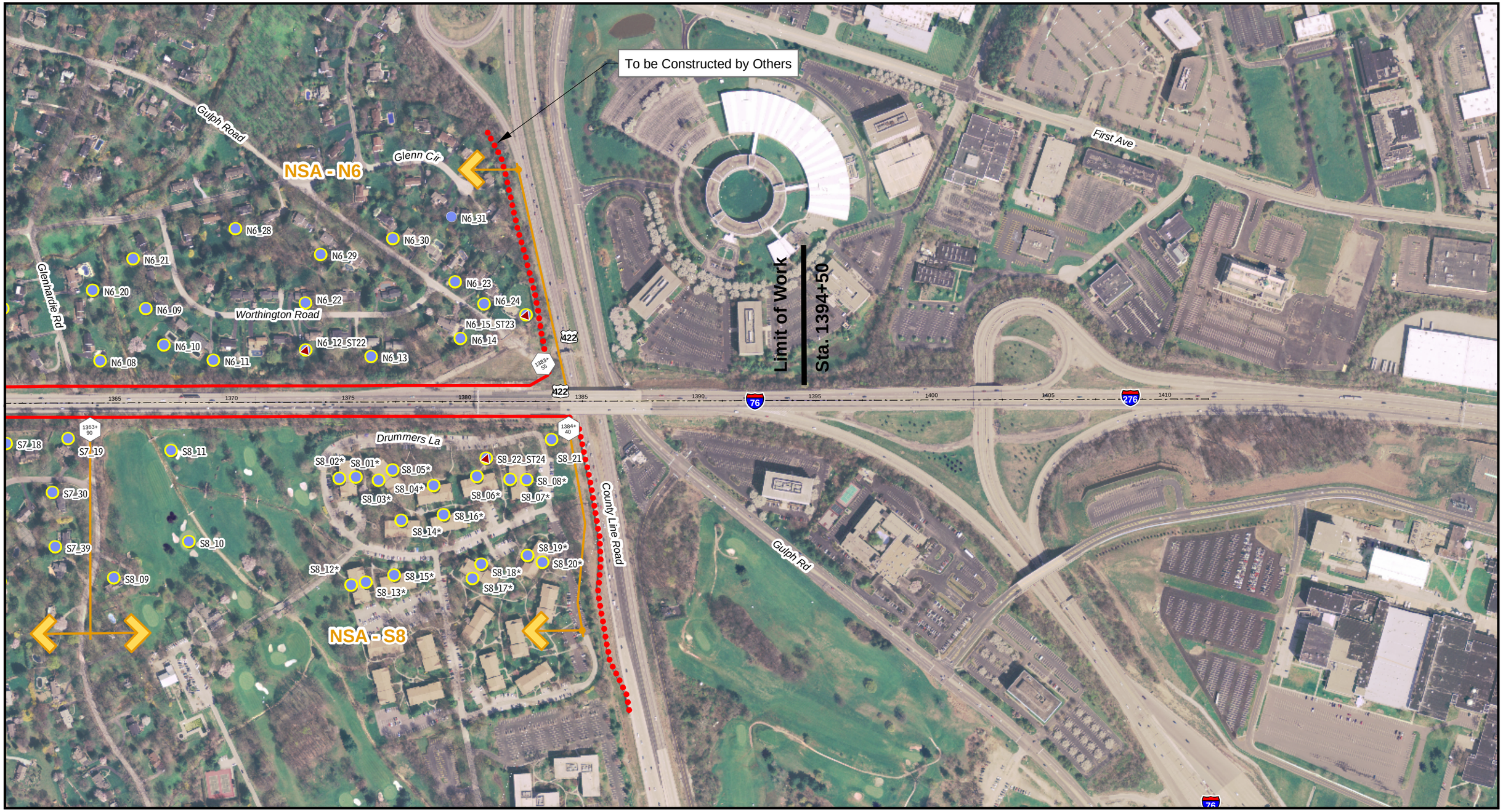

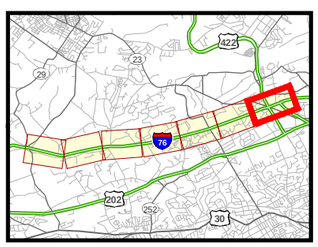

Sheet 7 of 7

0 400 800 Feet

Noise Receptors:

- Measurement and Prediction Site
- Prediction Site
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- Not Recommended for Further Consideration
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Pennsylvania Turnpike

Chester and Montgomery Counties, Pennsylvania

Milepost 320 to 326 Reconstruction Project

Noise Receptor Sites and Potential Noise Barrier Locations

Figure 11

HARRIS MILLER MILLER & HANSON INC.

5.2.1 Existing (2007) Computed Sound Levels

The PTC provided mainline Turnpike traffic volume and vehicle classification counts from January 2007 for modeling existing condition sound levels. In the morning, traffic volumes typically are higher in the eastbound direction; in the afternoon, westbound volumes are higher. As a result, sound levels at receptors adjacent to the south side of the Turnpike typically are highest in the morning and sound levels at receptors adjacent to the north side are highest in the afternoon.

To ensure a conservative evaluation, both directions of traffic were evaluated independently, and the hour with conditions corresponding to the highest noise levels was identified for each direction. For eastbound Turnpike traffic, loudest-hour traffic conditions occurred between 7:00 AM and 8:00 AM. For westbound Turnpike traffic, loudest-hour traffic conditions occurred between 3:00 PM and 4:00 PM. The 7:00 AM to 8:00 AM eastbound traffic and the 3:00 PM to 4:00 PM westbound traffic then were modeled simultaneously to produce a conservative estimate of loudest-hour conditions on both sides of the Turnpike.

STV Inc. provided May 2005 traffic data for local roads including Yellow Springs Road, Mill Road, Valley Forge Road, Thomas Road, and Glenhardie Road. The information included volume, vehicle classification, and speed data in continuous 15-minute intervals for several days at each traffic monitoring location. Traffic data from intervals corresponding to Turnpike loudest-hour conditions were used for TNM modeling.

Traffic data for US 422 were obtained from TNM files developed by Environmental Acoustics, Inc. for use on a concurrent project.

Appendix C provides further information on the modeled traffic.

Computed loudest-hour L_{eq} sound levels for existing conditions ranged from 51 to 75 dBA among all prediction sites. Typically, locations closest to the Turnpike had the highest computed sound levels. In Table 5, prediction sites with loudest-hour sound levels approaching or exceeding the NAC discussed in Section 3.1 are identified in bold. For the purpose of this evaluation, L_{eq} sound levels of 66 dBA or higher approach or exceed the NAC for residential or other noise-sensitive outdoor land uses. Under existing conditions, 172 prediction sites representing 454 receptor units were computed to experience noise impacts during the loudest hour of the day. Although noise impacts occur in all 14 NSAs under existing conditions, the highest numbers of impacted receptor units occur in NSA-S5 (173), NSA-S8 (75), and NSA-S6 (69) due to the presence of multi-family residences.

5.2.2 Future (2035) Computed Sound Levels

Loudest–hour conditions for 2035 were computed using traffic projections developed by the Delaware Valley Regional Planning Commission (DVRPC) in their March 2003 report titled “Pennsylvania Turnpike Proposed PA 29 Slip Ramp Traffic Study.” The DVRPC forecasted 2025 volumes on the Turnpike using their Regional Travel Simulation Model, assuming six travel lanes on the Turnpike and slip ramps providing all four movements. Using the 2006 actual Annual Average Daily Traffic (AADT) volumes provided by the PTC and the forecasted 2025 volumes from the DVRPC, annual growth rates of 2.28% for the eastbound direction and 2.35% for the westbound direction were calculated. These growth rates were then applied to calculate the design year 2035 traffic volumes. Consistent with the methodology used for computing existing sound levels, the future loudest-hour sound levels shown in Table 5 were computed using a combination of morning and afternoon peak-hour traffic. For both the

eastbound and westbound directions, peak-hour traffic volumes were determined separately based on percentages of Average Daily Traffic (ADT) volumes. To provide a conservative estimate of future loudest-hour sound levels, the eastbound and westbound peak-hour traffic volumes then were modeled as if occurring simultaneously.

2035 traffic for local roads was computed by applying a 1.8% annual growth rate (provided by STV Inc.) to the existing conditions traffic data for Yellow Springs Road, Mill Road, Valley Forge Road, Thomas Road, and Glenhardie Road. As a conservative assumption, the escalated traffic volumes were modeled at the same speeds obtained during the May 2005 traffic counts.

2030 Traffic data for US 422 were obtained from TNM files developed by Environmental Acoustics, Inc. for use on a concurrent project. The 2030 volumes were then escalated using the same 1.8% growth rate as used for local roads to obtain projected 2035 volumes.

Loudest-hour L_{eq} sound levels for future conditions are projected to range from 52 to 77 dBA among all prediction sites. In general, locations closest to the Turnpike will experience the highest sound levels. In Table 5, prediction sites with loudest-hour sound levels approaching or exceeding the NAC discussed in Section 3.1 are identified in bold. For the purpose of this evaluation, L_{eq} sound levels of 66 dBA or higher approach or exceed the NAC for residential or other noise-sensitive outdoor land uses. Under future conditions, 225 prediction sites representing 618 receptor units are projected to experience noise impacts during the loudest hour of the day. Although noise impacts occur in all 14 NSAs under future conditions, the highest numbers of impacted receptor units occur in NSA-S5 (193), NSA-S8 (121), and NSA-S6 (100) due to the presence of multi-family residences.

The following sections provide further information on computed future sound levels and projected noise impacts in each NSA.

NSAs North of Turnpike

- **NSA-N1** (near Howells Road) Nine single-family homes in this NSA will experience noise impact with loudest-hour sound levels of 66 to 74 dBA, L_{eq}. The highest L_{eq} sound levels (71 to 74 dBA) will be at first-row homes located along Howells Road and Green Lane. Increases above existing loudest-hour sound levels will range from about two to three decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*
- **NSA-N2** (near White Deer Trail) Six single-family homes, including five on White Deer Trail and one located off of Diamond Rock Road, with loudest-hour sound levels of 66 to 73 dBA, L_{eq} will experience noise impact. The properties along White Deer Trail are subject to an easement agreement with the PTC. Sound levels at receptors set farther back on Chautauqua Trail and Horseshoe Trail will range from 59 to 63 dBA, L_{eq}. Increases above existing sound levels are expected to range from about two to four decibels in this area. *Consideration of traffic noise mitigation is warranted for this NSA.*
- **NSA-N3** (Yellow Springs Road to Mill Road) Seven single-family homes in this NSA are expected to experience noise impact. Loudest-hour L_{eq} sound levels at the closest impacted homes along Yellow Springs Road and Wellspring Lane will range from 66 to 74 dBA. Increases above existing sound levels are expected to range from about one to three decibels in this area. *Consideration of traffic noise mitigation is warranted for this NSA.*
- **NSA-N4** (Mill Road to Valley Forge National Park) Loudest-hour L_{eq} sound levels of 66 to 74 dBA are expected to cause noise impacts at 12 single-family homes on Yellow Springs Road,

Rose Cottage Lane, and Covered Bridge Road. Increases above existing sound levels in this NSA are expected to range from about one to three decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-N5** (Valley Forge National Park) Loudest-hour sound levels generally will approach or exceed the Category B NAC of 67 dBA, L_{eq} at distances of up to about 250 to 350 feet from the Turnpike right-of-way line into Valley Forge National Park. Much of this impacted land along the Park's southern boundary is undeveloped open fields or woodland. Areas near two structures in the vicinity of Wilson Road, Lafayette's Quarters and the Whittle House, will experience noise impact with loudest-hour sound levels of about 73 dBA, L_{eq}. Increases above existing sound levels in this NSA are expected to range from about one to five decibels. The greatest increases will occur in areas where the Turnpike widening will reduce noise shielding provided by existing terrain. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-N6** (west of Thomas Road to US 422) 32 single-family homes in this NSA will experience noise impact with loudest-hour sound levels ranging from 66 to 73 dBA, L_{eq}. The highest sound levels will be at first-row receptors located along the south sides of Richards Road and Worthington Road and also on Glenhardie Road near the Turnpike overpass and at the east end of Gulph Road. In addition, several residences on the north side of Worthington Road will experience noise impacts. Near the east end of this NSA, noise from traffic on US 422 also contributes to loudest-hour sound levels. Future computed sound levels assume the construction of a noise barrier along the west side of US 422 as part of a separate project. As a result, although sound levels are expected to increase by about one to two decibels throughout most of the NSA, future sound levels are expected to decrease in some areas close to the proposed US 422 noise barrier. Nonetheless, loudest-hour sound levels are expected to approach or exceed the NAC at receptors close to both US 422 and the Turnpike. *Consideration of traffic noise mitigation is warranted for this NSA.*

NSAs South of Turnpike

- **NSA-S1** (west of Howells Road to Yellow Springs Road overpass) 32 receptor units in both single-family and multi-family residences will experience noise impacts. Most of the impacted residences are located on the north side of Yellow Springs Road and will have future loudest-hour sound levels ranging from about 66 to 71 dBA, L_{eq}. Although several receptor units south of Yellow Springs Road will be impacted, generally sound levels in that area will not exceed the NAC. Increases above existing sound levels are expected to range from about zero to two decibels. In some locations, increases in sound levels are limited because a new retaining wall will partially block line of sight to Turnpike traffic. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S2** (Vanguard and Crossroads Schools, east of Yellow Springs Road overpass) In this NSA, one single-family home on North Valley Road will experience noise impact with a loudest-hour sound level of about 67 dBA, L_{eq}. In addition, outdoor activity areas at the Vanguard School (used by both the Vanguard and the Crossroads Schools) will experience loudest-hour sound levels of up to about 70 dBA, L_{eq}, thereby exceeding the NAC for Category B land use. Homes located south of the Vanguard School on Minden Lane will have loudest-hour L_{eq} sound levels of up to 58 dBA and are not expected to be impacted. In some locations, increases in sound levels are limited because a new retaining wall will partially block line of sight to Turnpike traffic. Increases above existing sound levels are expected to range from about zero to two decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S3** (west of Mill Road) Loudest-hour L_{eq} sound levels of 67 to 75 dBA are expected to cause noise impacts at 10 single-family homes on Hawkweed Way, Larkspur Way, Thistle Way and Adler Lane. In general, impacts will be limited to first-row residences. Increases above existing sound levels in this NSA are expected to range from about one to three decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S4** (east of Mill Road) 60 receptor units in both single-family and multi-family residences will experience noise impact in this NSA. Loudest-hour sound levels at impacted residences will range from about 66 to 77 dBA, L_{eq}. The highest sound levels will be at first-row, single-family homes on Armstrong Court and at multi-family residences on Sturbridge Lane and Main Street. Increases above existing loudest-hour sound levels will range from about one to three decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S5** (Chesterbrook, west of Valley Creek) In this NSA, noise impacts were assessed at first-, second-, and third-floor patios and balconies. Approximately 193 units in multi-family residences will experience noise impacts with loudest-hour sound levels of 66 to 76 dBA, L_{eq}. Typically sound levels will be several decibels higher at upper story locations than at ground floor locations due to decreased noise shielding and decreased ground effects. The highest sound levels will occur at residences on Washington Place, Yorktown Place, Eagles Ridge Drive, Valley Stream Circle, and Valley Stream Lane. In general, increases above existing loudest-hour sound levels will range from about zero to two decibels, although some locations will experience changes of up to four decibels. In some ground-floor locations below the Turnpike's pavement level, sound levels may decrease slightly due to increased shielding provided by the widened roadway's shoulder. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S6** (Chesterbrook, Valley Creek to Valley Forge Road) 100 receptor units in both single-family and multi-family residences in this NSA will experience noise impact. Loudest-hour sound levels at impacted receptor units will range from about 66 to 77 dBA, L_{eq}. The highest sound levels will be at first-row, single-family homes on Morgan Lane, Lafayette Lane, Salomon Lane, and Franklin Lane and at townhouse-style multi-family residences on Iroquois Court, Applehouse Pond Drive, Springhouse Pond Drive, and Millhouse Pond Drive. Increases above existing loudest-hour sound levels will range from about zero to four decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S7** (Valley Forge Road to Glenhardie Road) In this NSA, 35 single-family homes will experience noise impacts with loudest-hour sound levels of about 66 to 77 dBA, L_{eq}. The highest sound levels will occur east of Thomas Road at homes on Park Ridge Drive and Park Ridge Terrace and also near the eastern end of Colonel Dewees Road. In the westernmost portion of the NSA, where homes are set back behind the Valley Forge Service Plaza, loudest hour sound levels will range from about 55 to 66 dBA, L_{eq}. Immediately west of Thomas Road, loudest-hour sound levels at first-row homes on Lexington Lane and Pulaski Lane will range from about 65 to 72 dBA. Increases above existing loudest-hour sound levels will range from about zero to three decibels. *Consideration of traffic noise mitigation is warranted for this NSA.*

- **NSA-S8** (Glenhardie Road to US 422) In this NSA, noise impacts were assessed at first-, second-, and third-floor patios and balconies. Outdoor use areas associated with 121 receptor units in multi-family buildings will experience noise impacts. Typically sound levels will be several decibels higher at upper story locations than at ground floor locations due to decreased noise shielding and decreased ground effects. The highest loudest-hour sound levels of about 68 to 73 dBA will occur along Drummers Lane. In addition, portions of the Glenhardie Country Club Golf Course will experience loudest-hour sound levels approaching or exceeding the NAC for

Category B land use. Increases above existing loudest-hour sound levels will range from about one to four decibels.[14] An existing noise barrier at the eastern end of the NSA along the west side of US 422 was included in all computations of both existing and future sound levels. *Consideration of traffic noise mitigation is warranted for this NSA.*

[14] The area at the northeast corner of this NSA may experience a temporary increase of up to five decibels if a portion of an existing noise barrier is removed temporarily during construction.

6. HIGHWAY TRAFFIC NOISE CONSIDERATION AND MITIGATION ALTERNATIVES

6.1 Mitigation Alternatives

FHWA has identified certain noise mitigation measures to reduce traffic noise impact 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 which would be adversely impacted by traffic noise
- Sound insulation of public or nonprofit institutional structures
- Construction of noise barriers[15]

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 five-decibel reduction in noise from heavy trucks, average speeds would need to be reduced from 65 to 45 mph.[16] Therefore, speed restrictions are not a feasible noise mitigation measure for this area. Truck restrictions would not be practical because the Turnpike is the major interstate highway across Pennsylvania's southern tier. Therefore, truck restrictions also are not a feasible noise mitigation measure for this project.

Although planned changes in grading due to the Turnpike widening will limit potential noise impacts in some areas, more significant reductions would require substantial changes to either the Turnpike's horizontal or vertical alignment. Such alignment shifts are beyond the scope of this roadway improvement project and therefore are beyond the scope of this evaluation.

Little undeveloped land exists adjacent to the Turnpike throughout the project corridor. Therefore, acquisition of buffer zones to preempt future development of noise-sensitive land uses is not a feasible alternative for this project.

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 impact must be given to exterior areas. The interior criterion (NAC Category E, see Section 3.1) 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."[17]

[15] Adapted from CFR 772.13.c and PennDOT Publication No. 24, Section 3.2.
[16] Menge, Christopher W., et al., *FHWA Traffic Noise Model, Version 1.0 Technical Manual*, Report FHWA-PD-96-101, February 1998, Figure 11, page 34.
[17] CFR 772.11 and PennDOT Publication No. 24, Section 2.4.1.

6.2 Preliminary Noise Barrier Evaluation

Construction of noise barriers is the only remaining highway traffic noise abatement measure to be considered. A preliminary noise barrier evaluation was conducted for each NSA meeting the warranted criteria described in Section 3.1.1. The objective of each evaluation was to determine whether a noise barrier could meet the feasibility and reasonableness criteria described in Section 3.1.2 and Section 3.1.3. The evaluations were conducted to determine the preferred alignment, approximate end points, and the approximate average height of each proposed noise barrier.

Although the analysis was conducted using the validated traffic noise prediction model with the full set of prediction sites for each NSA, the noise barrier design was conducted at a preliminary level. Specifically, ranges of barrier heights were evaluated in two-foot increments with the noise barrier assumed to be of constant height for its entire length. In general, noise barriers were evaluated for feasibility and reasonableness with constant heights of 10, 12, 14, 16, 18, and 20 feet above ground level to determine whether a barrier could be designed to meet the feasibility and reasonableness criteria. For any recommended noise barriers, further acoustical and engineering design would be necessary prior to construction.

6.2.1 Summary of Results and Recommendations

Based on studies conducted to date, noise barriers in 11 of the 14 NSAs were found to be warranted, feasible, and reasonable. The 11 areas include NSA-N1, NSA-N5 and NSA-N6 on the north side of the Turnpike and NSA-S1, NSA-S2, NSA-S3, NSA-S4, NSA-S5, NSA-S6, NSA-S7, and NSA-S8 on the south side of the Turnpike. These 11 noise barriers therefore are recommended for further consideration during final design. The recommended noise barriers would range in height from approximately 12 to 16 feet and would have a total length of approximately 37,300 feet. The recommended barriers would benefit approximately 1,006 receptor units and would have a total cost of approximately $13,148,000, based on a unit cost of $25 per square foot.[18] If it subsequently develops during the final design phase that conditions have changed, these noise barriers may no longer be recommended. A final decision on the recommendations will be made upon completion of the project design and the public involvement processes.

The potential effects of sound reflected between noise barriers on opposite sides of the Turnpike were evaluated using TNM's parallel barrier module. Due to the presence of noise-sensitive land use on both sides of the Turnpike throughout the majority of the project area, it is recommended that all noise barriers be constructed with sound-absorptive materials on the side facing the Turnpike. In locations with noise barriers directly across the Turnpike from one another, sound-absorptive materials will reduce the degradation of each barrier's effectiveness that may be caused by multiple reflections of sound between the barriers. In locations where a noise barrier is constructed on only one side of the Turnpike, sound-absorptive materials will reduce potential increases in noise levels at residences on the opposite side of the Turnpike caused by reflected traffic noise.

The results provided in Table 7 (and also summarized in Table 1 and Table 6) assume the use of sound-absorptive noise barriers.

[18] PennDOT Publication No. 24 provides for the use of a cost index factor of $25.00 per square foot for calculation of noise barrier reasonableness (PennDOT Pub. 24, Section 3.3.3.1, May 2007). Actual construction costs are expected to be higher.

Figure 11 shows the locations of the potential noise barriers and Table 6 provides a summary of the noise barriers considered within each NSA:

- The first column of Table 6 identifies the NSA.
- The second column provides the number of impacted receptor units and/or identifies other noise-sensitive land uses within the NSA, including Valley Forge National Park and the Vanguard School.
- The third column identifies, based on the presence of noise-sensitive land where traffic noise impacts are predicted, whether each NSA warrants consideration of noise abatement (see Section 3.1.1 for a description of the Warranted Criteria). Because consideration of noise abatement was warranted within each NSA, preliminary noise barrier design was conducted for each area.
- The table's fourth column indicates that noise barriers were found to be feasible within each NSA. As described in Section 3.1.2, this means that noise barriers would provide highway traffic noise reductions of at least five decibels at a majority of impacted receptor units and also satisfy other engineering and safety criteria.
- The next three columns provide information on the approximate location (in terms of station numbers), length, and average height of the best preliminary barrier design for each NSA. Although other length and height combinations were evaluated, the barrier configurations shown in the table were judged to provide the best combination of satisfying noise reduction goals and feasibility and cost reasonableness requirements. In cases where it was not possible to design a noise barrier for the entire NSA that would satisfy the feasibility and reasonableness criteria, attempts were made to sub-divide the NSA and to design noise barriers for smaller clusters of residences. Appendix E provides data for other barrier designs that were considered during the analysis.
- The following three columns show the estimated cost of each noise barrier based on the unit cost of $25 per square foot described under the Reasonableness Criteria in Section 3.1.3, the number of receptor units benefited by the barrier and therefore included in the cost reasonableness calculation, and the cost per benefited receptor unit. The number of benefited receptor units assumes the use of sound absorptive noise barriers.
- The final column indicates whether the best preliminary barrier design meets the reasonableness criteria.

Table 6. Summary of Evaluated Noise Barriers

NSA	Number of Impacted Receptor Units and/or Other Noise-sensitive Land Use	Warrants Noise Abatement Consideration?	Feasible?	Approximate Barrier Location (Station Nos.)	Barrier Length (feet) [1]	Average Barrier Height (feet)	Barrier Cost (x 1,000) [1]	Number of Benefited Receptor Units[2]	Cost per Benefited Receptor Unit[1] (x 1,000)	Reasonable?
NSA-N1	9	Yes	Yes	1071+10 to 1079+35	815	16	$325	7	$46.5	Yes
NSA-N2	6	Yes	Yes	1116+55 to 1149+90	3,375	18	$1,518	4	$379.5	No
NSA-N3	7	Yes	Yes	1149+90 to 1201+50	5,260	18	$2,367	14	$169.1	No
NSA-N4	12	Yes	Yes	1201+90 to 1238+55	3,670	16	$1,467	16	$91.7	No
NSA-N5	Valley Forge National Park	Yes	Yes	1256+95 to 1271+25	1,430	12	$430	Valley Forge National Park	NA	Yes
NSA-N6	32	Yes	Yes	1336+05 to 1383+55	4,760	14	$1,667	73	$22.8	Yes
NSA-S1	32	Yes	Yes	1071+15 to 1148+50	7,740	14	$2,710	55	$49.3	Yes
NSA-S2	1 + Vanguard School	Yes	Yes	1148+50 to 1170+40	2,200	14	$770	7 + Vanguard and Crossroads Schools	NA	Yes
NSA-S3	10	Yes	Yes	1177+70 to 1202+00	2,435	16	$973	45	$21.6	Yes
NSA-S4	60	Yes	Yes	1202+95 to 1222+10	1,930	14	$676	126	$5.4	Yes
NSA-S5	193	Yes	Yes	1224+55 to 1249+80	2,530	14	$886	278	$3.2	Yes
NSA-S6	100	Yes	Yes	1249+80 to 1295+45	4,590	14	$1,607	194	$8.3	Yes
NSA-S7	35	Yes	Yes	1297+20 to 1363+90	6,765	14	$2,368	49	$48.3	Yes
NSA-S8	121	Yes	Yes	1363+90 to 1384+40	2,105	14	$736	172	$4.3	Yes

Notes:
1. Approximate barrier lengths and costs are from FHWA Traffic Noise Model (TNM) output. Results shown in table have been rounded. Apparent discrepancies with roadway station nos. are due to non-parallel or overlapping barrier sections.
2. Impacted receptor units with at least 3 dBA of noise reduction and/or non-impacted receptor units with at least 5 dBA of noise reduction. Assumes sound-absorptive barriers.

Source: HMMH, 2007.

6.2.2 Detailed Noise Barrier Descriptions

This section of the report provides further information on the preliminary noise barrier evaluation for each NSA. Table 7 provides with-barrier sound levels and insertion loss (noise reduction) values at all receptors for each recommended noise barrier. In Table 7, impacted receptors are shown in **bold** and benefited receptors are highlighted. All with-barrier sound levels in Table 7 assume the use of sound absorptive noise barriers.

NSAs North of Turnpike

- **NSA-N1** (near Howells Road) A 16-foot high, 815-foot long noise barrier would reduce noise levels by five to seven decibels at five of the nine impacted receptor units in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria described in Section 3.1.2. In addition, two other impacted residences would receive noise reductions of at least three decibels, for a total of seven benefited receptor units.

  The estimated cost for the noise barrier (based on a unit cost of $25 per square foot) would be approximately $325,000, or about $46,500 per benefited receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units, resulting in higher costs per receptor. Barrier alternatives that were either taller or longer would be higher in cost and would not benefit additional receptors. It is possible that revised information or further optimization during final design could result in a design that benefits additional receptors.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-N2** (near White Deer Trail). An 18-foot high noise barrier extending for approximately 3,375 feet would provide noise reductions of five to eight decibels at four of the six impacted homes in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria.

  The estimated cost for the noise barrier would be approximately $1,518,000 or about $379,500 per receptor unit. This cost exceeds the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would not provide at least five decibels of noise reduction at 50% or more of the impacted receptor units. Barrier alternatives that were either taller or longer would be more costly per receptor unit.

  Because the impacted homes in this NSA are widely spaced and are set back on a hillside overlooking the Turnpike, additional attempts at barrier optimization are unlikely to provide a noise barrier alternative that meets the reasonableness criteria. The properties along White Deer Trail are subject to an easement agreement with the PTC.

  This noise barrier satisfies the feasibility criteria but does not satisfy the reasonableness criteria. Therefore, this noise barrier is not recommended for further consideration.

- **NSA-N3** (Yellow Springs Road to Mill Road) An 18-foot high noise barrier extending for approximately 5,260 feet would provide noise reductions of five to 13 decibels at all seven

impacted homes in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. In addition, the noise barrier would provide at least five decibels of noise reduction at seven non-impacted homes, resulting in a total of 14 benefited homes.

The estimated cost for the noise barrier would be approximately $2,367,000, or about $169,100 per receptor unit. This cost exceeds the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units, resulting in higher costs per receptor. Barrier alternatives that were either taller or longer would be more costly, but would not benefit additional homes.

This noise barrier satisfies the feasibility criteria but does not satisfy the reasonableness criteria. Therefore, this noise barrier is not recommended for further consideration.

- **NSA-N4** (Mill Road to Valley Forge National Park) A 16-foot high noise barrier extending for approximately 3,670 feet would provide noise reductions of five to 11 decibels at seven of 12 impacted homes in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. In addition, the noise barrier would provide at least three decibels of noise reduction at five other impacted homes and five decibels of noise reduction at four non-impacted homes, resulting in a total of 16 benefited homes.

  The estimated cost for the noise barrier would be approximately $1,467,000, or about $91,700 per receptor unit. This cost exceeds the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units, resulting in higher costs per receptor. Barrier alternatives that were either taller or longer would be more costly, but would not benefit additional homes.

  This noise barrier satisfies the feasibility criteria but does not satisfy the reasonableness criteria. Therefore, this noise barrier is not recommended for further consideration.

- **NSA-N5** (Valley Forge National Park) A 12-foot high noise barrier extending for approximately 1,430 feet near the edge of pavement would provide noise reductions of about seven to nine decibels in outdoor areas near Lafayette's Quarters and the Whittle House. The estimated cost for the barrier, which would cross Wilson Road on the Turnpike overpass, would be approximately $430,000.

  A noise barrier is recommended for a portion of this property due to its national historical significance. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-N6** (west of Thomas Road to US 422) A 14-foot high noise barrier extending for approximately 4,760 feet would provide noise reductions of five to 10 decibels at all 32 impacted residences in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least five decibels of noise reduction at 41 non-impacted residences, resulting in a total of 73 benefited receptor units.

  The estimated cost for the noise barrier would be approximately $1,667,000, or about $22,800 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor

units, resulting in higher costs per receptor. Barrier alternatives that were either taller or longer would not benefit additional impacted receptors.

This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

NSAs South of Turnpike

- **NSA-S1** (west of Howells Road to Yellow Springs Road overpass) A 14-foot high noise barrier extending for approximately 7,740 feet would provide noise reductions of five to nine decibels at 25 of 32 receptor units in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least three decibels of noise reduction at four other impacted residences and at least five decibels of noise reduction at 26 non-impacted residences, resulting in a total of 55 benefited receptor units.

  The estimated cost for the noise barrier would be approximately $2,710,000, or about $49,300 per receptor unit. This just meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units, resulting in higher costs per receptor. Barrier alternatives that were either taller or longer would benefit additional receptors, but would be more costly, and would exceed the cost reasonableness standard. It is possible that revised information or further optimization during final design could result in a design that benefits additional receptors.

  The western end of this barrier would begin near the residences located immediately west of Howell's Road. The eastern end would be contiguous with the western end of the barrier in NSA-S2, meeting at the Yellow Springs Road overpass.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S2** (Vanguard and Crossroads Schools, east of Yellow Springs Road overpass) A 14-foot high noise barrier extending for approximately 2,200 feet would provide noise reductions of about five to nine decibels at outdoor use areas, including playing fields, a ropes course, and outdoor dining areas, used by both the Vanguard School and the Crossroads School. In addition, the noise barrier would provide five to nine decibels of noise reduction at seven benefited homes and would satisfy each of the feasibility criteria.

  The western end of this barrier would be contiguous with the eastern end of the barrier in NSA-S1, meeting at the Yellow Springs Road overpass. The barrier would terminate east of the Vanguard School. The estimated cost for the noise barrier would be approximately $770,000.

  Based on the studies done so far, this noise barrier is recommended. If it subsequently develops during the final design phase that these conditions have changed substantially, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S3** (west of Mill Road) A 16-foot high noise barrier extending for approximately 2,435 feet would provide noise reductions of five to 11 decibels at all 10 impacted residences in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least five decibels of noise reduction at 35 non-impacted residences, resulting in a total of 45 benefited receptor units.

  The estimated cost for the noise barrier would be approximately $973,000, or about $21,600 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would benefit additional receptors, but would be more costly.

  The western end of this barrier would begin west of Hawkweed Way. The eastern end would terminate adjacent to the Valley Forge Road bridge over the Turnpike.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S4** (east of Mill Road) A 14-foot high noise barrier extending for approximately 1,930 feet would provide noise reductions of five to 13 decibels at all 60 impacted residences in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least five decibels of noise reduction at 66 non-impacted residences, resulting in a total of 126 benefited receptor units.

  The estimated cost for the noise barrier would be approximately $676,000, or about $5,400 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would benefit additional impacted receptors and would be more costly.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S5** (Chesterbrook, west of Valley Creek) A 14-foot high noise barrier extending for approximately 2,530 feet would provide noise reductions of five to 13 decibels at all 193 impacted receptor units in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least five decibels of noise reduction at 85 non-impacted residences, resulting in a total of 278 benefited receptor units.

  The estimated cost for the noise barrier would be approximately $886,000, or about $3,200 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would not benefit additional impacted receptors and would be more costly.

This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S6** (Chesterbrook, Valley Creek to Valley Forge Road) A 14-foot high noise barrier extending for approximately 4,590 feet would provide noise reductions of five to 12 decibels at 98 of 100 impacted residences in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least three decibels of noise reduction at the two remaining impacted residences and at least five decibels of noise reduction at 94 non-impacted receptor units, resulting in a total of 194 benefited receptor units. The estimated cost for the noise barrier would be approximately $1,607,000, or about $8,300 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would be more costly per receptor unit.

  The west end of this barrier would be contiguous with the eastern end of the barrier in NSA-S5. The east end of the barrier would terminate immediately west of the Valley Forge Road bridge over the Turnpike.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S7** (Valley Forge Road to Glenhardie Road)

  A 14-foot high noise barrier extending for approximately 6,765 feet would provide noise reductions of five to 11 decibels at all 35 impacted residences in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least five decibels of noise reduction at 14 non-impacted residences, resulting in a total of 49 benefited receptor units. The estimated cost for the noise barrier would be approximately $2,368,000, or about $48,300 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would not benefit additional impacted receptors and would be more costly.

  The west end of this barrier would begin east of Valley Forge Road bridge over the Turnpike. The east end of the barrier would be contiguous with the western end of the barrier in NSA-S8, meeting at the bridge over Glenhardie Road.

  This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

- **NSA-S8** (Glenhardie Road to US 422) A 14-foot high noise barrier extending for approximately 2,105 feet would provide noise reductions of five to 11 decibels at 107 of 121 impacted receptor

units in this NSA, thereby providing at least five decibels of noise reduction at 50% or more of the impacted receptor units. The barrier also would satisfy each of the other feasibility criteria. The noise barrier also would provide at least three decibels of noise reduction at the remaining 14 impacted receptor units and at least five decibels of noise reduction at 51 non-impacted receptor units, resulting in a total of 172 benefited receptor units. The estimated cost for the noise barrier would be approximately $736,000, or about $4,300 per receptor unit. This meets the cost reasonableness standard of $50,000 per receptor unit. Barrier alternatives that were either lower in height or shorter in length would benefit fewer receptor units. Barrier alternatives that were either taller or longer would not benefit additional impacted receptors and would be more costly. In addition to reducing noise levels at the receptor units within this NSA, the noise barrier also would benefit the portions of the Glenhardie Country Club Golf Course closest to the Turnpike.

The west end of this barrier would be contiguous with the east end of the barrier in NSA-S7, meeting at the bridge over Glenhardie Road. The east end of this barrier would be contiguous with the northern end of the existing noise barrier along the west side of US 422.

This noise barrier satisfies both the feasibility criteria and the reasonableness criteria. Therefore, based on the studies done to date, this noise barrier is recommended. If it subsequently develops during the final design phase that these conditions have changed, the barrier may no longer be recommended. A final decision on the recommendation will be made upon completion of the project design and the public involvement processes.

Table 7. Computed Loudest-Hour Sound Levels and Insertion Loss Values

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-N1	N1_01	1	71	73	68	5
NSA-N1	N1_02	2	72	74	67	7
NSA-N1	N1_03	1	71	73	68	5
NSA-N1	N1_04_ST2[2]	1	68	71	70	1
NSA-N1	N1_05	1	64	66	65	1
NSA-N1	N1_06	1	68	70	65	5
NSA-N1	N1_07	1	64	66	63	3
NSA-N1	N1_08	1	64	66	63	3
NSA-N5	N5_01_ST16[2]	0	68	73	66	7
NSA-N5	N5_02	0	72	73	64	9
NSA-N5	N5_P1	0	73	75	--[3]	--[3]
NSA-N5	N5_P2	0	66	68	--[3]	--[3]
NSA-N5	N5_P3	0	60	62	--[3]	--[3]
NSA-N5	N5_P4	0	69	70	--[3]	--[3]
NSA-N5	N5_P5	0	66	68	--[3]	--[3]
NSA-N5	N5_P6	0	60	63	--[3]	--[3]
NSA-N5	N5_P7	0	57	59	--[3]	--[3]
NSA-N5	N5_P8	0	57	59	--[3]	--[3]
NSA-N6	N6_01	1	64	65	60	5
NSA-N6	N6_02	1	71	73	63	10
NSA-N6	N6_03	3	69	71	62	9
NSA-N6	N6_04_LT4[2]	4	68	70	62	8
NSA-N6	N6_05	3	66	68	60	8
NSA-N6	N6_06	1	66	66	58	8
NSA-N6	N6_07	2	64	65	58	7
NSA-N6	N6_08	1	70	70	61	9
NSA-N6	N6_09	1	65	66	58	8
NSA-N6	N6_10	1	67	68	60	8
NSA-N6	N6_11	2	69	68	60	8
NSA-N6	N6_12_ST22[2]	3	72	73	63	10
NSA-N6	N6_13	3	71	71	62	9
NSA-N6	N6_14	1	70	72	63	9
NSA-N6	N6_15_ST23[2]	1	70	67	63	4
NSA-N6	N6_16	2	59	61	56	5
NSA-N6	N6_17	4	63	65	58	7
NSA-N6	N6_18_ST19[2]	4	63	64	57	7
NSA-N6	N6_19	2	63	64	57	7
NSA-N6	N6_20	2	62	63	56	7
NSA-N6	N6_21	2	61	62	55	7
NSA-N6	N6_22	6	65	66	59	7
NSA-N6	N6_23	2	64	65	60	5
NSA-N6	N6_24	1	66	66	61	5
NSA-N6	N6_25	3	64	65	58	7

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-N6	N6_26	3	60	62	56	6
NSA-N6	N6_27	3	63	65	57	8
NSA-N6	N6_28	4	60	62	55	7
NSA-N6	N6_29	3	58	60	55	5
NSA-N6	N6_30	4	59	61	56	5
NSA-N6	N6_31	4	61	60	58	2
NSA-S1	S1_01	2	66	66	62	4
NSA-S1	S1_02_ST1[2]	3	67	68	62	6
NSA-S1	S1_03	6	66	67	60	7
NSA-S1	S1_04	1	67	68	62	6
NSA-S1	S1_05	1	66	68	64	4
NSA-S1	S1_06	1	67	68	61	7
NSA-S1	S1_07_ST3[2]	1	68	70	62	8
NSA-S1	S1_08	1	64	65	60	5
NSA-S1	S1_09	1	65	66	59	7
NSA-S1	S1_10	1	66	68	61	7
NSA-S1	S1_11	1	70	71	62	9
NSA-S1	S1_12	4	67	69	62	7
NSA-S1	S1_13	1	67	69	61	8
NSA-S1	S1_14	1	66	67	59	8
NSA-S1	S1_15_LT1[2]	3	66	66	58	8
NSA-S1	S1_16	5	63	64	58	6
NSA-S1	S1_17	1	69	69	61	8
NSA-S1	S1_18	1	58	59	51	8
NSA-S1	S1_19	2	67	69	67	2
NSA-S1	S1_20	4	62	63	59	4
NSA-S1	S1_21	2	64	65	63	2
NSA-S1	S1_22	1	61	63	60	3
NSA-S1	S1_23	1	65	67	65	2
NSA-S1	S1_24	1	65	67	64	3
NSA-S1	S1_25	2	64	65	61	4
NSA-S1	S1_26	2	63	65	62	3
NSA-S1	S1_27	1	63	65	61	4
NSA-S1	S1_28	2	60	62	55	7
NSA-S1	S1_29	2	62	63	60	3
NSA-S1	S1_30	2	58	60	53	7
NSA-S1	S1_31	1	59	61	56	5
NSA-S1	S1_32_ST6[2]	5	60	61	58	3
NSA-S1	S1_33	1	64	64	60	4
NSA-S1	S1_34	2	60	61	54	7
NSA-S1	S1_35	1	58	60	53	7
NSA-S1	S1_36	2	59	61	54	7
NSA-S1	S1_37	2	57	59	51	8
NSA-S1	S1_38	6	57	58	53	5
NSA-S1	S1_39	1	60	61	55	6

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S2	S2_01	1	67	67	58	9
NSA-S2	S2_02_ST7[2]	0	69	70	61	9
NSA-S2	S2_03	0	65	67	59	8
NSA-S2	S2_04	1	63	63	56	7
NSA-S2	S2_05	1	61	62	55	7
NSA-S2	S2_06	1	56	58	53	5
NSA-S2	S2_07	3	55	57	52	5
NSA-S2	S2_08	1	53	55	51	4
NSA-S2	S2_09	0	58	59	53	6
NSA-S2	S2_10	0	61	62	55	7
NSA-S3	S3_01	1	63	65	60	5
NSA-S3	S3_02_ST9[2]	2	66	69	61	8
NSA-S3	S3_03	2	68	70	60	10
NSA-S3	S3_04	1	67	69	58	11
NSA-S3	S3_05	1	67	69	60	9
NSA-S3	S3_06	4	62	64	58	6
NSA-S3	S3_07	1	62	64	55	9
NSA-S3	S3_08_ST10[2]	1	67	68	58	10
NSA-S3	S3_09	2	73	75	62	13
NSA-S3	S3_10	2	59	61	58	3
NSA-S3	S3_11	1	63	64	57	7
NSA-S3	S3_12	3	63	65	56	9
NSA-S3	S3_13	3	61	63	56	7
NSA-S3	S3_14	3	60	61	53	8
NSA-S3	S3_15	2	63	64	56	8
NSA-S3	S3_16	1	66	67	61	6
NSA-S3	S3_17	3	57	59	54	5
NSA-S3	S3_18	2	62	63	55	8
NSA-S3	S3_19	4	63	64	53	11
NSA-S3	S3_20	2	56	57	49	8
NSA-S3	S3_21	3	55	57	50	7
NSA-S3	S3_22	3	60	62	55	7
NSA-S3	S3_23	2	60	62	59	3
NSA-S3	S3_24	5	54	56	52	4
NSA-S4	S4_01	2	74	76	64	12
NSA-S4	S4_02	2	72	73	62	11
NSA-S4	S4_03	1	74	75	63	12
NSA-S4	S4_04	3	75	77	65	12
NSA-S4	S4_05_ST11[2]	10	68	70	61	9
NSA-S4	S4_06	6	75	77	64	13
NSA-S4	S4_07	2	74	76	63	13
NSA-S4	S4_08	2	64	65	61	4
NSA-S4	S4_09	1	66	68	59	9
NSA-S4	S4_10	2	69	70	59	11
NSA-S4	S4_11	6	70	71	61	10

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S4	S4_12	14	64	66	57	9
NSA-S4	S4_13	6	61	64	56	8
NSA-S4	S4_14	3	58	59	53	6
NSA-S4	S4_15	2	60	62	55	7
NSA-S4	S4_16	6	61	63	55	8
NSA-S4	S4_17	6	60	61	55	6
NSA-S4	S4_18	3	54	55	51	4
NSA-S4	S4_19	4	58	60	52	8
NSA-S4	S4_20	11	65	67	57	10
NSA-S4	S4_21	13	61	62	53	9
NSA-S4	S4_22	5	62	64	55	9
NSA-S4	S4_23	9	58	60	52	8
NSA-S4	S4_24	6	59	60	52	8
NSA-S4	S4_25	6	61	63	54	9
NSA-S5	S5_01, 1st floor	2	70	71	63	8
NSA-S5	S5_01, 2nd floor	2	73	75	66	9
NSA-S5	S5_02, 1st floor	2	72	73	61	12
NSA-S5	S5_02, 2nd floor	2	73	75	65	10
NSA-S5	S5_03, 1st floor	2	71	73	63	10
NSA-S5	S5_03, 2nd floor	2	72	75	66	9
NSA-S5	S5_03, 3rd floor	2	73	76	69	7
NSA-S5	S5_04, 1st floor	2	69	71	62	9
NSA-S5	S5_04, 2nd floor	2	71	75	66	9
NSA-S5	S5_05, 1st floor	2	64	66	59	7
NSA-S5	S5_05, 2nd floor	2	66	69	61	8
NSA-S5	S5_06, 1st floor	2	70	72	61	11
NSA-S5	S5_06, 2nd floor	2	71	74	64	10
NSA-S5	S5_07, 1st floor	5	68	69	59	10
NSA-S5	S5_07, 2nd floor	5	72	74	62	12
NSA-S5	S5_08, 1st floor	5	71	72	60	12
NSA-S5	S5_08, 2nd floor	5	72	74	64	10
NSA-S5	S5_09, 1st floor	4	70	72	62	10
NSA-S5	S5_09, 2nd floor	4	74	76	63	13
NSA-S5	S5_10, 1st floor	5	70	71	62	9
NSA-S5	S5_10, 2nd floor	5	73	75	62	13
NSA-S5	S5_11, 1st floor	6	68	69	60	9
NSA-S5	S5_11, 2nd floor	6	71	73	61	12
NSA-S5	S5_12, 1st floor	2	64	65	61	4
NSA-S5	S5_12, 2nd floor	2	68	70	63	7
NSA-S5	S5_13, 1st floor	2	67	66	59	7
NSA-S5	S5_13, 2nd floor	2	70	72	64	8
NSA-S5	S5_14, 1st floor	2	59	61	57	4
NSA-S5	S5_14, 2nd floor	2	63	65	59	6
NSA-S5	S5_14, 3rd floor	2	68	70	62	8
NSA-S5	S5_15, 1st floor	2	62	64	57	7

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S5	S5_15, 2nd floor	2	66	68	60	8
NSA-S5	S5_15, 3rd floor	2	68	70	62	8
NSA-S5	S5_16, 1st floor	2	60	62	56	6
NSA-S5	S5_16, 2nd floor	2	64	66	58	8
NSA-S5	S5_17, 1st floor	2	67	69	59	10
NSA-S5	S5_17, 2nd floor	2	69	71	61	10
NSA-S5	S5_18, 1st floor	5	66	67	58	9
NSA-S5	S5_18, 2nd floor	5	71	72	60	12
NSA-S5	S5_19, 1st floor	6	68	68	58	10
NSA-S5	S5_19, 2nd floor	6	70	72	60	12
NSA-S5	S5_20, 1st floor	5	66	68	58	10
NSA-S5	S5_20, 2nd floor	5	71	72	60	12
NSA-S5	S5_21, 1st floor	5	60	61	53	8
NSA-S5	S5_21, 2nd floor	5	68	70	57	13
NSA-S5	S5_22, 1st floor	4	59	60	53	7
NSA-S5	S5_22, 2nd floor	4	67	69	56	13
NSA-S5	S5_23, 1st floor	6	62	63	55	8
NSA-S5	S5_23, 2nd floor	6	67	68	58	10
NSA-S5	S5_24, 1st floor	2	60	61	58	3
NSA-S5	S5_24, 2nd floor	2	65	66	61	5
NSA-S5	S5_24, 3rd floor	2	68	70	64	6
NSA-S5	S5_25, 1st floor	2	64	65	58	7
NSA-S5	S5_25, 2nd floor	2	68	70	62	8
NSA-S5	S5_25, 3rd floor	2	69	71	64	7
NSA-S5	S5_26, 1st floor	2	59	59	56	3
NSA-S5	S5_26, 2nd floor	2	62	63	59	4
NSA-S5	S5_27, 1st floor	2	62	62	57	5
NSA-S5	S5_27, 2nd floor	2	66	68	61	7
NSA-S5	S5_28, 1st floor	2	60	61	56	5
NSA-S5	S5_28, 2nd floor	2	65	66	59	7
NSA-S5	S5_29, 1st floor	2	58	59	54	5
NSA-S5	S5_29, 2nd floor	2	63	64	57	7
NSA-S5	S5_29, 3rd floor	2	65	67	59	8
NSA-S5	S5_30, 1st floor	2	58	59	54	5
NSA-S5	S5_30, 2nd floor	2	62	64	56	8
NSA-S5	S5_30, 3rd floor	2	64	66	58	8
NSA-S5	S5_31, 1st floor	2	58	60	54	6
NSA-S5	S5_31, 2nd floor	2	64	65	56	9
NSA-S5	S5_31, 3rd floor	2	65	67	58	9
NSA-S5	S5_32, 1st floor	2	58	60	54	6
NSA-S5	S5_32, 2nd floor	2	63	65	58	7
NSA-S5	S5_32, 3rd floor	2	67	69	60	9
NSA-S5	S5_33, 1st floor	5	61	63	54	9
NSA-S5	S5_33, 2nd floor	5	66	67	56	11
NSA-S5	S5_34, 1st floor	5	64	65	55	10

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S5	S5_34, 2nd floor	5	67	69	57	12
NSA-S5	S5_35, 1st floor	6	59	60	52	8
NSA-S5	S5_35, 2nd floor	6	64	65	55	10
NSA-S5	S5_36, 1st floor	6	64	66	56	10
NSA-S5	S5_36, 2nd floor	6	67	68	58	10
NSA-S5	S5_37, 1st floor	6	61	62	54	8
NSA-S5	S5_37, 2nd floor	6	67	68	56	12
NSA-S5	S5_38, 1st floor	4	63	64	54	10
NSA-S5	S5_38, 2nd floor	4	66	68	57	11
NSA-S5	S5_39, 1st floor	5	60	61	53	8
NSA-S5	S5_39, 2nd floor	5	64	65	55	10
NSA-S5	S5_40_ST14[2]	0	72	74	62	12
NSA-S6	S6_01	3	73	74	63	11
NSA-S6	S6_02	11	73	75	65	10
NSA-S6	S6_03	6	73	75	67	8
NSA-S6	S6_04_ST15[2]	4	71	75	66	9
NSA-S6	S6_05	3	65	68	61	7
NSA-S6	S6_06	4	71	74	67	7
NSA-S6	S6_07	5	68	71	66	5
NSA-S6	S6_08	5	72	74	67	7
NSA-S6	S6_09	1	74	76	70	6
NSA-S6	S6_10	2	71	72	64	8
NSA-S6	S6_11	2	70	73	63	10
NSA-S6	S6_12	2	70	74	63	11
NSA-S6	S6_13_LT3[2]	3	71	74	63	11
NSA-S6	S6_14	3	71	72	62	10
NSA-S6	S6_15	2	71	72	61	11
NSA-S6	S6_16	2	75	77	65	12
NSA-S6	S6_17	1	68	68	61	7
NSA-S6	S6_18	2	64	66	62	4
NSA-S6	S6_19	7	70	72	61	11
NSA-S6	S6_20	12	65	66	61	5
NSA-S6	S6_21	6	61	63	59	4
NSA-S6	S6_22	4	64	67	61	6
NSA-S6	S6_23	7	59	60	57	3
NSA-S6	S6_24	8	63	65	60	5
NSA-S6	S6_25	3	63	66	60	6
NSA-S6	S6_26	6	69	71	61	10
NSA-S6	S6_27	3	64	66	58	8
NSA-S6	S6_28	4	61	62	56	6
NSA-S6	S6_29	3	62	63	57	6
NSA-S6	S6_30	1	60	61	54	7
NSA-S6	S6_31	2	65	65	57	8
NSA-S6	S6_32	4	59	60	56	4
NSA-S6	S6_33	1	60	63	62	1

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S6	S6_34	4	64	66	56	10
NSA-S6	S6_35	11	55	57	51	6
NSA-S6	S6_36	16	55	57	54	3
NSA-S6	S6_37	4	60	62	54	8
NSA-S6	S6_38	7	58	60	55	5
NSA-S6	S6_39	4	59	60	54	6
NSA-S6	S6_40	4	57	58	55	3
NSA-S6	S6_41	1	60	62	61	1
NSA-S6	S6_42	6	62	63	54	9
NSA-S6	S6_43	12	60	62	56	6
NSA-S6	S6_44	7	58	60	56	4
NSA-S6	S6_45	16	60	62	56	6
NSA-S6	S6_46	6	63	65	57	8
NSA-S6	S6_47	2	55	57	50	7
NSA-S6	S6_48	6	54	56	51	5
NSA-S6	S6_49	2	53	53	48	5
NSA-S6	S6_50	11	54	56	53	3
NSA-S7	S7_01	0	60	61	57	4
NSA-S7	S7_02	2	64	66	59	7
NSA-S7	S7_03_ST17[2]	6	58	60	57	3
NSA-S7	S7_04	2	61	64	58	6
NSA-S7	S7_05	2	64	66	59	7
NSA-S7	S7_06	3	65	68	60	8
NSA-S7	S7_07_ST18[2]	1	67	69	61	8
NSA-S7	S7_08	1	70	72	65	7
NSA-S7	S7_09	1	60	62	58	4
NSA-S7	S7_10	2	65	67	60	7
NSA-S7	S7_11	1	74	76	66	10
NSA-S7	S7_12	2	73	74	64	10
NSA-S7	S7_13_ST20[2]	2	70	71	62	9
NSA-S7	S7_14	1	70	70	61	9
NSA-S7	S7_15	1	68	69	60	9
NSA-S7	S7_16	2	66	68	58	10
NSA-S7	S7_17	2	71	72	61	11
NSA-S7	S7_18	2	74	76	66	10
NSA-S7	S7_19	1	75	77	70	7
NSA-S7	S7_20	2	56	57	55	2
NSA-S7	S7_21	3	55	56	54	2
NSA-S7	S7_22	2	53	55	54	1
NSA-S7	S7_23	1	56	57	55	2
NSA-S7	S7_24	1	57	58	56	2
NSA-S7	S7_25	1	55	56	55	1
NSA-S7	S7_26	1	55	57	56	1
NSA-S7	S7_27	2	63	65	61	4
NSA-S7	S7_28	4	65	66	57	9

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S7	S7_29	3	67	69	61	8
NSA-S7	S7_30	1	68	70	62	8
NSA-S7	S7_31	2	53	55	53	2
NSA-S7	S7_32	2	53	54	54	0
NSA-S7	S7_33	2	51	52	52	0
NSA-S7	S7_34	2	55	57	55	2
NSA-S7	S7_35	3	55	57	55	2
NSA-S7	S7_36	3	57	59	55	4
NSA-S7	S7_37	4	56	58	53	5
NSA-S7	S7_38_ST21[2]	3	58	60	53	7
NSA-S7	S7_39	2	64	66	58	8
NSA-S7	S7_40	4	52	54	52	2
NSA-S7	S7_41	5	62	64	56	8
NSA-S8	S8_01, 1st floor	3	65	67	58	9
NSA-S8	S8_01, 2nd floor	4	68	69	59	10
NSA-S8	S8_01, 3rd floor	4	71	73	62	11
NSA-S8	S8_02, 1st floor	4	64	66	58	8
NSA-S8	S8_02, 2nd floor	4	66	68	59	9
NSA-S8	S8_02, 3rd floor	4	71	73	62	11
NSA-S8	S8_03, 1st floor	4	63	65	57	8
NSA-S8	S8_03, 2nd floor	4	67	68	59	9
NSA-S8	S8_03, 3rd floor	4	70	72	61	11
NSA-S8	S8_04, 1st floor	3	66	68	60	8
NSA-S8	S8_04, 2nd floor	4	68	70	61	9
NSA-S8	S8_04, 3rd floor	4	71	73	62	11
NSA-S8	S8_05, 1st floor	3	64	66	59	7
NSA-S8	S8_05, 2nd floor	4	67	68	61	7
NSA-S8	S8_05, 3rd floor	4	70	72	63	9
NSA-S8	S8_06, 1st floor	3	65	67	61	6
NSA-S8	S8_06, 2nd floor	4	68	69	62	7
NSA-S8	S8_06, 3rd floor	4	70	72	63	9
NSA-S8	S8_07, 1st floor	3	64	67	62	5
NSA-S8	S8_07, 2nd floor	4	66	68	61	7
NSA-S8	S8_07, 3rd floor	4	69	72	65	7
NSA-S8	S8_08, 1st floor	2	63	66	62	4
NSA-S8	S8_08, 2nd floor	4	65	68	64	4
NSA-S8	S8_08, 3rd floor	4	69	71	66	5
NSA-S8	S8_09	1	60	63	57	6
NSA-S8	S8_10	0	61	63	55	8
NSA-S8	S8_11	0	69	70	60	10
NSA-S8	S8_12, 1st floor	4	58	60	54	6
NSA-S8	S8_12, 2nd floor	4	61	63	55	8
NSA-S8	S8_12, 3rd floor	4	64	66	58	8
NSA-S8	S8_13, 1st floor	3	58	60	54	6
NSA-S8	S8_13, 2nd floor	4	61	63	56	7

NSA	Prediction Site	Number of Receptor Units	Loudest-hour L_{eq} Sound Level (dBA)[1]			
			Existing (2007)	Future (2035)		
				No Barrier	With Barrier	Insertion Loss
NSA-S8	S8_13, 3rd floor	4	64	66	58	8
NSA-S8	S8_14, 1st floor	4	61	63	57	6
NSA-S8	S8_14, 2nd floor	4	65	66	59	7
NSA-S8	S8_14, 3rd floor	4	68	69	60	9
NSA-S8	S8_15, 1st floor	4	59	61	55	6
NSA-S8	S8_15, 2nd floor	4	63	64	57	7
NSA-S8	S8_15, 3rd floor	4	64	66	59	7
NSA-S8	S8_16, 1st floor	4	61	62	57	5
NSA-S8	S8_16, 2nd floor	4	64	66	60	6
NSA-S8	S8_16, 3rd floor	4	68	69	61	8
NSA-S8	S8_17, 1st floor	3	57	59	55	4
NSA-S8	S8_17, 2nd floor	4	60	61	56	5
NSA-S8	S8_17, 3rd floor	3	63	64	59	5
NSA-S8	S8_18, 1st floor	2	59	61	57	4
NSA-S8	S8_18, 2nd floor	4	62	65	60	5
NSA-S8	S8_18, 3rd floor	4	64	65	60	5
NSA-S8	S8_19, 1st floor	3	61	63	59	4
NSA-S8	S8_19, 2nd floor	3	64	65	61	4
NSA-S8	S8_19, 3rd floor	4	66	68	64	4
NSA-S8	S8_20, 1st floor	4	58	61	60	1
NSA-S8	S8_20, 2nd floor	3	61	63	62	1
NSA-S8	S8_20, 3rd floor	4	65	67	64	3
NSA-S8	S8_21	0	66	70	65	5
NSA-S8	S8_22_ST24[2]	0	68	69	62	7

1. Loudest-hour sound levels indicating noise impacts are shown in **bold**. Insertion losses for benefited receptors are highlighted. All with-barrier sound levels and insertion losses assume sound absorptive barriers.
2. Measurement and prediction site.
3. No noise barrier recommended in this portion of NSA-N5. The recommended noise barrier will benefit only those receptors near Lafayette's Quarters and the Whittle House.

Source: HMMH, 2007.

7. CONSTRUCTION NOISE CONSIDERATION AND MITIGATION ALTERNATIVES

An increase in project area noise levels will occur during the construction of the proposed project improvements. Construction noise differs from that generated by normal traffic due to differences in the spectral and temporal characteristics of the noise. The degree of noise impact during construction will be a function of the number and types of equipment being used, and the distances between the construction equipment and the noise sensitive areas. The PTC is committed to reasonable abatement of construction noise contingent on detailed construction noise analysis, design considerations during the Final Design process, and safety and engineering aspects.

8. PUBLIC INVOLVEMENT PROCESS

The results of the Noise Study will be conveyed to the public as part of an open house plans display. During the final design phase, the public will be invited to take part in a design charrette(s) to identify a noise wall treatment that reflects contextual sensitivity to its location.

APPENDIX A. WARRANTED, FEASIBLE AND REASONABLE WORKSHEETS

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Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **JULY 16, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N1**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **9**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **9**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **56%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **814 FT.**
    b. Average height of the proposed noise barrier **16 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$325,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **7**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **0**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$46,500**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: July 16, 2007
Qualified Professional Performing the Analysis
Grant S. Anderson, Principal Scientist, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 21, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N2**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **6**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **6**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **67%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **3,374 FT.**
    b. Average height of the proposed noise barrier **18 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$1,518,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **4**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **0**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$379,500**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **NO**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date: _____

PennDOT, Engineering District Environmental Manager

Date: May 21, 2007

Qualified Professional Performing the Analysis
Grant S. Anderson, Principal Scientist, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **APRIL 20, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N3**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **7**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **7**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **5,260 FT.**
    b. Average height of the proposed noise barrier **18 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$ 2,367,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **7**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **7**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$ 169,100**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **NO**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: April 20, 2007

Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 17, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N4**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **12**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **12**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **58%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **3,669 FT.**
    b. Average height of the proposed noise barrier **16 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$ 1,467,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **12**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **4**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$91,700**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **NO**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

PennDOT, Engineering District Environmental Manager — Date:

Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc. — Date: May 17, 2007

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **APRIL 17, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N5**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **0**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **0**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **0%**
   c. Is the percentage 50 or greater? **NO**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **1,432 FT.**
    b. Average height of the proposed noise barrier **12 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$430,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **0**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **0**
    d. Cost per benefited receptor unit (impacting and/or benefited) **NA**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision: Barrier benefits portion of Valley Forge National Park.

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: April 17, 2007
Qualified Professional Performing the Analysis
Alexander Donaldson, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 16, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-N6**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **32**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **32**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **4,761 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$1,667,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **32**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **41**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$22,800**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: May 16, 2007

Qualified Professional Performing the Analysis
Alexander Donaldson, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **APRIL 18, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S1**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **32**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **32**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **78%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **7,741 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$2,710,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **29**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **26**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$49,300**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: April 18, 2007
Qualified Professional Performing the Analysis
Grant S. Anderson, Principal Scientist, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **AUGUST 10, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S2**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **1**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **1**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **2,200 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$770,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **1**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **6**
    d. Cost per benefited receptor unit (impacting and/or benefited) **NA**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision: Noise barrier benefits outdoor use areas at the Vanguard and Crossroads Schools.

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: August 10, 2007
Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 16, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S3**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **10**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **10**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **2,434 FT.**
    b. Average height of the proposed noise barrier **16 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$ 973,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **10**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **35**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$ 21,600**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: May 16, 2007

Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **APRIL 13, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S4**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **60**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **60**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **1,930 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$676,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **60**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **66**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$5,400**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: April 13, 2007
Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 15, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S5**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **193**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **193**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **2,531 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$886,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **193**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **85**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$3,200**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: May 15, 2007

Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 15, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S6**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **100**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **100**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **98%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **4,591 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$1,607,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **100**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **94**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$8,300**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: May 15, 2007

Qualified Professional Performing the Analysis
Joseph Cardello, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **AUGUST 17, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S7**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **35**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **35**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **100%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **6764 FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$2,368,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **35**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **14**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$48,300**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

_____ Date: _____
PennDOT, Engineering District Environmental Manager

_____ Date: August 17, 2007
Qualified Professional Performing the Analysis
Alexander Donaldson, Consultant, HMMH Inc.

Appendix A – Warranted, Feasible and Reasonable Worksheet Template

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet

Date **MAY 15, 2007**
Project Name **PA TURNPIKE TOTAL RECONSTRUCTION PROJECT MP 320-326**
County **CHESTER COUNTY**
SR, Section **NOT APPLICABLE**

Community Name and/or NSA # **NSA-S8**

General

1. Type I or Type II project: **TYPE I**

2. Number of impacted Receptor Units in Community/NSA: **121**

Warranted

1. Community Documentation
   a. Date community was planned, designed and programmed: **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 planned, designed, and programmed after the date of approval of *CE, ROD, or FONSI as appropriate."* **N/A**

2. Criteria requiring consideration of noise abatement
   a. Project increases noise levels to greater than or equal to 66 dB(A)? **YES**
   b. Project causes a substantial increase of 10 dB(A) or more? **NO**
   c. Project decreases existing noise levels, but future noise levels are still greater than or equal to 66 dB(A)? **NO**

Feasibility

1. Impacted Receptor Units
   a. Number of Impacted Receptor Units: **121**
   b. Percentage of impacted Receptor Units receiving 5 dB(A) insertion losses: **88%**
   c. Is the percentage 50 or greater? **YES**

2. Can the noise barrier be physically constructed at the proposed location? **YES**

3. Any safety or engineering problems associated with the barrier, which preclude construction? **NO**

4. Does the barrier deny access to local vehicular and/or pedestrian travel? **NO**

5. Is the noise barrier maintainable? **YES**

6. Does the noise barrier impact utilities and/or vice versa? **NO**

7. Does the noise barrier impact drainage and/or vice versa? **NO**

Reasonableness

1. Community Desires Related to the Barrier

    a. Do at least 50 percent of the impacted and benefited receptor unit owner(s) desire the noise barrier? If yes, continue with the reasonableness questions. If no, the barrier can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the impacted receptor unit owners do not desire the barrier." **UNKNOWN**

2. Land-use Conformity

    a. Local zoning and planning controlled noise-sensitive land used within corridor? **YES**
    b. Land use in corridor expected to change in the future? **NO**

3. Additional Noise Barrier Details

    a. Length of the proposed noise barrier **2,104FT.**
    b. Average height of the proposed noise barrier **14 FT.**
    c. Barrier material **TBD**
    d. Post material **TBD**
    e. Additional right-of-way required? If so, cost associated with the right-of-way acquisition. **NO**
    f. Highway side color and texture? **TBD**
    g. Receptor side color and texture? **TBD**

4. Cost-Benefit Factors

    a. Cost of the proposed Noise Barrier **$736,000**
    b. Number of impacted receptor units receiving 3 dB(A) or more insertion loss or greater **121**
    c. Number of non-impacted benefited receptor units receiving 5 dB(A) or more insertion loss **51**
    d. Cost per benefited receptor unit (impacting and/or benefited) **$4,300**

Decision

Is the Noise Barrier(s) WARRANTED? **YES**
Is the Noise Barrier(s) FEASIBLE? **YES**
Is the Noise Barrier(s) REASONABLE? **YES**

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Date:

PennDOT, Engineering District Environmental Manager

Date: May 15, 2007

Qualified Professional Performing the Analysis
Alexander Donaldson, Consultant, HMMH Inc.

APPENDIX B. DESCRIPTION OF NOISE METRICS

This Appendix describes the noise metrics used in this report.

B.1 A-weighted Sound Level, dBA

Loudness is a subjective quantity that enables a listener to order the magnitude of different sounds on a scale from soft to loud. Although the perceived loudness of a sound is based somewhat on its frequency and duration, chiefly it depends upon the sound pressure level. Sound pressure level is a measure of the sound pressure at a point relative to a standard reference value; sound pressure level is always expressed in decibels (dB), a logarithmic quantity.

Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of sound pressure oscillations as they reach our ears. Frequency is expressed in units known as Hertz (abbreviated "Hz" and equivalent to one cycle per second). Sounds heard in the environment usually consist of a range of frequencies. The distribution of sound energy as a function of frequency is termed the "frequency spectrum."

The human ear does not respond equally to identical noise levels at different frequencies. Although the normal frequency range of hearing for most people extends from a low of about 20 Hz to a high of 10,000 Hz to 20,000 Hz, people are most sensitive to sounds in the voice range, between about 500 Hz to 2,000 Hz. Therefore, to correlate the amplitude of a sound with its level as perceived by people, the sound energy spectrum is adjusted, or "weighted."

The weighting system most commonly used to correlate with people's response to noise is "A-weighting" (or the "A-filter") and the resultant noise level is called the "A-weighted noise level" (dBA). A-weighting significantly de-emphasizes those parts of the frequency spectrum from a noise source that occurs both at lower frequencies (those below about 500 Hz) and at very high frequencies (above 10,000 Hz) where we do not hear as well. The filter has very little effect, or is nearly "flat," in the middle range of frequencies between 500 and 10,000 Hz. A-weighted sound levels have been found to correlate better than other weighting networks with human perception of "noisiness." One of the primary reasons for this is that the A-weighting network emphasizes the frequency range where human speech occurs.

B.2 Equivalent Sound Level, L_{eq}

The Equivalent Sound Level, abbreviated L_{eq}, is a measure of the exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest -- for example, an hour, an 8-hour school day, nighttime, or a full 24-hour day. However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(24)}$.

L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as (is "equivalent" to) the actual time-varying sound level with its normal peaks and valleys. It is important to recognize, however, that the two signals (the constant one and the time-varying one) would sound very different from each other. Also, the "average" sound level suggested by L_{eq} is not an arithmetic value, but a logarithmic, or "energy-averaged" sound level. Thus, the loudest events may dominate the noise environment described by the metric, depending on the relative loudness of the events.

APPENDIX C. MODELED TRAFFIC DATA

This appendix provides loudest-hour classified traffic volumes and speeds for each roadway modeled in TNM. Section 3.3 describes the loudest-hour computations and sources of traffic data.

Table C1. Existing (2007) Loudest-Hour Traffic Data used for TNM Modeling

Roadway	Volumes (vehicles/hour)			Speed (mph)
	Autos	Medium Trucks	Heavy Trucks	
Pennsylvania Turnpike eastbound	2,326	93	263	65
Pennsylvania Turnpike westbound	1,323	87	266	65
US Route 422 northbound	1,889	90	143	55
US Route 422 southbound	1,951	101	147	55
Yellow Springs Road, south of Turnpike (eastbound and westbound combined)	598	15	20	30
Yellow Springs Road, north of Turnpike (eastbound and westbound combined)	371	19	17	30
Mill Road (northbound and southbound combined)	262	7	4	40
Valley Forge Road (northbound and southbound combined)	531	16	14	45
Thomas Road (northbound and southbound combined)	179	9	4	30
Glenhardie Road (northbound and southbound combined)	135	5	0	35

Table C2. Future (2035) Loudest-Hour Traffic Data used for TNM Modeling

Roadway	Volumes (vehicles/hour)			Speed (mph)
	Autos	Medium Trucks	Heavy Trucks	
Pennsylvania Turnpike eastbound	2,923	104	452	65
Pennsylvania Turnpike westbound	3,154	142	248	65
US Route 422 northbound	3,280	171	248	60
US Route 422 southbound	2,663	138	201	60
Yellow Springs Road, south of Turnpike (eastbound and westbound combined)	985	25	33	30
Yellow Springs Road, north of Turnpike (eastbound and westbound combined)	611	31	28	30
Mill Road (northbound and southbound combined)	432	12	7	40
Valley Forge Road (northbound and southbound combined)	875	26	23	45
Thomas Road (northbound and southbound combined)	295	15	7	30
Glenhardie Road (northbound and southbound combined)	222	8	0	35

APPENDIX D. FIELD MEASUREMENT DATA SHEETS

The following sections contain the field sketches from each of the long-term measurement sites, followed by the field sketches, log sheets, and traffic counts from each of the short-term measurement sites.

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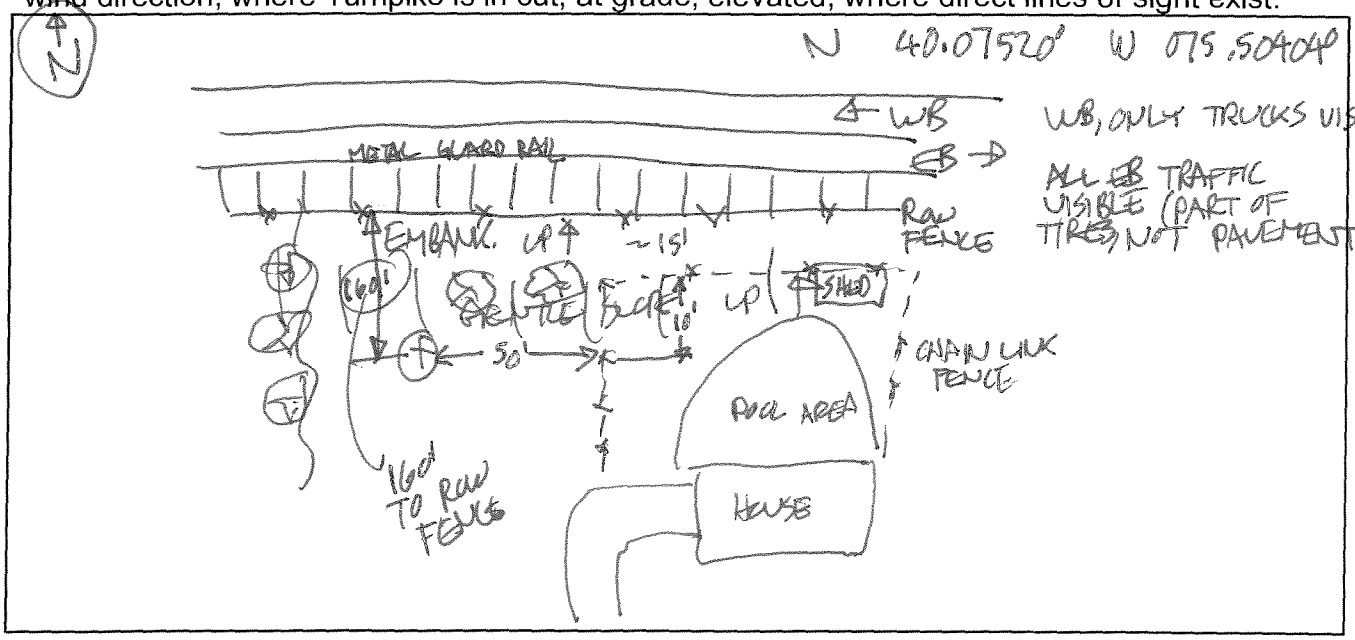
PROJECT: PTC 320-326
JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
LONG-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: S-1 MEASUREMENT SITE NO.: LT-1
ADDRESS: 2015 YELLOW SPRINGS RD
OWNER:
DESCRIPTION: SINGLE FAMILY HOME, BACKYARD
NOISE SOURCES: TURNPIKE TRAFFIC
NOISE MONITOR: LD 820 #1 S/N:
MICROPHONE: S/N:
CALIBRATOR: QC 10/20 S/N: Q0004002
START DATE: 1/30/07 NB/JAC END DATE:
START TIME: 15:50 END TIME:
SYNCH W/HOURS? YES
METRICS STORED: Leq, Ln, 1-SEC HISTORY
EXCEEDENCE THRESHOLD: 70 dBA EXCEEDENCE DURATION: 5 s.
TEMP. RANGE (°F): WEATHER CONDITIONS:

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PROJECT: PTC 320-326
JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
LONG-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: N-4 MEASUREMENT SITE NO.: LT-2

ADDRESS: 940 YELLOW SPRINGS RD

OWNER:

DESCRIPTION: SINGLE FAMILY HOME, BACKYARD ADJACENT TO POOL AREA

NOISE SOURCES: TURNPIKE TRAFFIC

NOISE MONITOR: LD 870 #2 S/N:

MICROPHONE: S/N:

CALIBRATOR: B&K 4231 S/N: 2039365

START DATE: 1/30/07 DEBAJA END DATE:

START TIME: 15:00 END TIME:

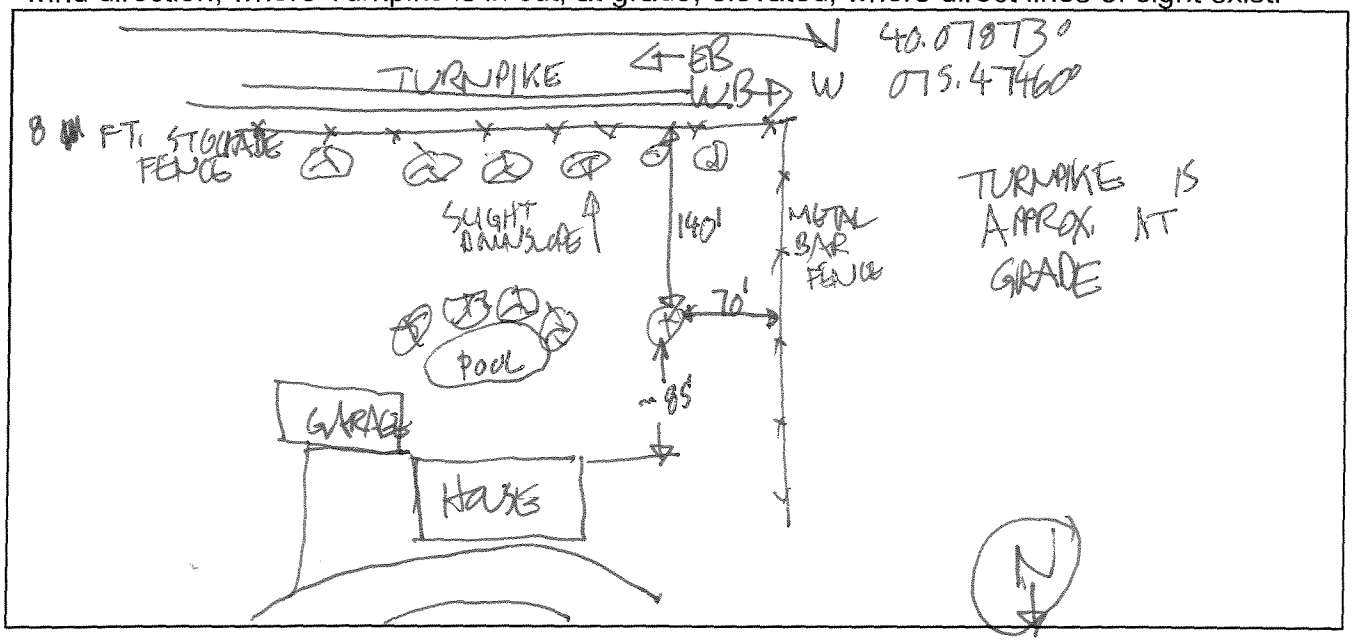
SYNCH W/HOURS? YES

METRICS STORED: L_{eq}, L_{01} I-SEC HISTORY

EXCEEDENCE THRESHOLD: 70 dBA EXCEEDENCE DURATION: 5 S.

TEMP. RANGE (°F): WEATHER CONDITIONS:

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PROJECT: PT(320-326
JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
LONG-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: S-6 MEASUREMENT SITE NO.: LT-3

ADDRESS: 251 LAFAYETTE LANE

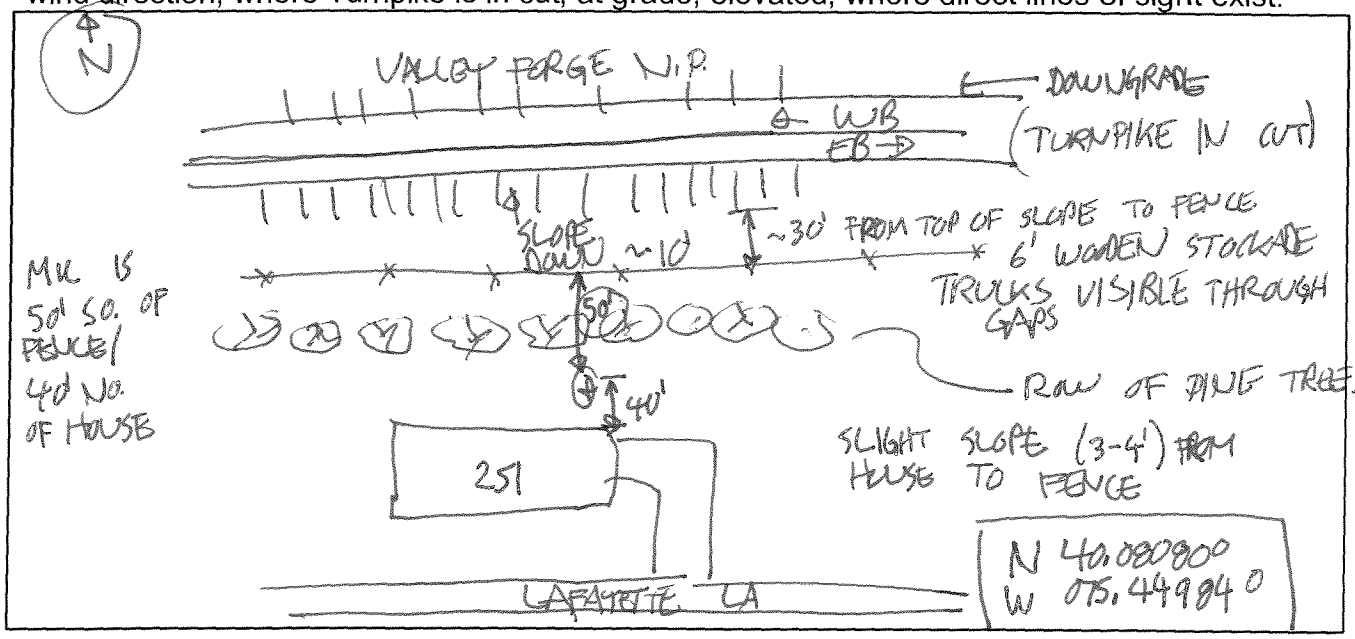
OWNER:

DESCRIPTION: SINGLE FAMILY HOME, BACKYARD

NOISE SOURCES: TURNPIKE TRAFFIC

NOISE MONITOR:	LD 820 #3	S/N:	
MICROPHONE:		S/N:	
CALIBRATOR:	LD CA 250	S/N:	2842
START DATE:	1/30/07 DEB/JAC	END DATE:	
START TIME:	13:15	END TIME:	
SYNCH W/HOURS?	YES		
METRICS STORED:	Leq, Ln 1 - SEE HISTORY		
EXCEEDENCE THRESHOLD:	70 dBA	EXCEEDENCE DURATION:	5 S.
TEMP. RANGE (°F):		WEATHER CONDITIONS:	

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PROJECT: PTC 320-326
JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
LONG-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: N-6 MEASUREMENT SITE NO.: LT-4

ADDRESS: 578 RICHARDS RD.

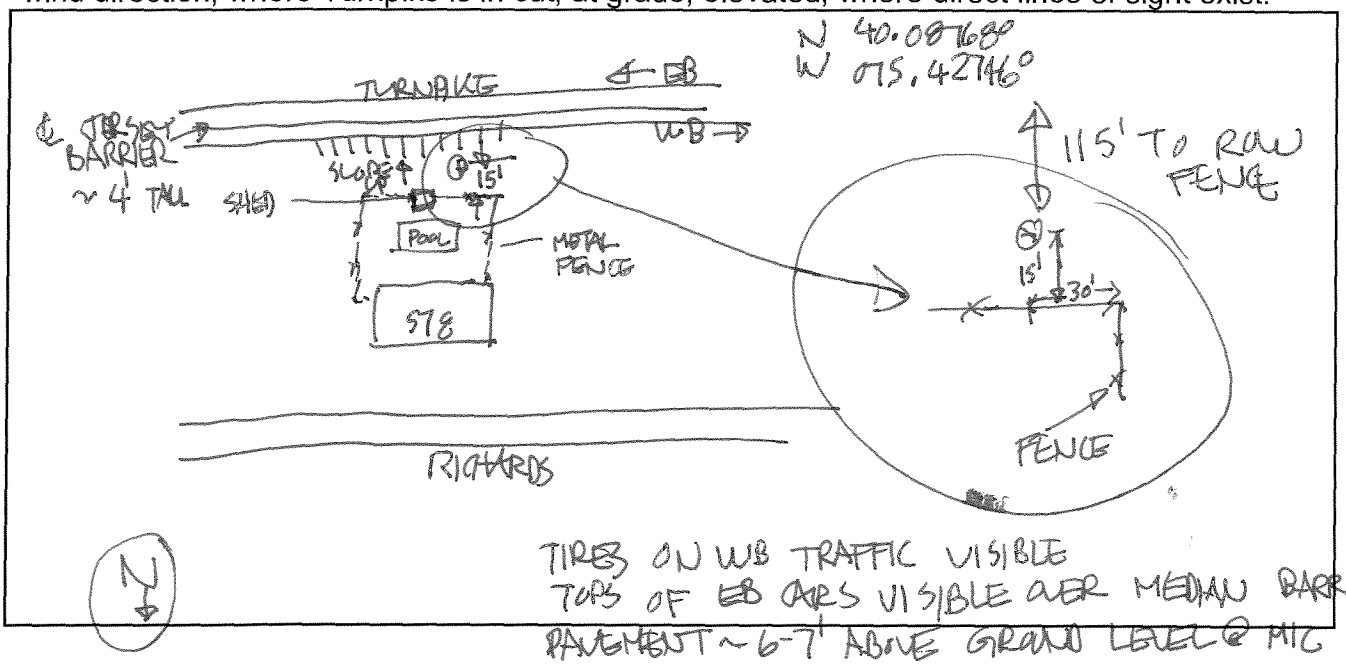
OWNER:

DESCRIPTION: SINGLE FAMILY HOME, LOCATED NEAR POOL AREA IN BACKYARD

NOISE SOURCES: TURNPIKE TRAFFIC

NOISE MONITOR:	LD 820 #4	S/N:	
MICROPHONE:	B&K 4189	S/N:	2386155
CALIBRATOR:	QC-20	S/N:	Q09050009
START DATE:	1/30/07	END DATE:	
START TIME:	12:15	END TIME:	
SYNCH W/HOURS?	Y		
METRICS STORED:	Leq, Ln, 1-sec TIME HISTORY		
EXCEEDENCE THRESHOLD:	70 dBA	EXCEEDENCE DURATION:	5 S.
TEMP. RANGE (°F):		WEATHER CONDITIONS:	

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - 51 MEASUREMENT SITE NO.: ST-1

ADDRESS: 2445-2443 Yellow Springs Rd

OWNER:

DESCRIPTION: backyard

NOISE SOURCES: PT / Howell's Rd

NOISE MONITOR: LD 870 #5 S/N:

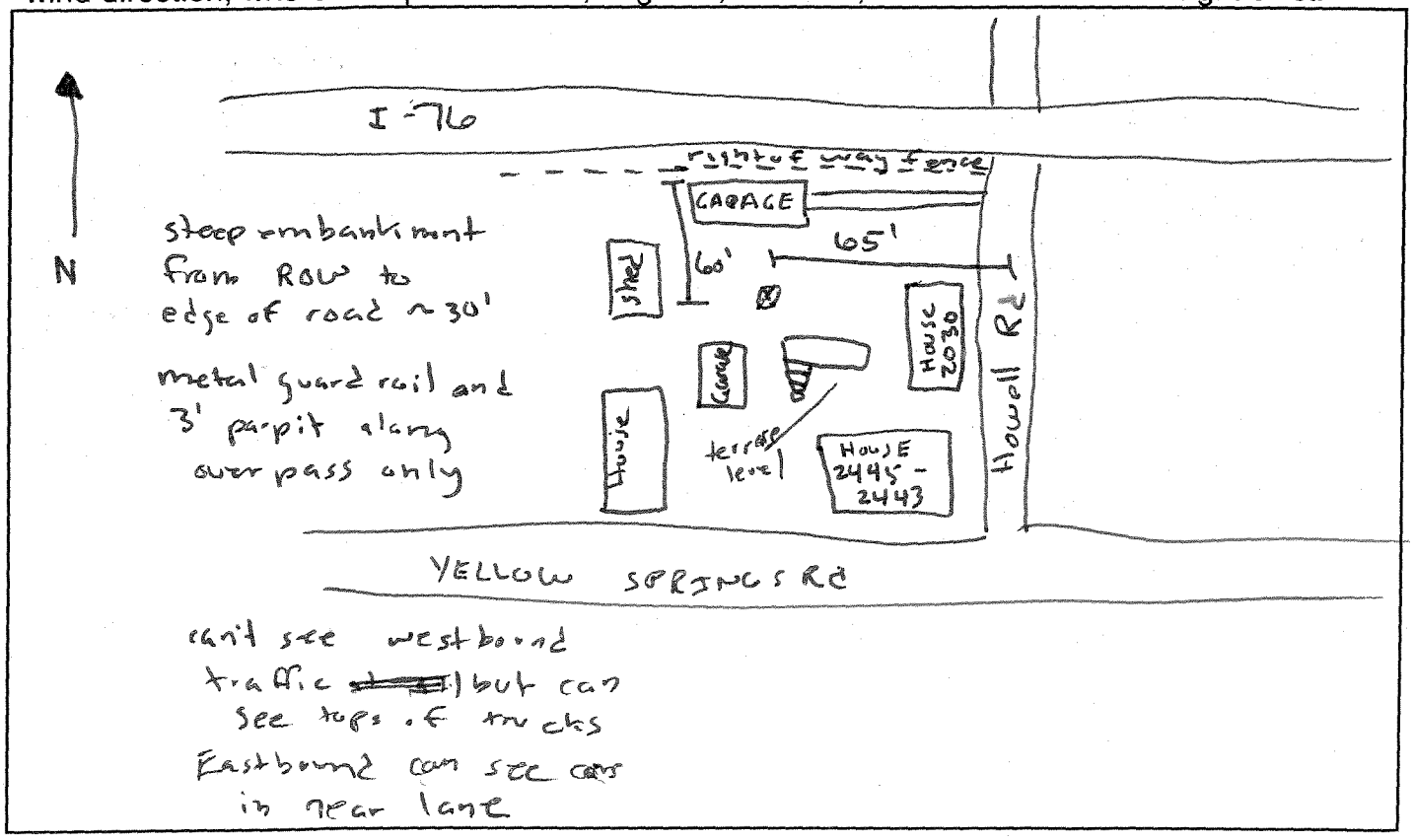
MICROPHONE: — S/N:

CALIBRATOR: — S/N:

TEMP. RANGE (°F): 30° WEATHER CONDITIONS: clear

wind < 3 mph

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-1 PERSONNEL: JAC/DEB

LOCATION/ADDRESS: 2445-2443 Yellow Springs Rd DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	10:00	60.6						Pre-cal 114.0
2	10:01	62.0		Yellow Springs Rd.				Post-cal 113.8
3	16:02	61.1						
4	10:03	57.2		49	5	3	30 min	
5	16:04	62.5						
6	10:05	56.5		Howell's Rd.				
7	10:06	58.7						
8	10:07	58.9		24	2	2		
9	10:08	59.9						
10	10:09	60.3						
11	10:10	62.2						
12	10:11	64.0						
13	10:12	62.1	√					Fedex on Howell
14	10:13	61.6						overflight no contribution
15	10:14	58.8						
16	10:15	61.3						
17	10:16	62.9	√					Truck on Yellow Spring
18	10:17	61.8						Flapping metal on truck
19	10:18	[illegible]	61.4					
20	10:19	[illegible]	61.9					
21	10:20	60.1						
22	10:21	60.3						
23	10:22	59.7						loud car carrier
24	10:23	61.5						↓
25	10:24	59.9						
26	10:25	58.3	√					over flight
27	10:26	60.9						
28	10:27	61.6						
29	10:28	62.7	√					truck on Howell
30	10:29	62.5						truck on Howell

TOTAL Leq = SUBSET Leq = Jake brake

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC-320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-N1 MEASUREMENT SITE NO.: ST-2

ADDRESS: 2030 Green Lane

OWNER: —

DESCRIPTION: Single Family Residence / backyard

NOISE SOURCES: Turnpike

NOISE MONITOR: LO 870 # 5 S/N: —

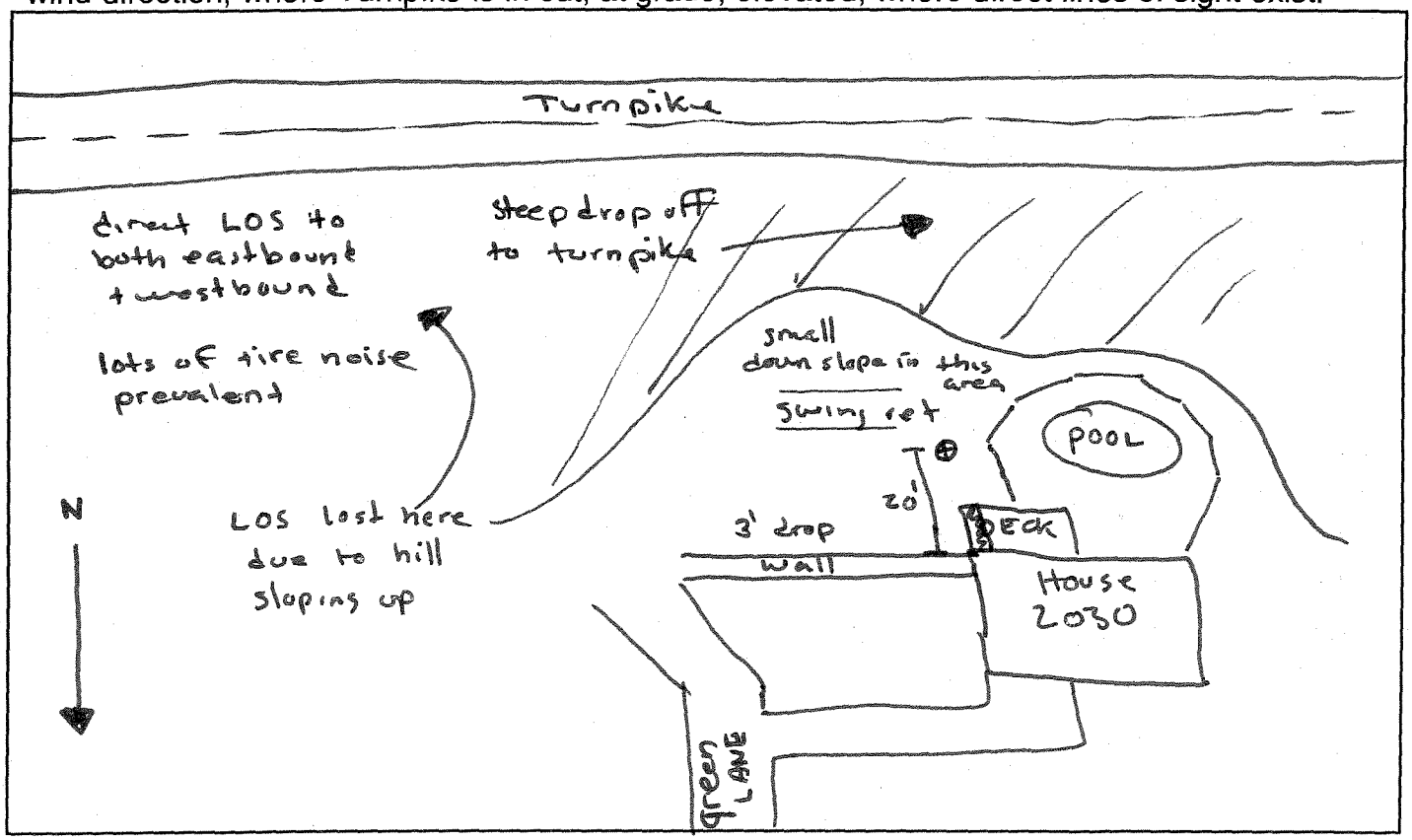
MICROPHONE: — S/N: —

CALIBRATOR: — S/N:

TEMP. RANGE (°F): 30° WEATHER CONDITIONS: Clear

Wind mostly calm, occ. gusts from So. up to ~5 mph

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-2 PERSONNEL: JAC / DEB

LOCATION/ADDRESS: 2030 Green Lane DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:03	66.8						Pre-cal 114.00
2	11:04	65.2						Post-cal 113.9
3	11:05	62.0						
4	11:06	62.2						
5	11:07	66.1						
6	11:08	62.9						
7	11:09	62.5						
8	11:10	63.1						
9	11:11	65.3						
10	11:12	64.9						
11	11:13	64.6						
12	11:14	65.0						
13	11:15	66.4						
14	11:16	67.2						group of trucks
15	11:17	63.4						
16	11:18	62.6						
17	11:19	63.8						
18	11:20	63.7						
19	11:21	65.5						
20	11:22	63.0						
21	11:23	61.7						
22	11:24	64.1						
23	11:25	63.8						
24	11:26	64.1	✓					single engine prop overflight
25	11:27	62.5						
26	11:28	64.0						
27	11:29	62.8						
28	11:30	62.8						
29	11:31	65.0						
30	11:32	63.4						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC - 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - S1 MEASUREMENT SITE NO.: ST-3

ADDRESS: 2305 Yellow Springs Rd

OWNER:

DESCRIPTION: Single family home / backyard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD870 #5 S/N: -

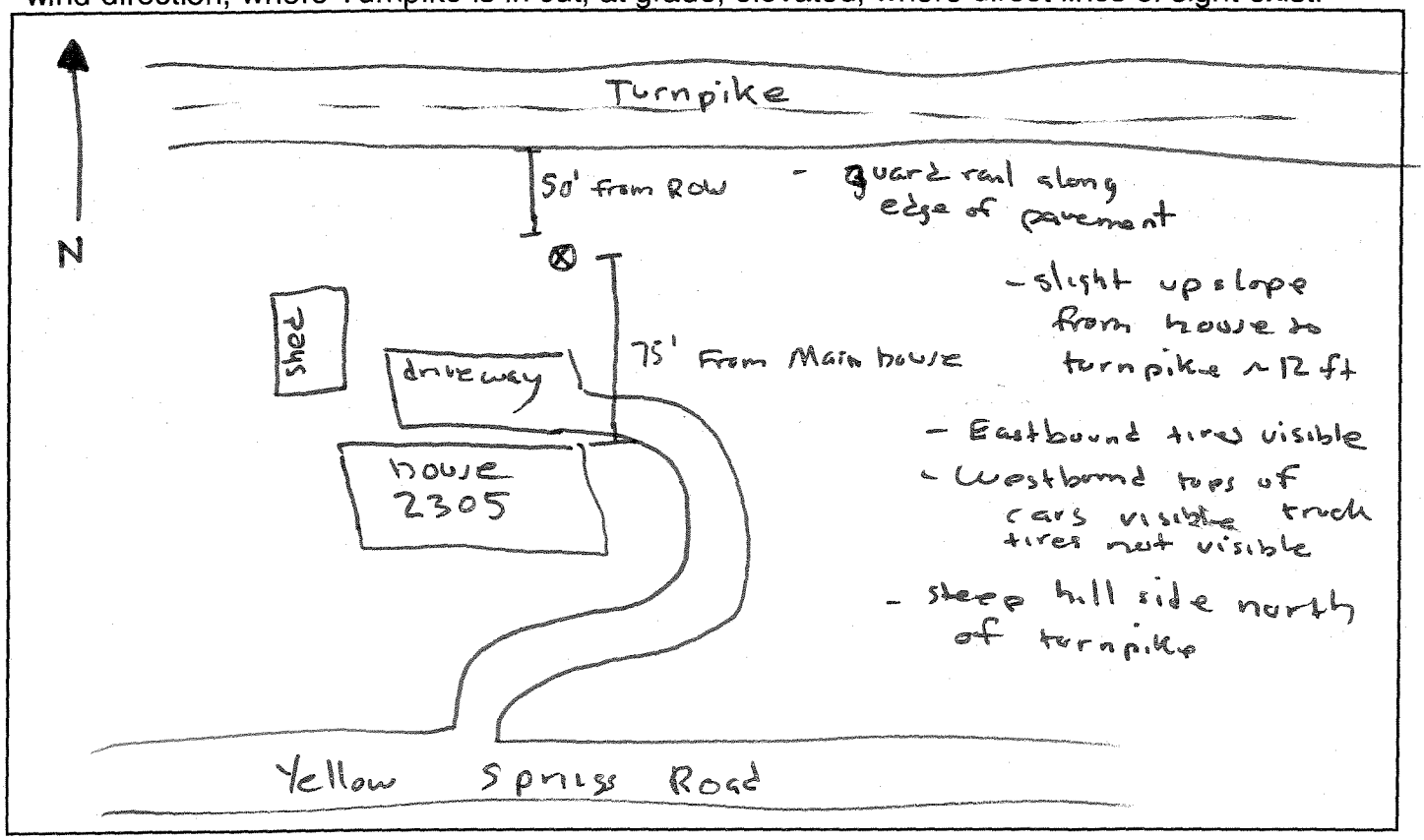
MICROPHONE: - S/N: -

CALIBRATOR: S/N: -

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: clear

Wind mostly calm

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-3 PERSONNEL: BJC / DED

LOCATION/ADDRESS: 2305 Yellow Springs Rd DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:53	66.1						Pre-cal 114.0
2	11:54	66.7						post-cal 114.0
3	11:55	65.2						
4	11:56	64.7						
5	11:57	64.0						
6	11:58	60.8						
7	11:59	63.3						
8	12:00	68.6						loud truck stack
9	12:01	65.3						
10	12:02	64.1						
11	12:03	63.6						
12	12:04	63.2						
13	12:05	65.0						
14	12:06	64.3						
15	12:07	63.8						
16	12:08	64.8						
17	12:09	62.8						
18	12:10	65.2						
19	12:11	64.3						
20	12:12	66.6						Loud truck
21	12:13	66.0						
22	12:14	64.7						
23	12:15	65.5						
24	12:16	63.8						
25	12:17	65.1						
26	12:18	63.7						
27	12:19	67.6						
28	12:20	58.1						
29	12:21	65.8						
30	12:22	62.3						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-N2 MEASUREMENT SITE NO.: ST-4

ADDRESS: 1990 Chuatauqua Trail

OWNER:

DESCRIPTION: Single family home / backyard

NOISE SOURCES: Turnpike in the distance

NOISE MONITOR: LD 810 #5 S/N: —

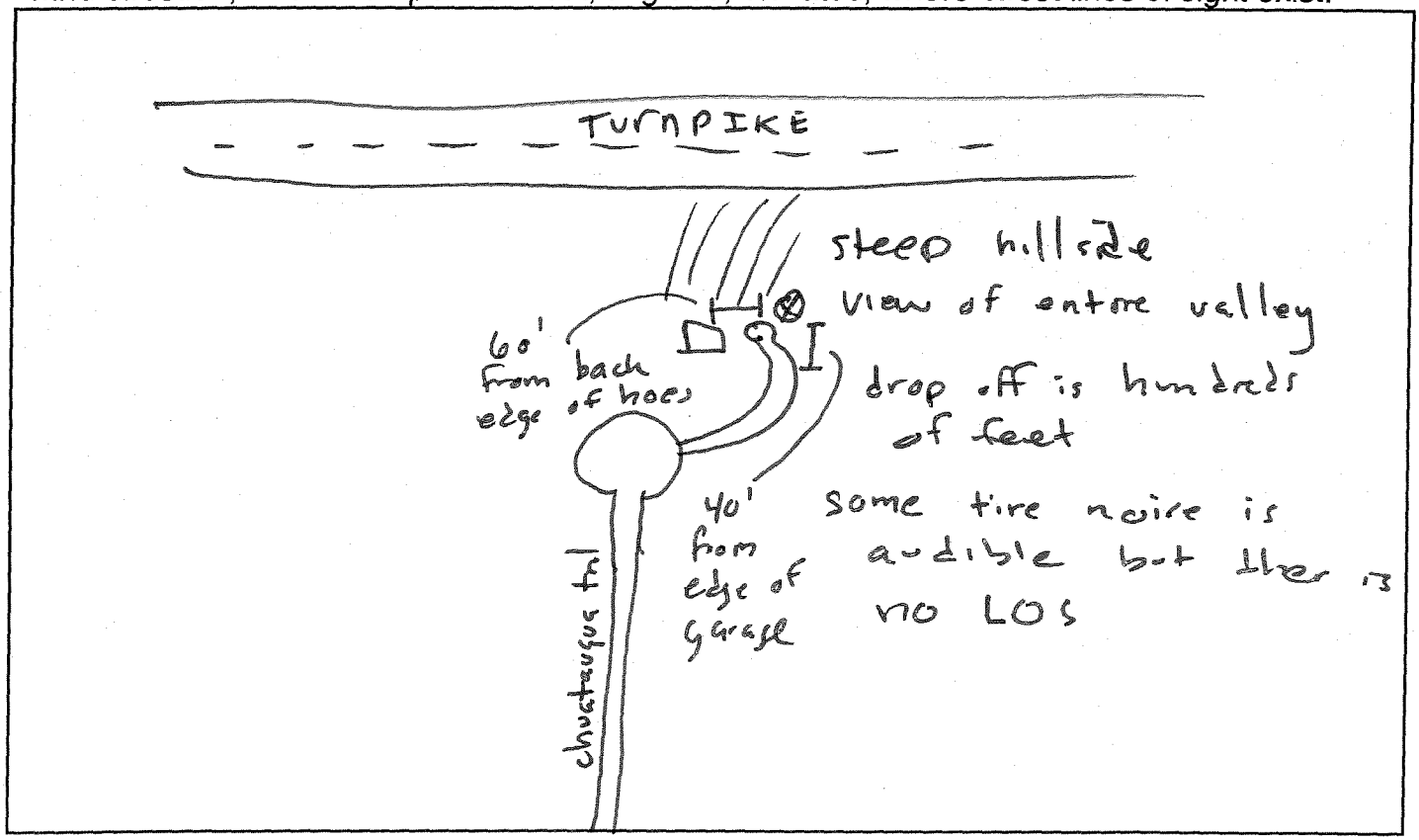
MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 20° WEATHER CONDITIONS: clear

<5 mph from south

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-4 PERSONNEL: JAC

LOCATION/ADDRESS: 1990 Chautauqua Trail DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	15: ~~30~~ 49	50.9						Pre-cal 114.0
2	15:50	48.0						post-cal 114.0
3	15:51	49.2						
4	15:52	47.9						
5	15:53	50.4						
6	15:54	52.2						
7	15:55	49.3						
8	15:56	49.4						
9	15:57	48.4						
10	15:58	47.5						
11	15:59	53.6						
12	16:00	51.5						
13	16:01	48.8						
14	16:02	50.1						
15	16:03	50.1						
16	16:04	56.1	X					medical helicopter low
17	16:05	54.1						
18	16:06	49.0						
19	16:07	48.4						
20	16:08	47.4						
21	16:09	47.3						
22	16:10	46.2						
23	16:11	48.3						
24	16:12	51.0	✓					overflight
25	16:13	48.7						
26	16:14	47.7						
27	16:15	52.9	✓					prop overflight
28	16:16	47.5						
29	16:17	48.7						
30	16:18	49.4						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - N2 MEASUREMENT SITE NO.: ST-5

ADDRESS: 1889 White Deer Trail

OWNER:

DESCRIPTION: Single family home / front yard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 870 HS S/N: -

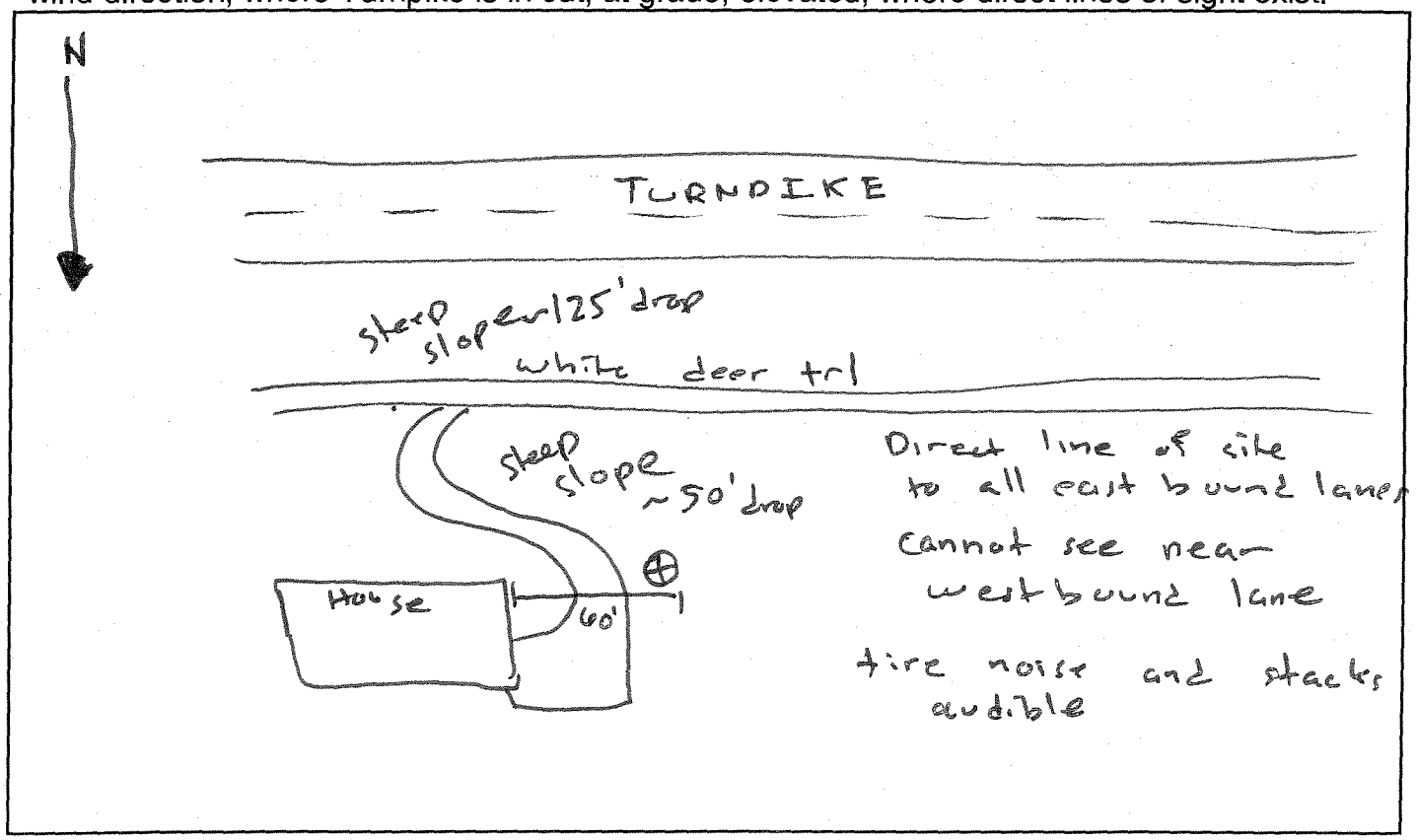
MICROPHONE: - S/N: -

CALIBRATOR: - S/N: -

TEMP. RANGE (°F): 30° WEATHER CONDITIONS: clear

<5 mph wind from south

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC- 320-326 ST-5 PERSONNEL: JAC

LOCATION/ADDRESS: 1889 white deer trail DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	14:59	60.2						pre cal 114.0
2	15:00	62.6						post cal 113.9
3	15:01	60.4						
4	15:02	59.2						
5	15:03	60.8						
6	15:04	61.6						
7	15:05	60.7						
8	15:06	60.5						
9	15:07	59.7						
10	15:08	62.6						
11	15:09	62.6						
12	15:10	61.9						
13	15:11	62.3						
14	15:12	61.0						
15	15:13	64.0						
16	15:14	60.5						
17	15:15	60.1						
18	15:16	61.0						
19	15:17	60.3	√					overflight
20	15:18	63.1						jake brake
21	15:19	61.6						
22	15:20	67.4						
23	15:21	60.1						
24	15:22	61.4						
25	15:23	63.0						
26	15:24	62.2						
27	15:25	62.3						
28	15:26	61.4						
29	15:27	62.9						
30	15:28	61.4						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC-320-326

JOB NO.: 30194 O

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - S1 MEASUREMENT SITE NO.: ST-6

ADDRESS: 1923 Standiford Drive

OWNER:

DESCRIPTION: Single family home / backyard

NOISE SOURCES: Turnpike / Yellow Springs road

NOISE MONITOR: LD810 #5 S/N: ~

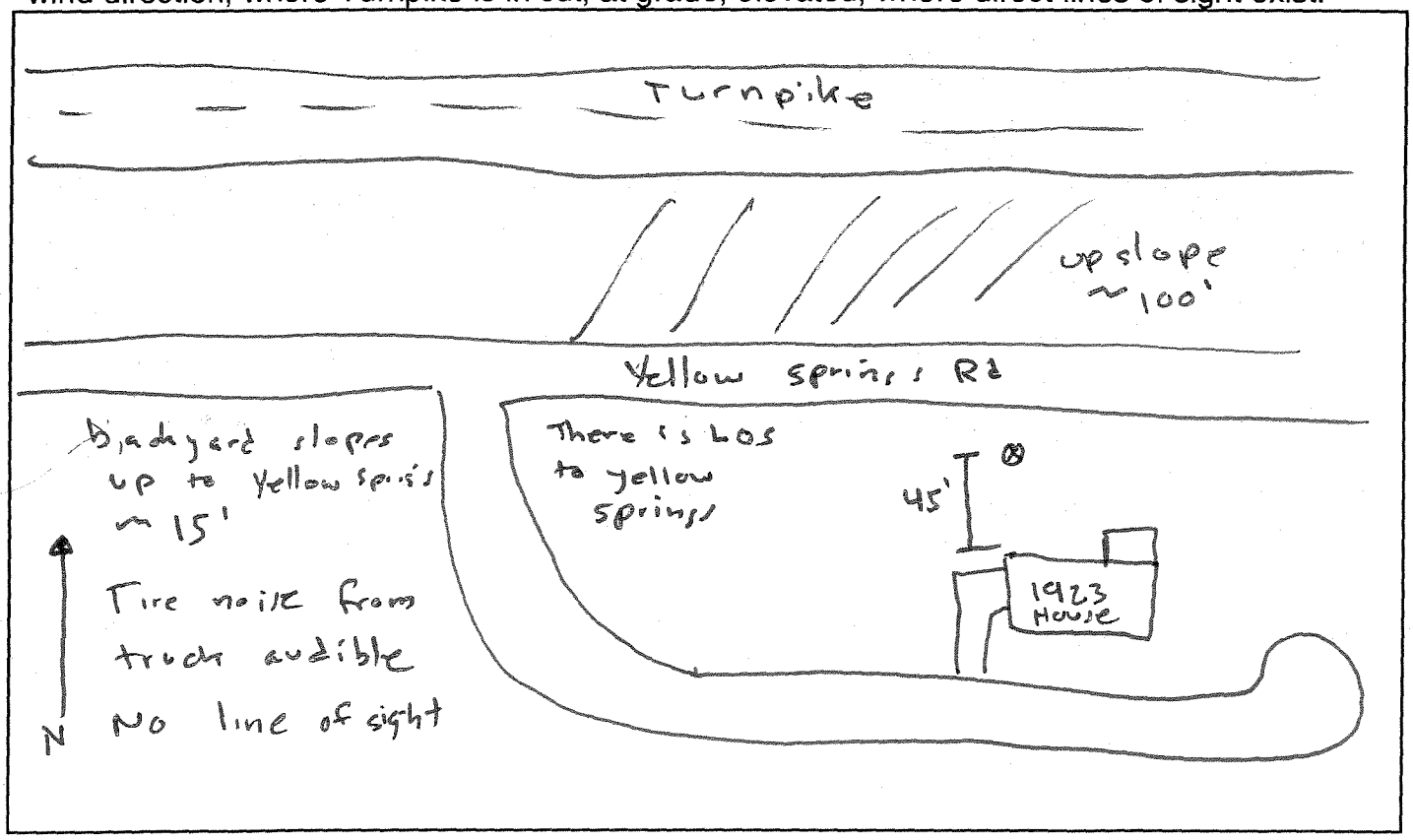
MICROPHONE: — S/N: —

CALIBRATOR: — S/N:

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: clear

light from south

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-6 PERSONNEL: JAC

LOCATION/ADDRESS: 1923 Standiford Drive DATE: 1/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	14:09	52.8						Pre-cal 114.1
2	14:10	52.9						Post-cal 114.0
3	14:11	53.1						
4	14:12	53.6						
5	14:13	54.2						
6	14:14	53.1						
7	14:15	52.1						
8	14:16	54.7						truck on Yellow
9	14:17	51.3						
10	14:18	54.8						
11	14:19	54.8						
12	14:20	53.6						
13	14:21	52.3						
14	14:22	52.9						
15	14:23	52.0						
16	14:24	55.7						
17	14:25	55.9						
18	14:26	54.9						
19	14:27	51.9						
20	14:28	56.1						loud car on yellow springs
21	14:29	54.5						
22	14:30	52.0						
23	14:31	52.4						
24	14:32	55.6						truck exhaust audible
25	14:33	56.9	X					↓↑
26	14:34	57.0	X					workers making noise on ladders
27	14:35	55.2						
28	14:36	54.7						
29	14:37	55.0						
30	14:38	52.5						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-52 MEASUREMENT SITE NO.: ST-7

ADDRESS: The Vanguard School Yellow Springs Rd

OWNER: 1777 North Valley Rd

DESCRIPTION: School Outdoor Use Area / Picnic Tables

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 870 #5 S/N: -

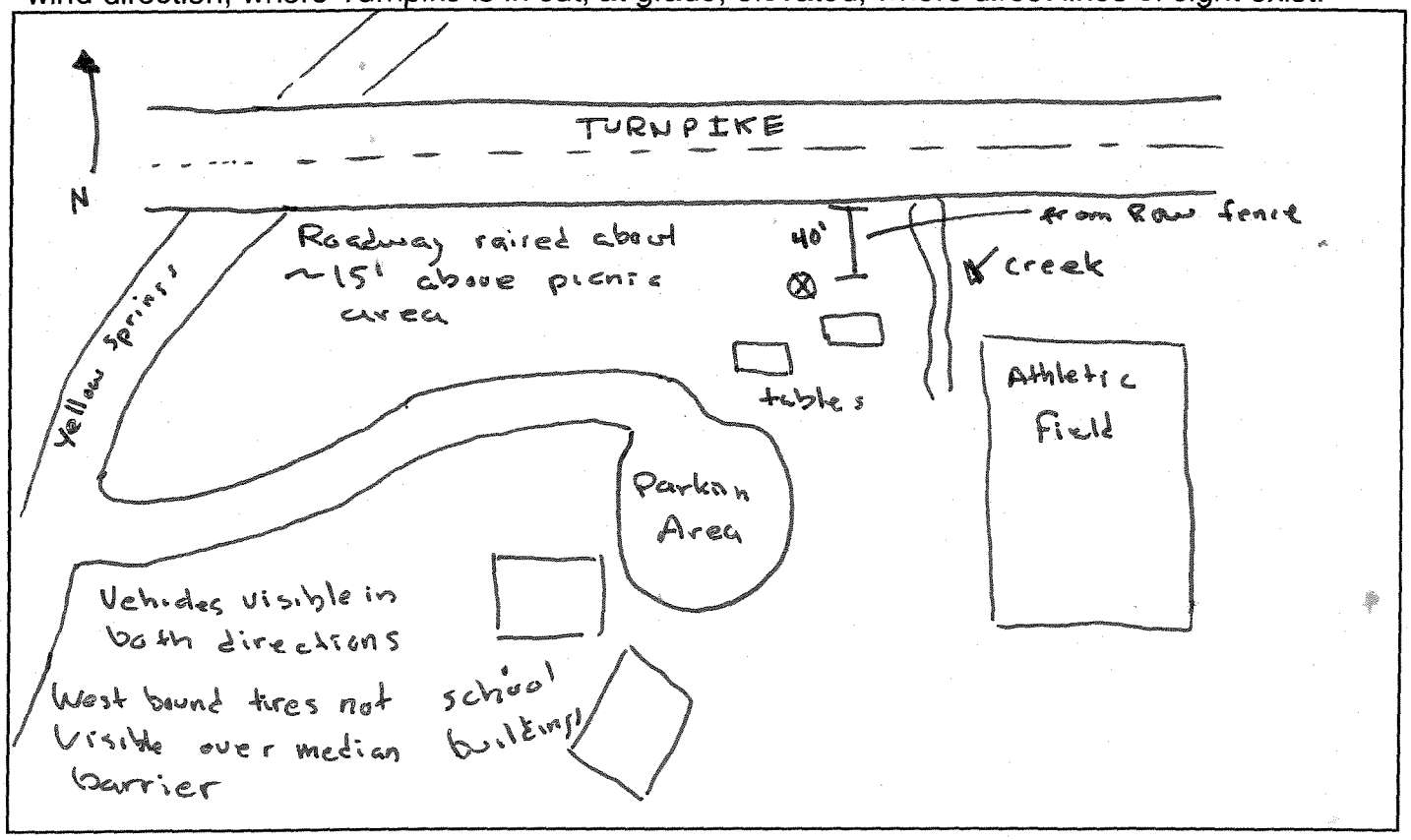
MICROPHONE: - S/N: -

CALIBRATOR: - S/N: -

TEMP. RANGE (°F): 30° WEATHER CONDITIONS: Overcast / Snow

<5 mph from West / Gusty

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-7 PERSONNEL: JAC

LOCATION/ADDRESS: Vanguard School DATE: 2/1/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	8:58	68.2						pre-cal 114.0
2	8:59	69.1						large group of trucks
3	9:00	67.7						
4	9:01	64.9						some crows
5	9:02	66.1						squaking in
6	9:03	65.0						nearby tree
7	9:04	65.3						
8	9:05	64.0						
9	9:06	65.2						post cal 113.9
10	9:07	66.7						
11	9:08	63.6						
12	9:09	64.9						
13	9:10	67.1						
14	9:11	66.2						
15	9:12	64.9						
16	9:13	67.4						
17	9:14	65.6						
18	9:15	64.1						
19	9:16	63.8						
20	9:17	67.4						
21	9:18	67.3						
22	9:19	65.8						
23	9:20	66.0						
24	9:21	66.8						
25	9:22	67.8						
26	9:23	65.8						
27	9:24	67.9						
28	9:25	65.6						
29	9:26	65.8						
30	9:27	64.0						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - N 3 MEASUREMENT SITE NO.: ST - 8

ADDRESS: 1919 Wellspring Lane

OWNER:

DESCRIPTION: Single family home / backyard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 870 # 5 S/N: —

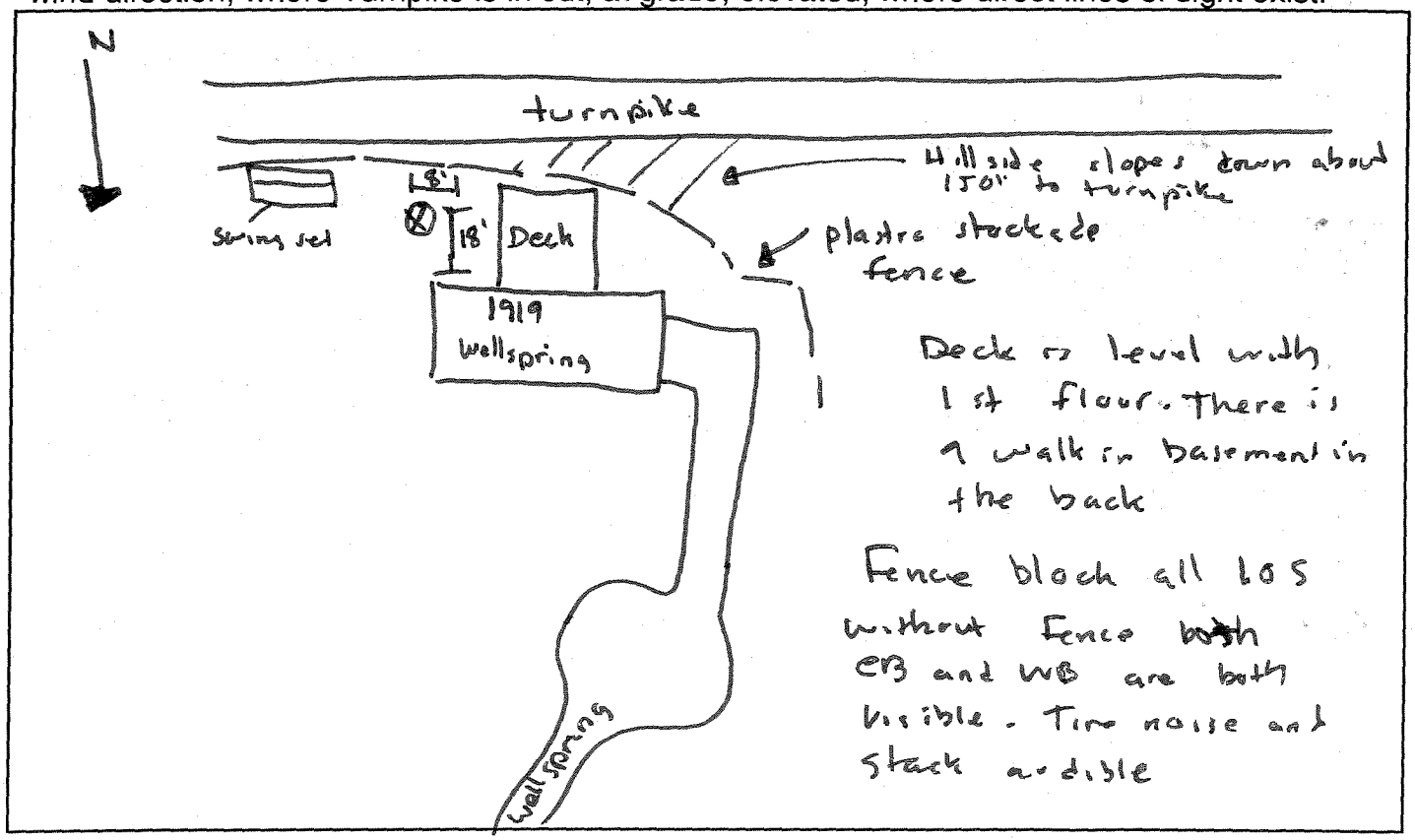
MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 35 WEATHER CONDITIONS: Overcast / Lt Snow

10 mph from SW

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-8 PERSONNEL: JAC

LOCATION/ADDRESS: ST-8 1919 Wellspring Lane DATE: 2/1/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	9:49	61.8						Pre cal 113.9
2	9:50	63.4						post cal 113.9
3	9:51	60.5						
4	9:52	63.8						
5	9:53	62.3						
6	9:54	61.1						
7	9:55	62.5						
8	9:56	64.6						
9	9:57	60.1						
10	9:58	66.3						loud truck stack
11	9:59	64.1						
12	10:00	65.6						
13	10:01	61.8						
14	10:02	65.6						
15	10:03	62.8						
16	10:04	61.7						
17	10:05	65.7						car on rumble strip
18	10:06	65.4						
19	10:07	61.6						
20	10:08	63.4						
21	10:09	62.5						
22	10:10	64.2						
23	10:11	63.4						
24	10:12	62.3						
25	10:13	62.9						
26	10:14	64.6						
27	10:15	62.9						
28	10:16	63.5						aver flight
29	10:17	64.6						
30	10:18	63.6						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PENNA TURN-PIKE

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-53 MEASUREMENT SITE NO.: ST-9

ADDRESS: 1809 Hawkweed Way

OWNER:

DESCRIPTION: Single Family Home / backyard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 870 #5 S/N: —

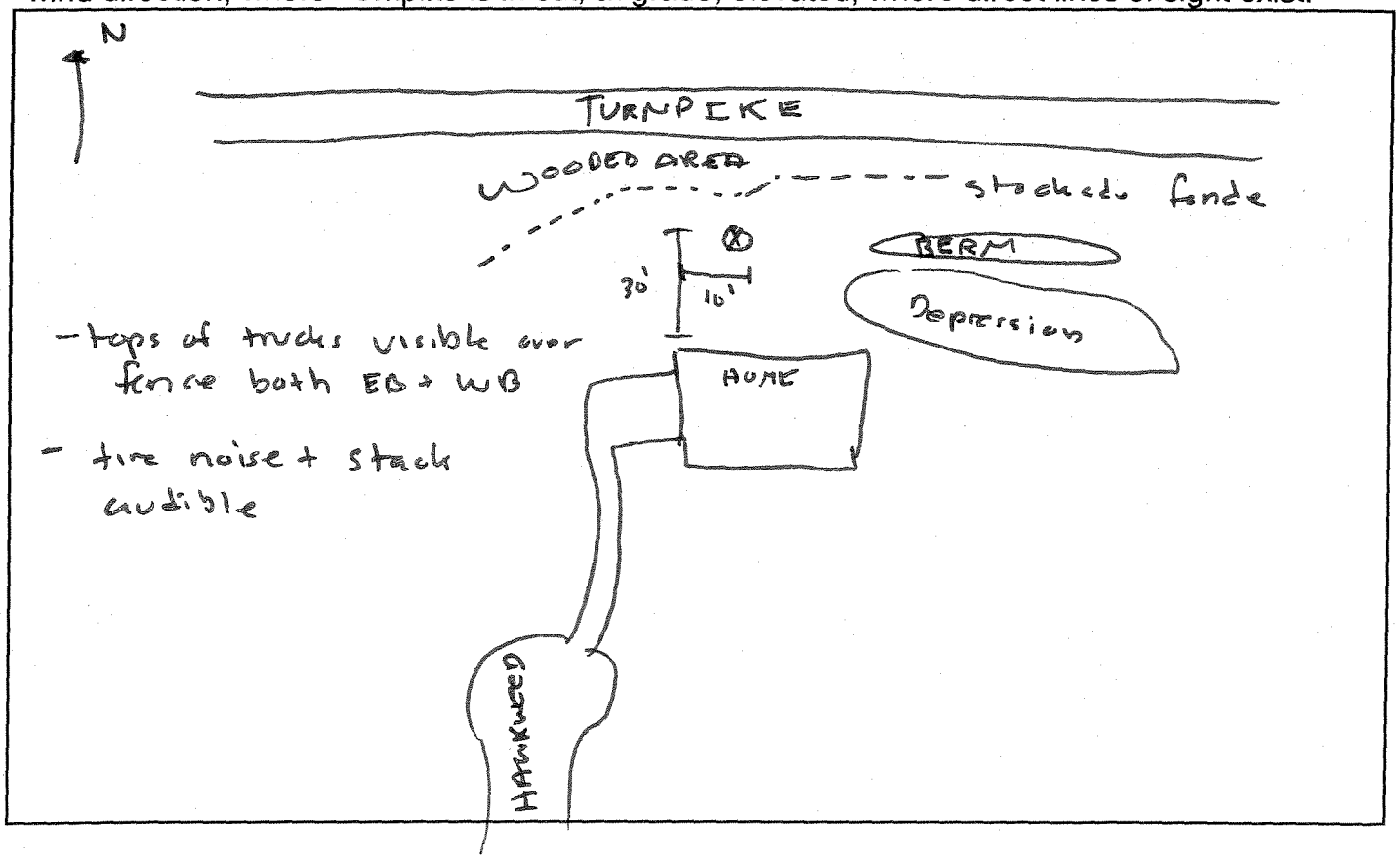
MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: Overcast

wind light

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC-320-326 ST-9 PERSONNEL: JAC

LOCATION/ADDRESS: 1809 Hawkweed Way DATE: 2/1/07

#	__ Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	14:20	60.1						pre cal 113.9
2	14:21	61.9						
3	14:22	60.8						
4	14:23	62.5						
5	14:24	58.0						
6	14:25	60.1						
7	14:26	59.8						
8	14:27	60.9						
9	14:28	59.9						
10	14:29	60.3						
11	14:30	61.5						
12	14:31	63.0						loud rumbling truck
13	14:32	60.6						
14	14:33	61.5						
15	14:34	60.7						
16	14:35	62.3						
17	14:36	62.1						
18	14:37	61.9						
19	14:38	60.6						
20	14:39	61.3						
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - 53 MEASUREMENT SITE NO.: ST-10

ADDRESS: 1708 Adler St

OWNER:

DESCRIPTION: Single Family home / Yard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 870 #5 S/N: —

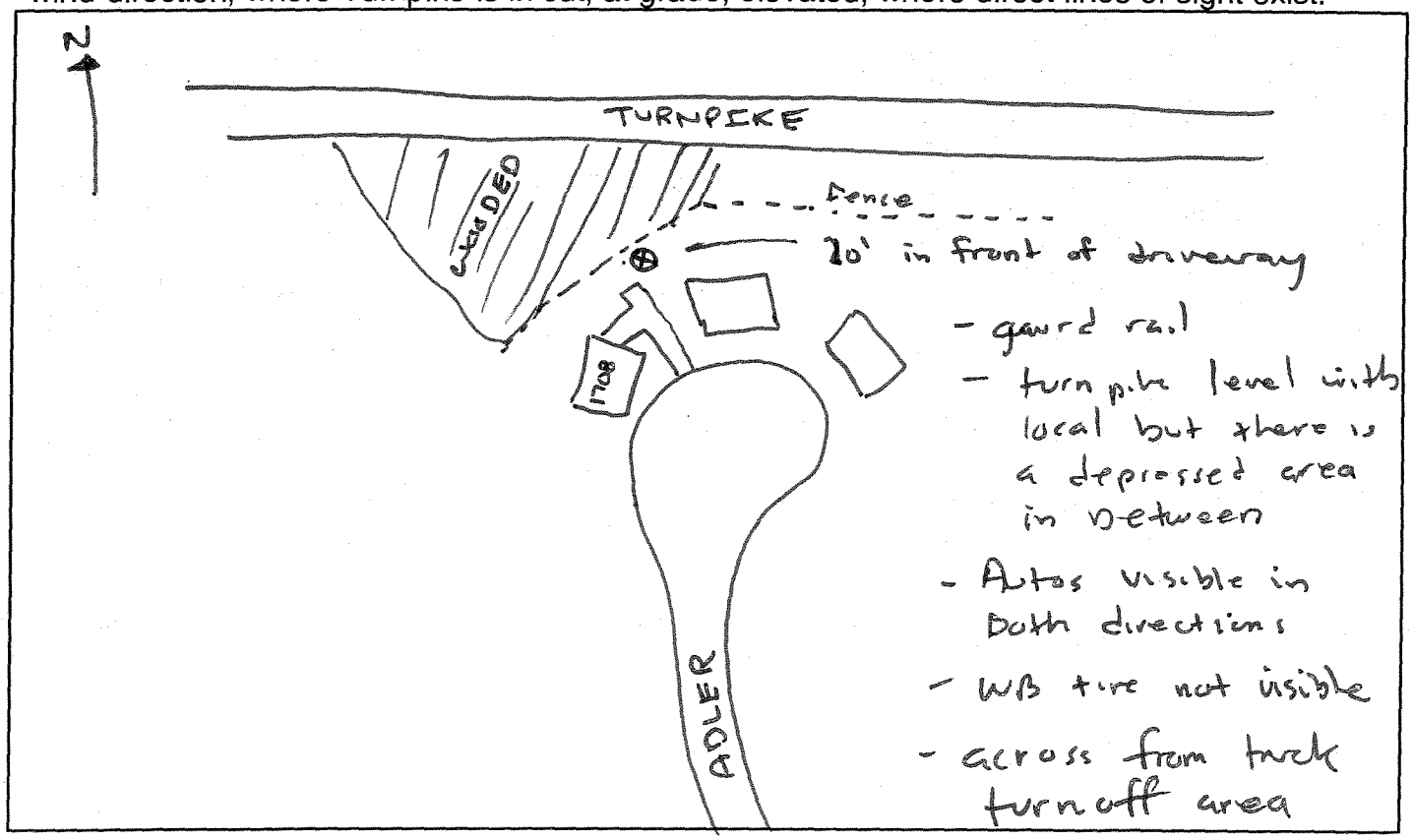
MICROPHONE: — S/N: —

CALIBRATOR: — S/N: —

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: Overcast

< 8 mph from South

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-10 PERSONNEL: ~~JAC~~

LOCATION/ADDRESS: 1708 Alder st DATE: 2/1/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	13:34	60.0						pre cal = 114.0
2	13:35	62.0						post cal = 113.9
3	13:36	62.2						
4	13:37	61.5						
5	13:38	59.7						
6	13:39	60.8						
7	13:40	61.6						
8	13:41	65.4						Rumble strip
9	13:42	62.3						
10	13:43	63.4						
11	13:44	62.1						
12	13:45	62.3						
13	13:46	62.4						
14	13:47	61.1						
15	13:48	61.6						
16	13:49	60.9						
17	13:50	59.5						
18	13:51	62.4						
19	13:52	62.3						
20	13:53	57.8						
21	13:54	60.2						
22	13:55	65.6						Dump trucks with low exhaust
23	13:56	64.1						
24	13:57	61.1						
25	13:58	59.2						
26	13:59	59.5						
27	14:00	61.3						
28	14:01	62.8						
29	14:02	61.5						Jake brake
30	14:03	62.3					trucks	accelerating out of stop area

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - S4 MEASUREMENT SITE NO.: ST11

ADDRESS: 29 Main St

OWNER:

DESCRIPTION: PA Tpk

NOISE SOURCES: GPS wp 600 N40.07756' W75.47350

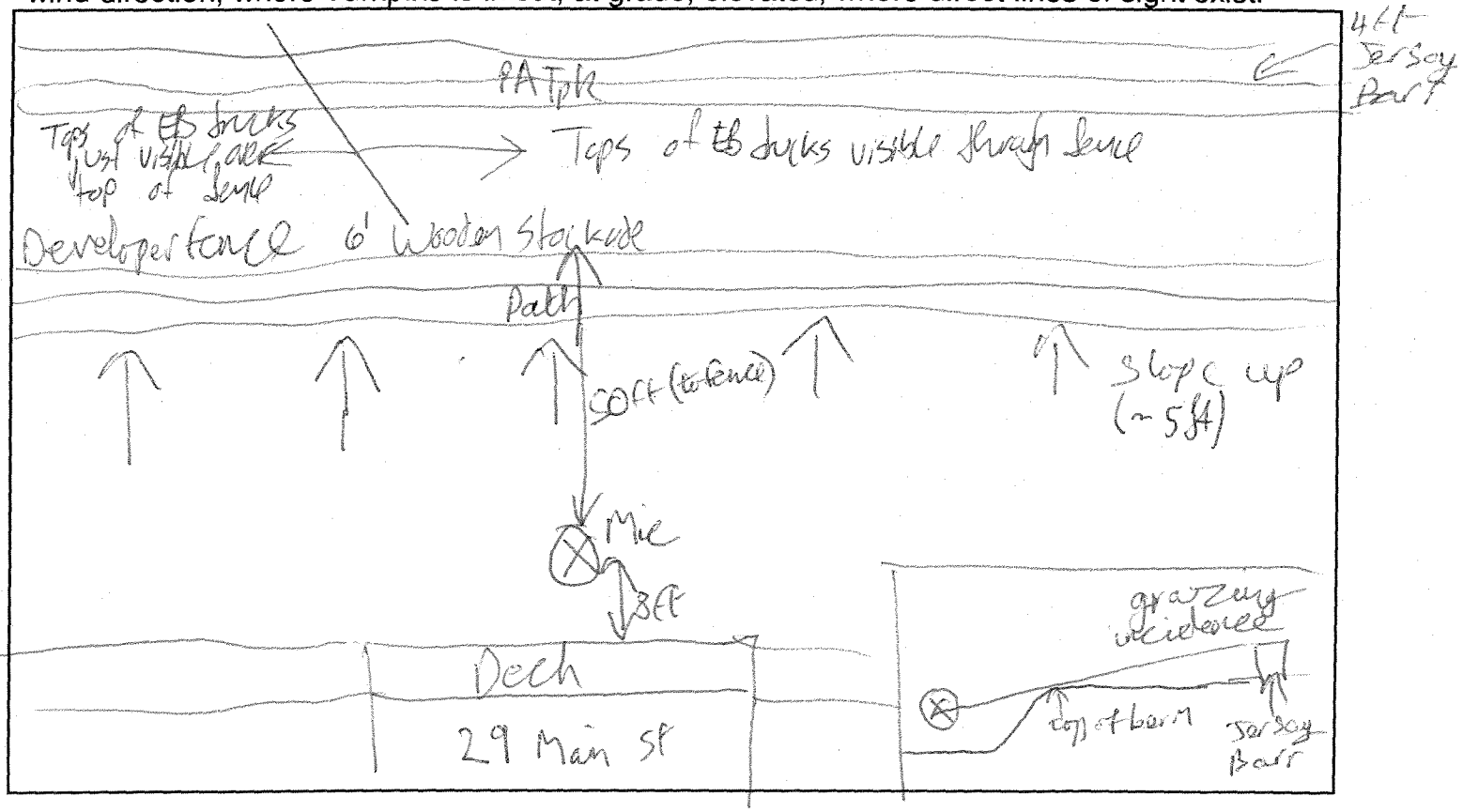
NOISE MONITOR: 4B8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 36 WEATHER CONDITIONS: Thin cloud cover wind 0, 4 mph

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST11 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: Behind 29/~~30~~ Main St DATE: 2/1/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:35	63.0						Pre Cal 114.1
2	11:36	63.0						
3	11:37	62.6						
4	11:38	63.3						
5	11:39	63.8						
6	11:40	64.1						
7	11:41	64.8						
8	11:42	63.1						
9	11:43	64.6						
10	11:44	66.0						
11	11:45	62.8						
12	11:46	64.5						
13	11:47	65.3						
14	11:48	63.0						
15	11:49	64.0					aircraft	
16	11:50	63.1						
17	11:51	63.8						
18	11:52	65.9					quiet aircraft	load truck
19	11:53	62.6						
20	11:54	62.1					aircraft (quiet)	
21	11:55	64.9						
22	11:56	64.1						
23	11:57	63.3						
24	11:58	63.8						
25	11:59	61.7						
26	12:00	64.9						
27	12:01	62.3						
28	12:02	64.5					aircraft (quiet), several load trucks	
29	12:03	62.8						
30	12:04	62.5						Post cal 114.0

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - N4 MEASUREMENT SITE NO.: ST-12

ADDRESS: 1906 General Alexander

OWNER:

DESCRIPTION: Single family home / side yard

NOISE SOURCES: Turnpike / Yellow Springs Rd

NOISE MONITOR: LD 870 #5 S/N: -

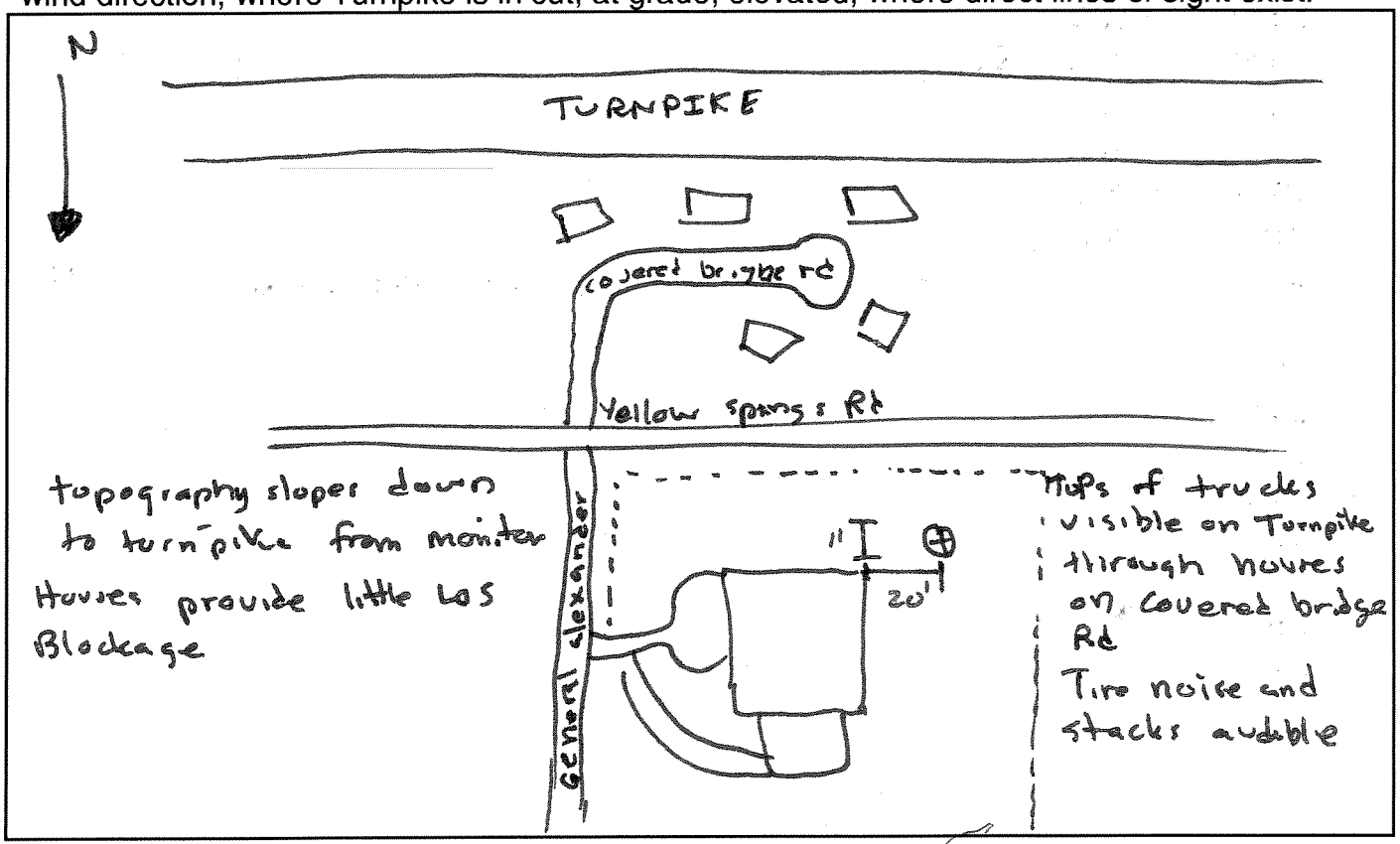
MICROPHONE: - S/N: -

CALIBRATOR: - S/N: -

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: Overcast

<5mph from South

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-12 PERSONNEL: JAC

LOCATION/ADDRESS: 1906 General Alexander DATE: 2/1/07

#	⊥ Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	10:40	57.8						pre cal 114.0
2	10:41	59.0						
3	10:42	56.7						
4	10:43	58.6						
5	10:44	59.1		30	cars	on Yellow	Sponge	Tree 20 minutes
6	10:45	58.7		C	MT			
7	10:46	59.4		O	T			
8	10:47	58.5						
9	10:48	56.2						
10	10:49	58.1						
11	10:50	57.8						
12	10:51	56.8						
13	10:52	56.1						
14	10:53	57.5						
15	10:54	57.6						
16	10:55	60.9	X					Dog Barking
17	10:56	59.7						
18	10:57	58.4						
19	10:58	60.1						
20	10:59	60.4						
21	11:00			end	measurement	Joe	bit	by Barking dog :)
22	11:01							
23	11:02							
24	11:03							
25	11:04							
26	11:05							
27	11:06							
28	11:07							
29	11:08							
30	11:09							

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - N4 MEASUREMENT SITE NO.: ST-13

ADDRESS: 1853 Covered Bridge Lane

OWNER:

DESCRIPTION: Single Family Home / backyard

NOISE SOURCES: Turnpike

NOISE MONITOR: LD 810 #5 S/N: -

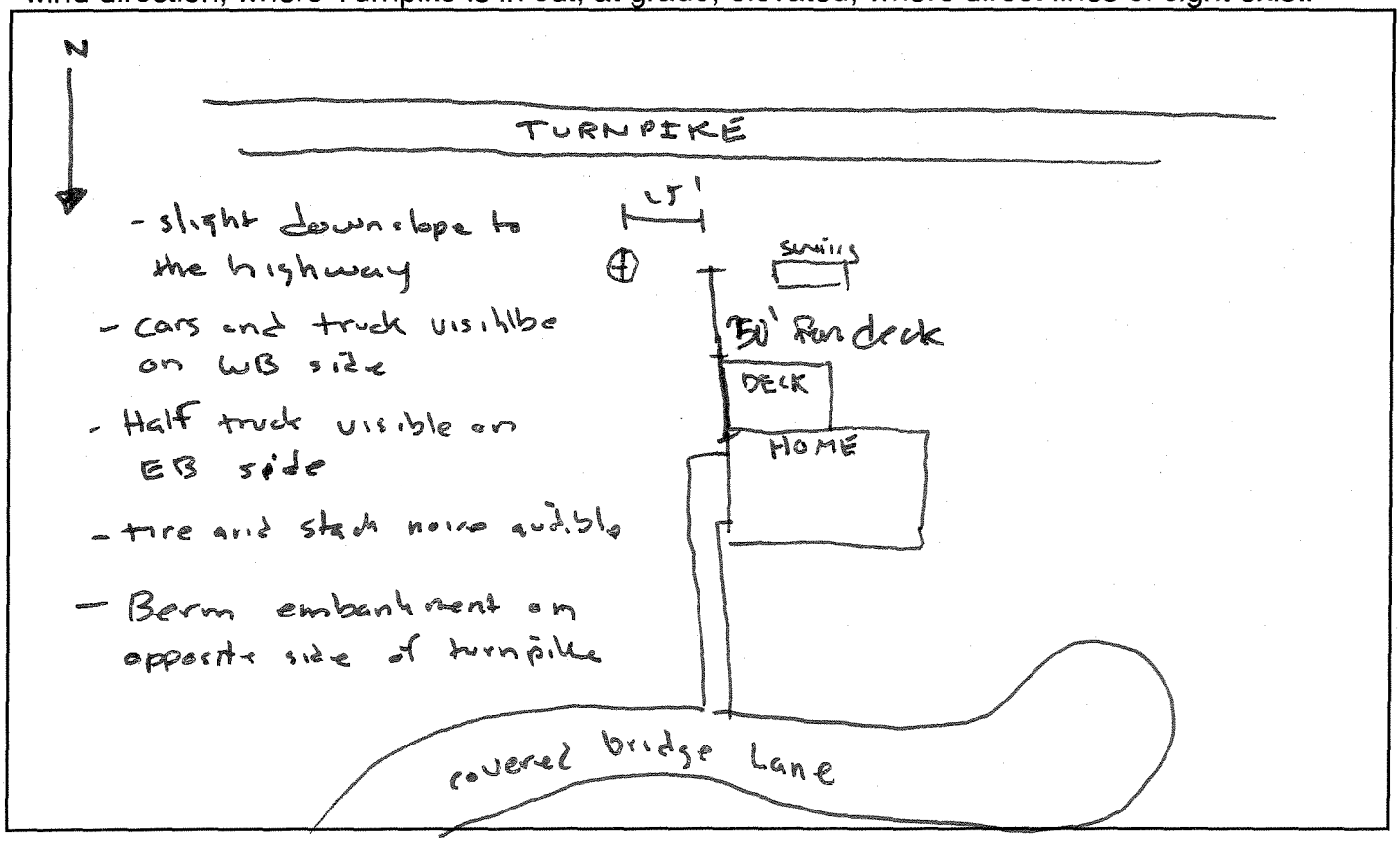
MICROPHONE: - S/N: -

CALIBRATOR: S/N: -

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: Partly Cloudy

~8 mph from S

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST-13 PERSONNEL: JAC

LOCATION/ADDRESS: 1853 Covered Bridge Lane DATE: 2/1/07

#	__ Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:20	59.8						Pre-cal 113.9
2	11:21	62.4						Post-cal 113.9
3	11:22	62.3						
4	11:23	66.0						
5	11:24	62.2						
6	11:25	65.3						
7	11:26	63.1						
8	11:27	61.8						
9	11:28	64.0						
10	11:29	63.0						
11	11:30	61.7						
12	11:31	62.9						
13	11:32	61.2						
14	11:33	63.4						
15	11:34	63.4						
16	11:35	60.4						
17	11:36	62.7						
18	11:37	64.2						
19	11:38	62.2						
20	11:39	60.7						
21	11:40	61.1						
22	11:41	63.0						
23	11:42	64.0						
24	11:43	63.5						
25	11:44	64.4						
26	11:45	63.7						
27	11:46	63.5						
28	11:47	65.1	X					Horn Blowing
29	11:48	63.0						
30	11:49	63.4						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-55 MEASUREMENT SITE NO.: ST 14

ADDRESS: 1213 Eagles Ridge Dr.

OWNER:

DESCRIPTION: GPS WP 599 N40°07842 W75°46613

NOISE SOURCES:

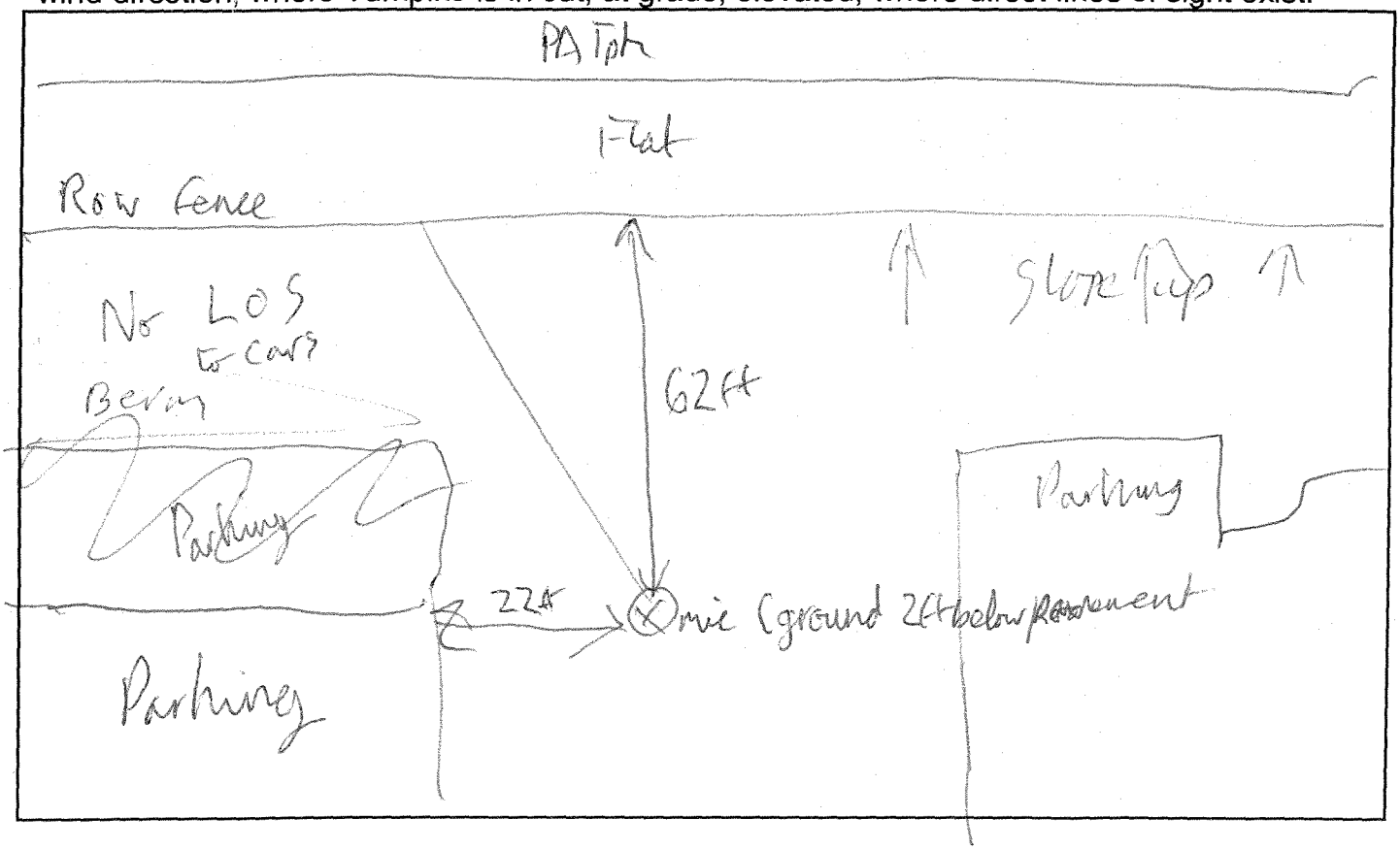
NOISE MONITOR: LD 8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 32 WEATHER CONDITIONS: 0-7mph from NE

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST14 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: 1213 Eagles Ridge Dr. DATE: 02/01/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	10:39	65.0						Pre-Cal 114.0
2	10:40	63.1						
3	10:41	67.3						
4	10:42	66.4						
5	10:43	65.6						
6	10:44	67.5						
7	10:45	66.0						
8	10:46	68.7						
9	10:47	64.7						
10	10:48	65.8						
11	10:49	66.9						
12	10:50	66.8						
13	10:51	65.3						
14	10:52	65.3						
15	10:53	64.5						
16	10:54	66.7						
17	10:55	67.2						
18	10:56	68.4						
19	10:57	67.1						
20	10:58	66.6						
21	10:59	66.5						
22	~~11:00~~	68.7						
23	11:01	66.4						
24	11:02	63.9						
25	11:03	68.2						
26	11:04	69.0						
27	11:05	67.0						
28	11:06	64.5						
29	11:07	67.1						
30	11:08	66.1						Post Cal 114.0

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-S6 MEASUREMENT SITE NO.: ST1S

ADDRESS: 307 Apple House Pond Dr

OWNER:

DESCRIPTION: GPS WP 598 N40.07952° W078.45 73°

NOISE SOURCES: PA Tpk

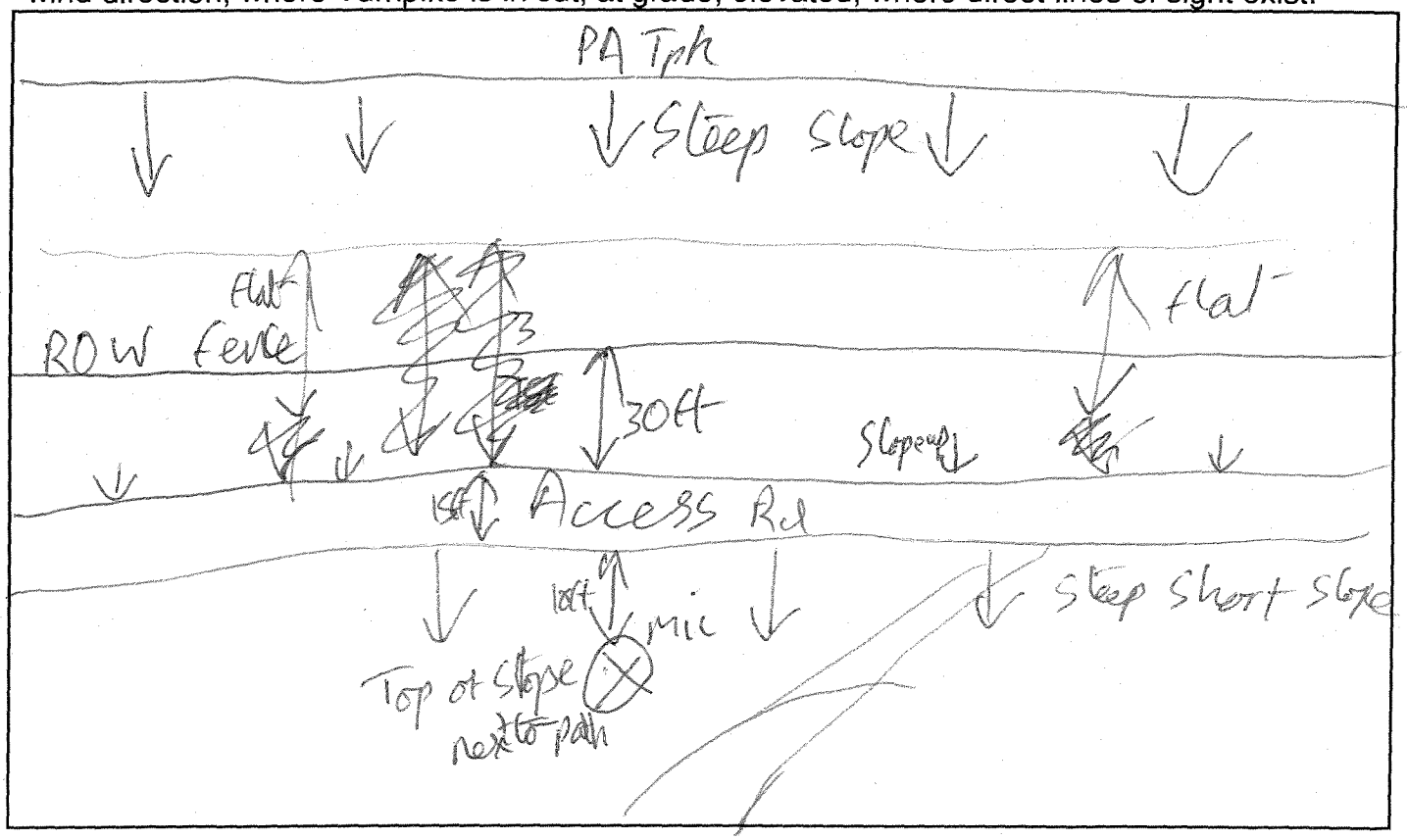
NOISE MONITOR: LD8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 31° WEATHER CONDITIONS: light snow, calm

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST15 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: 307 Applebrook pond Dr DATE: 02/01/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	9:49	66.5						Pre-cal 114
2	9:50	69.8						
3	9:51	66.5						
4	9:52	68.1						
5	9:53	67.5					aircraft	
6	9:54	68.4						
7	9:55	65.2						
8	9:56	66.6						
9	9:57	69.9						
10	9:58	67.6						
11	9:59	67.3						
12	10:00	71.3		(truck	dominates)		noisy truck, aircraft	
13	10:01	69.0						
14	10:02	67.0						
15	10:03	68.6						
16	10:04	69.5						
17	10:05	68.4						
18	10:06	68.1						
19	10:07	67.6						
20	10:08	64.5						
21	10:09	69.0						
22	10:10	66.8						Post Cal 114.0
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA - N5 MEASUREMENT SITE NO.: ST 16

ADDRESS: Lafayettes house

OWNER:

DESCRIPTION: GPS WP 597 N40.08042° W 75.45744°

NOISE SOURCES: PA Tpk

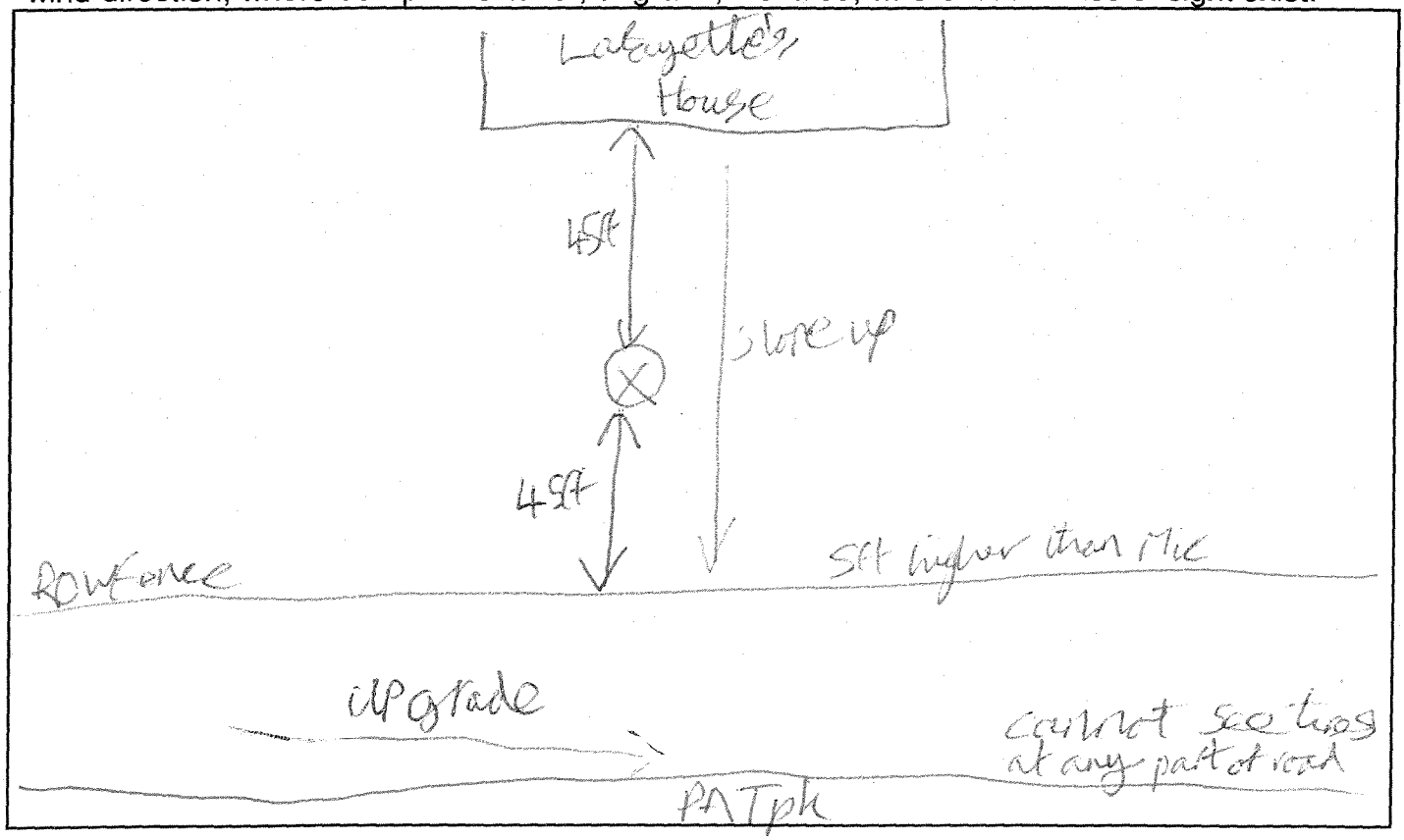
NOISE MONITOR: LDS S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 31 WEATHER CONDITIONS: light snow 92% humidity

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST 10 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: Lafayette's House DATE: 02/01/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	09:08	66.1						Cal change
2	09:09	64.8						Cal check 114.0
3	09:10	63.9					aircraft	
4	09:11	63.3					aircraft	
5	09:12	65.9						
6	09:13	64.8						
7	09:14	65.3						
8	09:15	63.4						
9	09:16	65.4						
10	09:17	65.7						
11	09:18	63.4						
12	09:19	64.9						
13	09:20	66.7						
14	09:21	64.5						
15	09:22	63.5					aircraft	
16	09:23	66.5						
17	09:24	63.6						
18	09:25	66.8						
19	09:26	66.5						
20	09:27	63.7						cal check 114.0
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA57 MEASUREMENT SITE NO.: ST17

ADDRESS: 1465 Anthony Wayne Dr

OWNER:

DESCRIPTION: WP596 N 40°00'22.6" W 75°43'36.8"

NOISE SOURCES: PA Tpk, Service area (Truck idling)

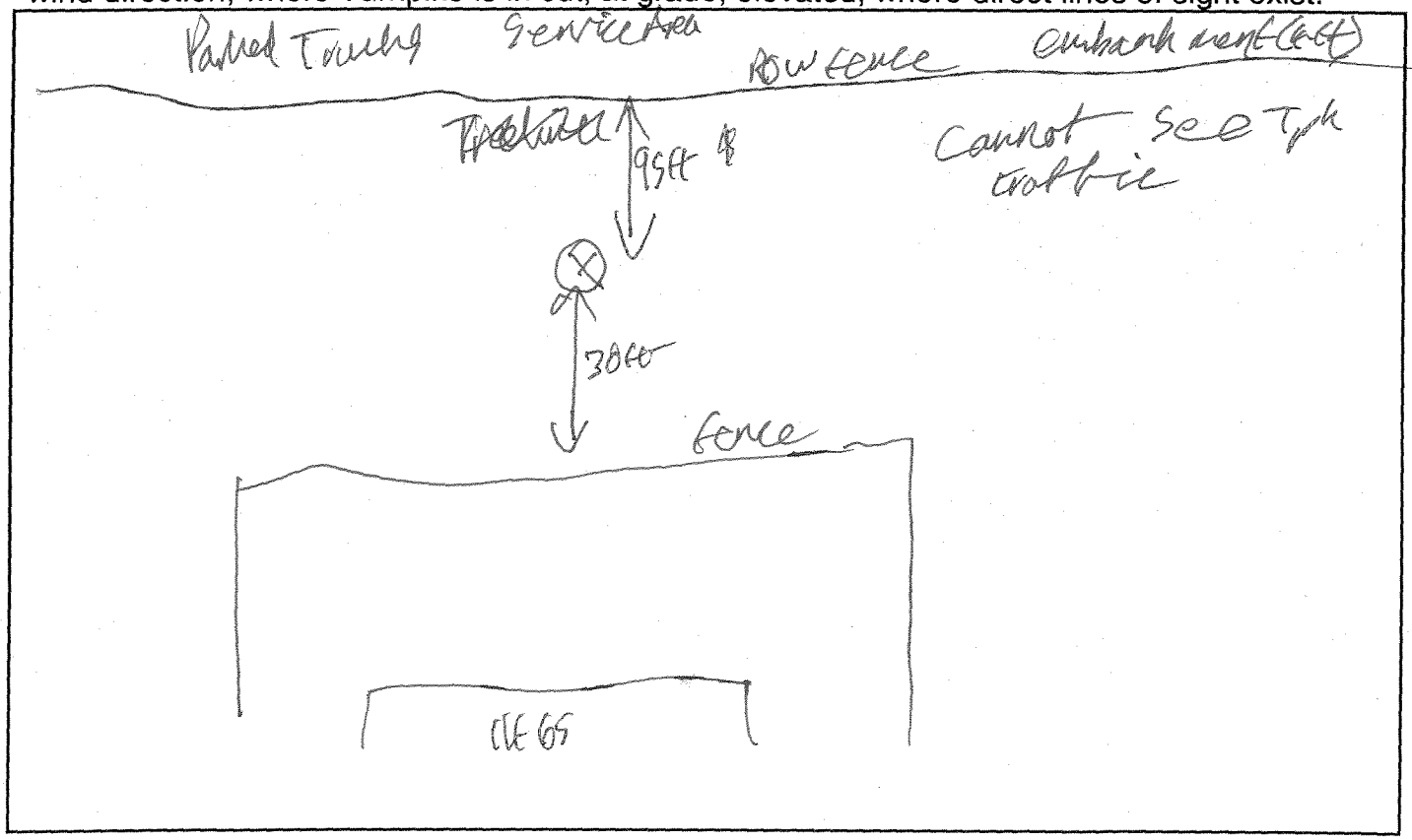
NOISE MONITOR: LD8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 29°F WEATHER CONDITIONS: calm
40% humidity

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST17 PERSONNEL: ADD / DEB

LOCATION/ADDRESS: 1463 Anthony Wayne Dr. DATE: 01/31/07

early 17:XX

#	__ Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	18:03	53.9						PreCal 114.1
2	18:04	54.5						
3	18:05	54.0						
4	18:06	52.6						
5	18:07	53.6					distant talk	
6	18:08	52.6						
7	18:09	53.2						
8	18:10	54.1					distant talk (barely audible)	
9	18:11	54.3						
10	18:12	55.4						
11	18:13	56.2						
12	18:14	56.3						
13	18:15	55.4						
14	18:16	53.9						
15	18:17	54.9						
16	18:18	54.8						
17	18:19	55.2						
18	18:20	64.0						
19	18:21	54.6						
20	18:22	54.6						Post-cal 114.1
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-57 MEASUREMENT SITE NO.: ST18

ADDRESS: 1497 Lexington Ln

OWNER:

DESCRIPTION: GPS WP595 N40.08533° W75.43050°

NOISE SOURCES: PA Tpk. occasional a/c

NOISE MONITOR: LD8 S/N:

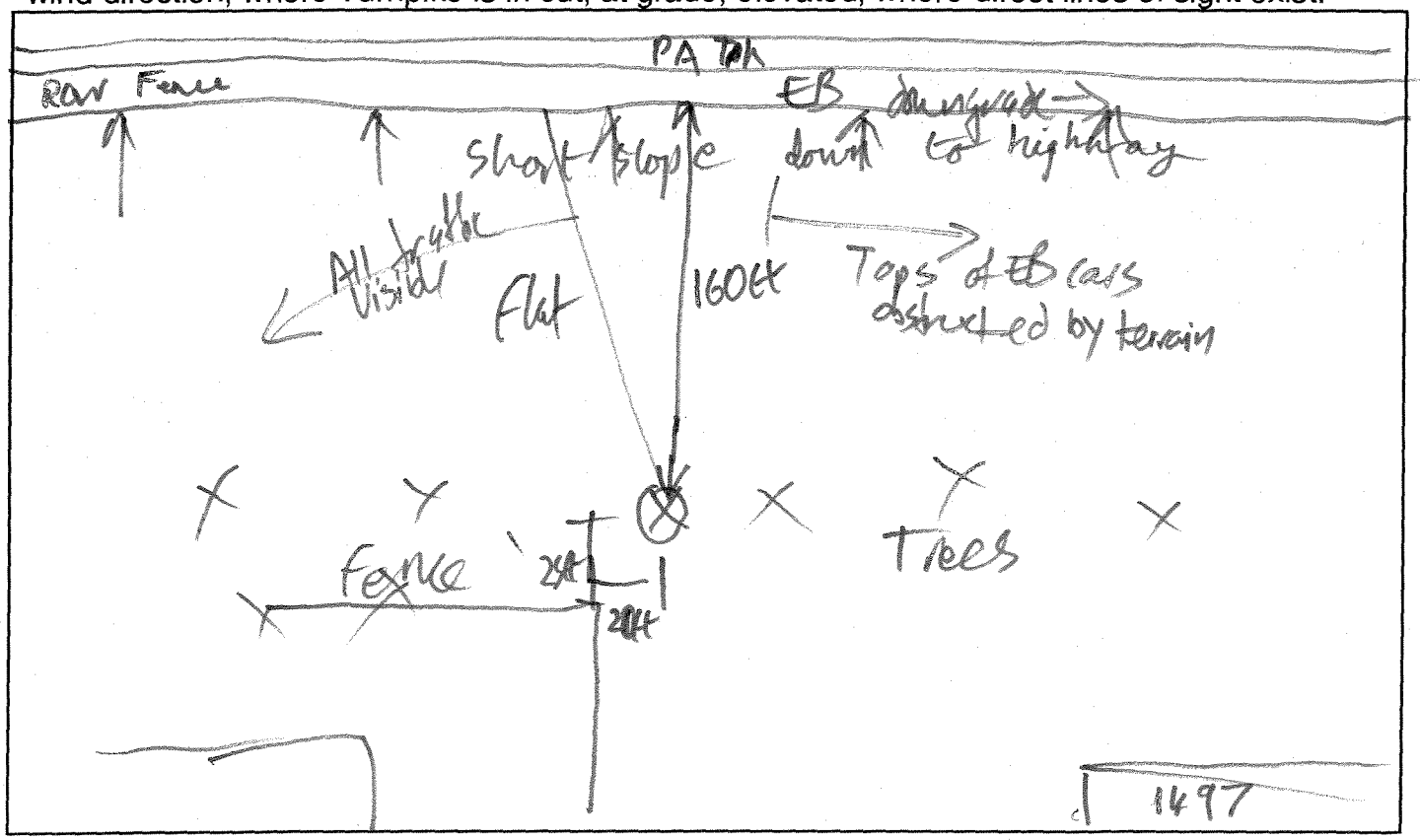
MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 30°F WEATHER CONDITIONS: wind 3-6mph from N

Humidity 36%

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 STR PERSONNEL: 01/31/07

LOCATION/ADDRESS: 1199 Lexington Lane. DATE: ADD/DEB

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	17:01	60.1						Pre Cal 114.1
2	17:02	59.7						
3	17:03	62.7						
4	17:04	62.3						
5	17:05	62.0					await	
6	17:06	64.6					Helicopter (loud)	
7	17:07	62.0					Crunching leaves	
8	17:08	61.9						
9	17:09	60.8						
10	17:10	60.8						
11	17:11	59.9						
12	17:12	60.6						
13	17:13	61.5					a/c	
14	17:14	63.0						
15	17:15	61.7						
16	17:16	64.1						
17	17:17	62.3						
18	17:18	61.6						
19	17:19	61.2						
20	17:20	61.4						Post Cal 114.1
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 3019140

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-N6 MEASUREMENT SITE NO.: ST19

ADDRESS: 1503 Stevens Dr.

OWNER:

DESCRIPTION: GPS WPS92 N40.08871 W075.42780°

NOISE SOURCES: PA Tpk, local road

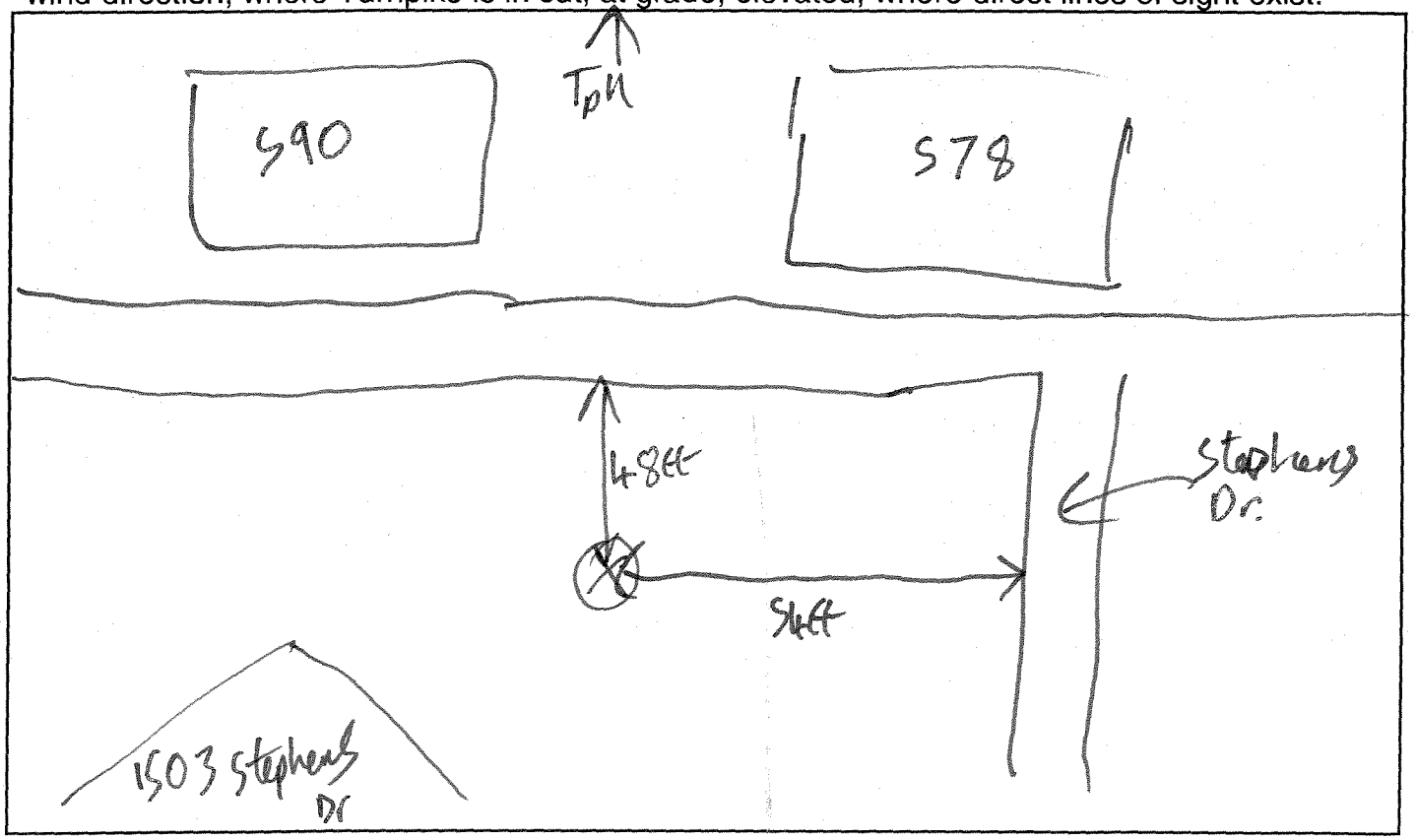
NOISE MONITOR: L08 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 31°F WEATHER CONDITIONS: Calm, clear sky

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST 19 PERSONNEL: AOD

LOCATION/ADDRESS: 1603 Stevens Dr DATE: 01/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos (local Road – 25mph)	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	13:03	58.2	✓	III			aircraft, birds	
2	13:04	55.5		II				
3	13:05	55.3						
4	13:06	57.8						
5	13:07	55.8		II				
6	13:08	56.3						
7	13:09	58.2		III				
8	13:10	56.2		I				
9	13:11	55.3						
10	13:12	54.7						
11	13:13	59.5		IIII				
12	13:14	56.1		I				
13	13:15	54.1					aircraft distant	
14	13:16	56.5		I				
15	13:17	56.8		I				
16	13:18	56.2						
17	13:19	55.7						
18	13:20	55.6					aircraft distant	
19	13:21	57.2		II				
20	13:22	60.1				I ←	local Avg truck	
21	13:23	55.8		I				
22	13:24	55.9		I				
23	13:25	58.2		I				
24	13:26	56.6		II				
25	13:27	54.9		I				
26	13:28	58.0		II				
27	13:29	56.3						
28	13:30	57.3		II			distant a/c	
29	13:31	55.9						
30	13:32	56.8						

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: 3019L0

JOB NO.: PTC 320-326

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-S7 MEASUREMENT SITE NO.: ST20

ADDRESS: 587 Park Ridge Dr

OWNER:

DESCRIPTION: GPS WP N 40.08683° W 75.42577°

NOISE SOURCES: PA Tpk

NOISE MONITOR: LD8 S/N:

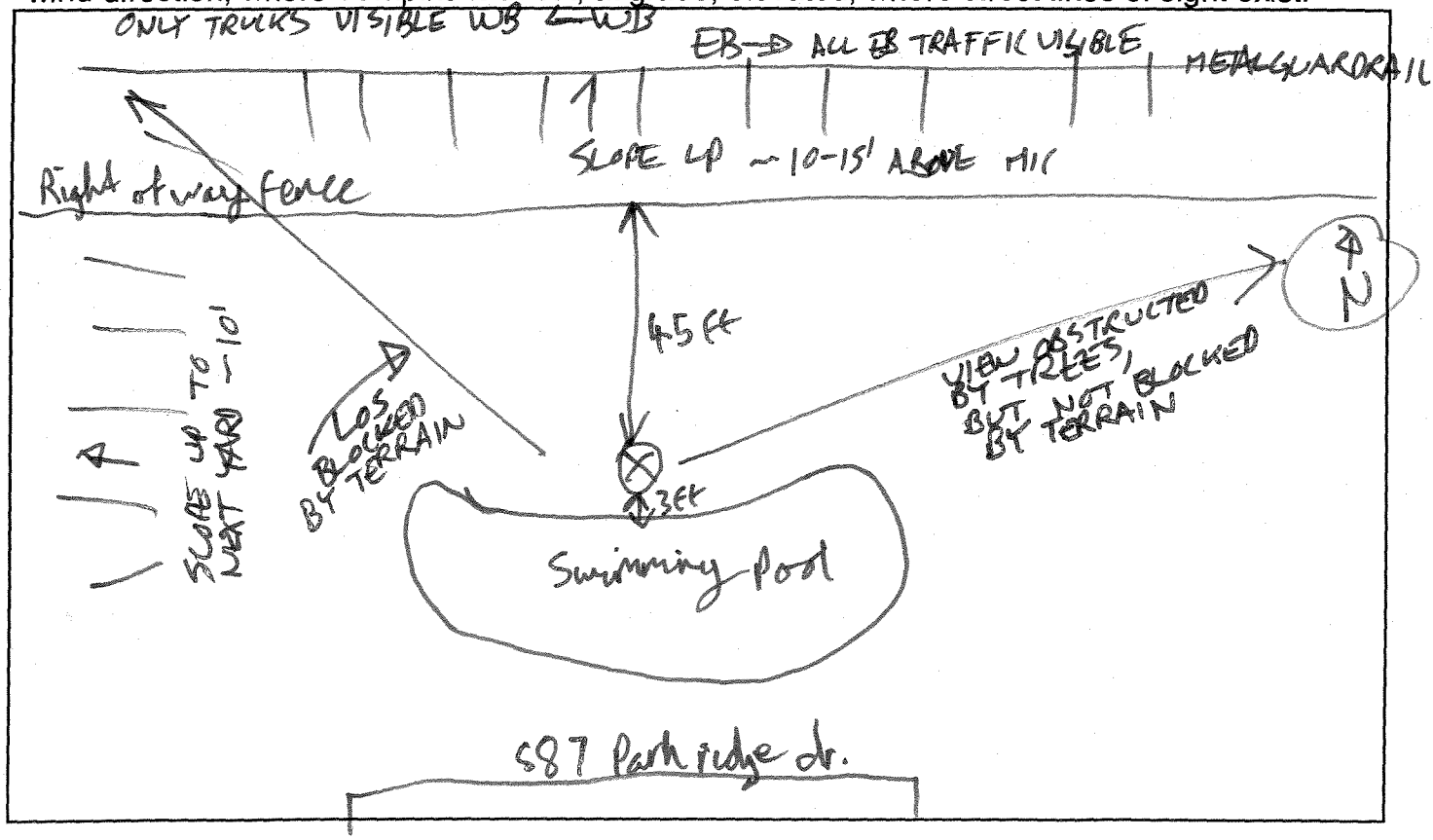
MICROPHONE: 3674 S/N:

CALIBRATOR: 4 S/N: 3279130006

TEMP. RANGE (°F): 35 WEATHER CONDITIONS:

less than 3mph from SW 36% humidity

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: 587 Park Ridge Dr. ST20 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: ↓ DATE: 01/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	15:33	65.8						Pre-Cal 114.1
2	15:34	66.3						
3	15:35	67.3						
4	15:36	64.6						
5	15:37	66.5						
6	15:38	65.7						
7	15:39	64.7						
8	15:40	64.4						
9	15:41	65.9						
10	15:42	64.7						
11	15:43	64.9						
12	15:44	68.3						
13	15:45	63.0						
14	15:46	66.1						
15	15:47	65.0						
16	15:48	65.6					wind chimes (faint)	
17	15:49	64.3						
18	15:50	65.5						
19	15:51	66.7						
20	15:52	65.6						
21	15:53	65.1						Post Cal 114.1
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-57 MEASUREMENT SITE NO.: ST 21

ADDRESS: 591 Cd Dewees Dr.

OWNER:

DESCRIPTION: GPS WP594 N40.08553° W75.42509°

NOISE SOURCES: PA Tpk, construction 1 block over, wildlife (birds, dogs)

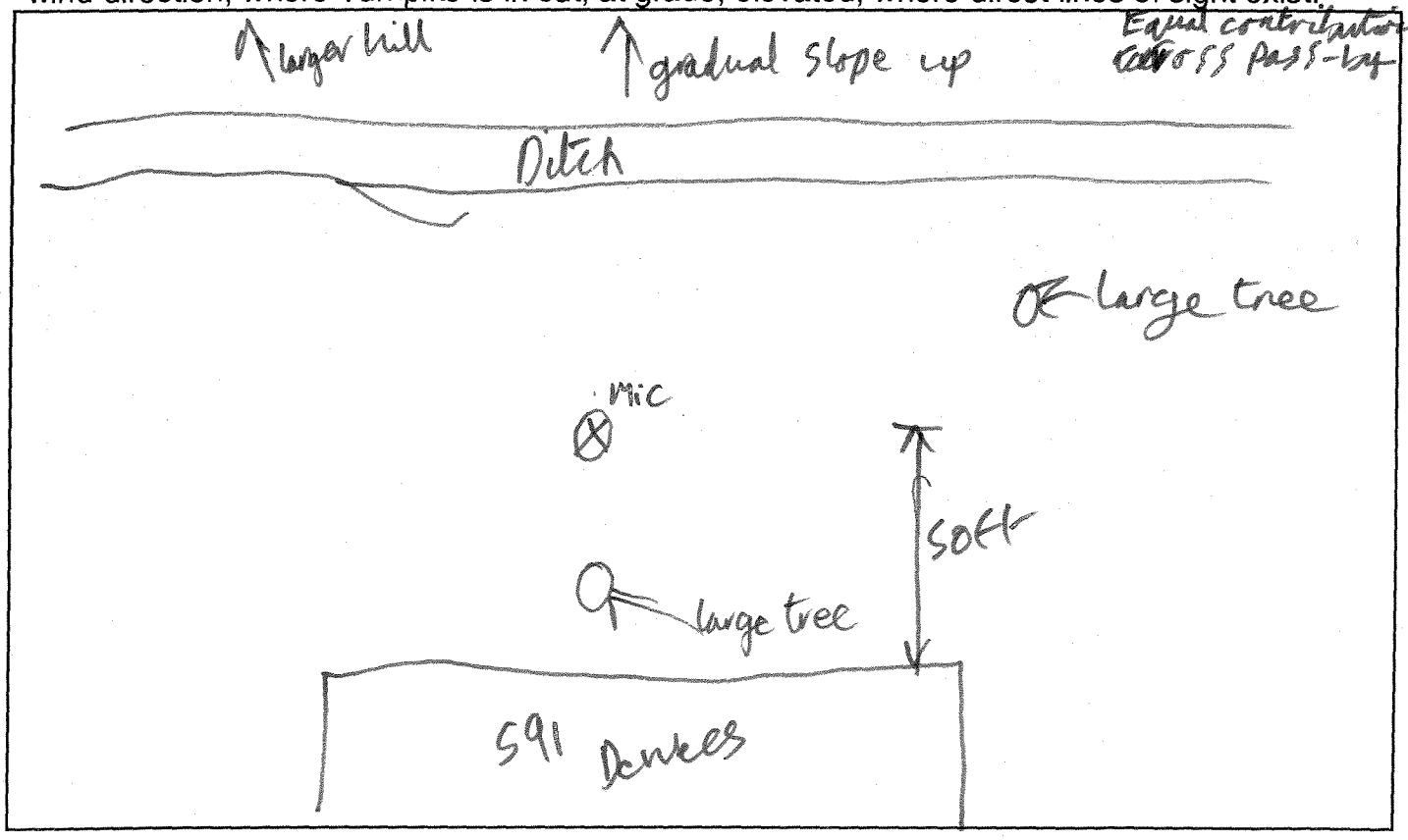
NOISE MONITOR: LD8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 34 WEATHER CONDITIONS: Wind 13mph N

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PA Tpk ST21 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: 591 Col Dewees DATE: ~~ADD/DEB~~ 3/6/07

Really 5:xx

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	16:16	57.2						Pre Cal 114.1
2	16:17	56.8					aircraft (quiet)	
3	16:18	56.8					Mechanical noise from house (Quiet)	
4	16:19	54.5					Grinding metal next St, a/c flyover	
5	16:20	54.4						Z → load bird, dog, truck on st
6	16:21	55.6					bird	
7	16:22	56.5					bird	
8	16:23	56.3						
9	16:24	55.3						
10	16:25	55.7					aircraft	
11	16:26	56.7					aircraft	
12	16:27	56.3						
13	16:28	56.8						
14	16:29	56.1						
15	16:30	55.5					Starting next road	
16	16:31	55.8						
17	16:32	56.1					Dogs barking	
18	16:33	57.2					Dogs barking	
19	16:34	54.7						
20	16:35	55.1						Post cal 114.1
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-N6 MEASUREMENT SITE NO.: 22

ADDRESS: 780

OWNER:

DESCRIPTION: GPS 91 N40.08973 W075.41930°

NOISE SOURCES: PA TPK

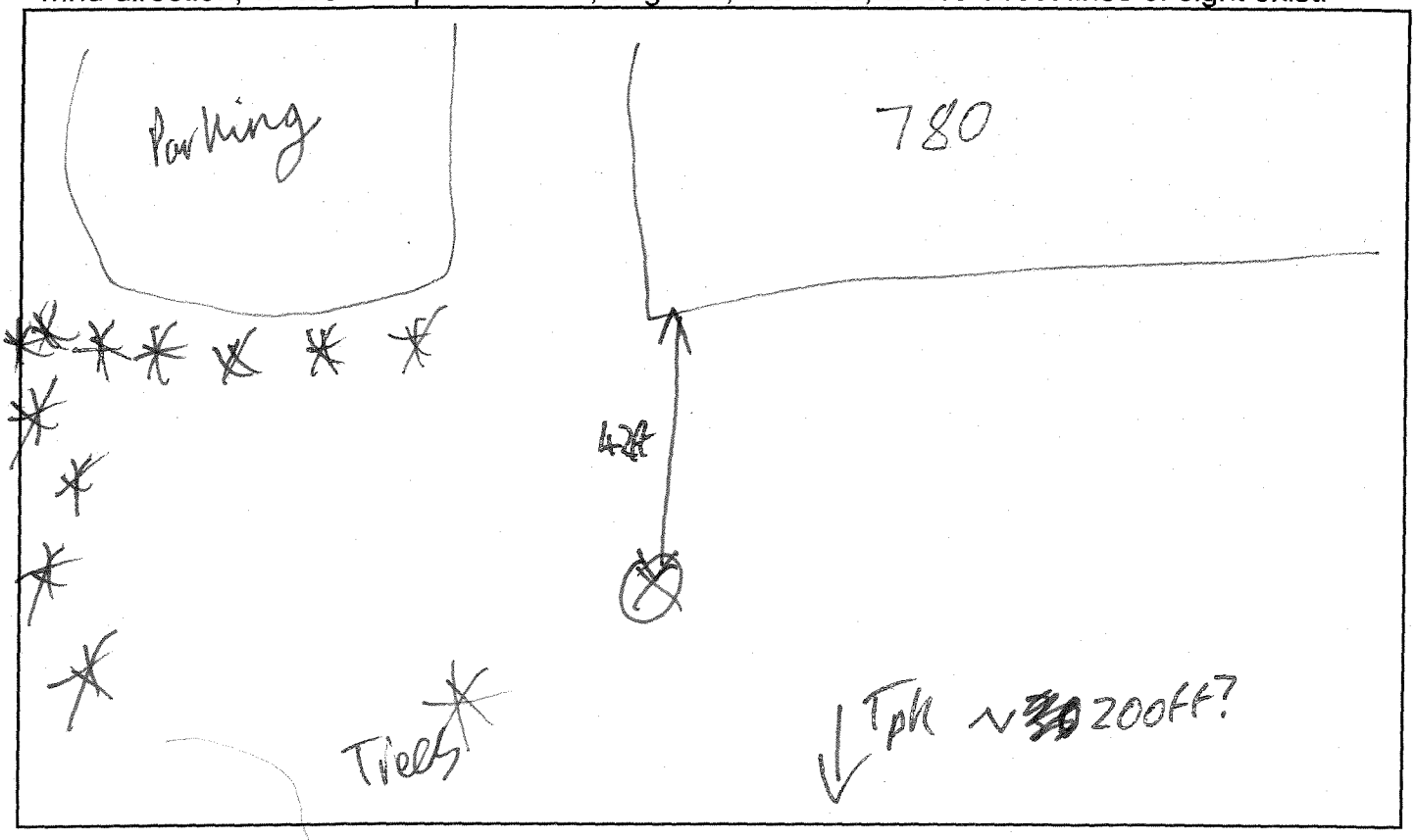
NOISE MONITOR: L08 S/N:

MICROPHONE: 3674 S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 27 WEATHER CONDITIONS: 3 - 5mph wind clear sky

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PA TPK site 22 PERSONNEL: ADD

LOCATION/ADDRESS: 780 Worthington Rd DATE: 01/31/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	12:04	65.9						
2	12:05	65.1						
3	12:06	67.0						
4	12:07	68.3	✓				light a/c	
5	12:08	68.5						
6	12:09	66.8						
7	12:10	68.7						
8	12:11	69.1						
9	12:12	67.9						
10	12:13	65.8						
11	12:14	64.4						
12	12:15	66.4						
13	12:16	69.1						
14	12:17	66.2						
15	12:18	66.3						
16	12:19	66.8						
17	12:20	67.4						
18	12:21	69.3						
19	12:22	66.7						
20	12:23	66.7						
21	12:24	64.2						
22	12:25	66.1						
23	12:26	67.7	✓				light a/c	
24	12:27	65.8						
25	12:28	68.6						
26	12:29	64.1						
27	12:30	70.0						
28	12:31	67.1						
29	12:32	66.8						
30	12:33	67.8						

marked time → -1:00

TOTAL Leq = SUBSET Leq =

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>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301960

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-N6 MEASUREMENT SITE NO.: ST23

ADDRESS: 799 Gulph Rd.

OWNER:

DESCRIPTION: GPS WP602 N40.09109° W75.41616°

NOISE SOURCES: Tpk I-422

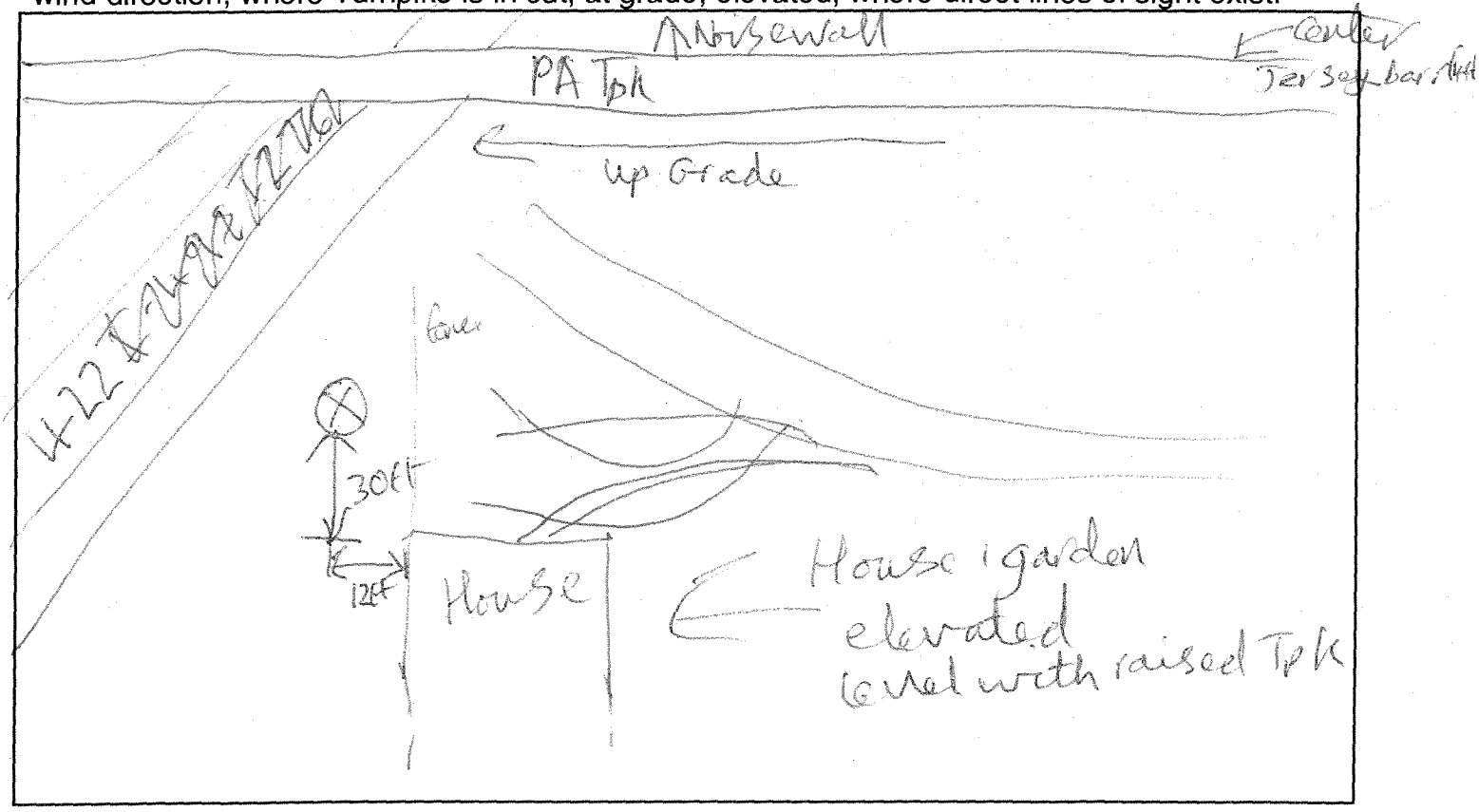
NOISE MONITOR: LD8 S/N:

MICROPHONE: S/N:

CALIBRATOR: S/N:

TEMP. RANGE (°F): 33 WEATHER CONDITIONS: 0-3mph wind 66% hum

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC 320-326 ST23 PERSONNEL: ADD/DEB

LOCATION/ADDRESS: 799 Gulph Rd DATE: 02/01/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	15:05	68.5						Cal check 114.1
2	15:06	68.5						
3	15:07	68.4						
4	15:08	68.8						
5	15:09	68.1						
6	15:10	67.4						
7	15:11	68.6						
8	15:12	69.9						
9	15:13	68.9						
10	15:14	69.0						
11	15:15	68.8						
12	16:16	68.0						
13	15:17	68.6						
14	15:18	68.4						
15	15:19	68.9						
16	15:20	68.6						
17	15:21	68.9						
18	15:22	68.4						
19	16:23	68.0						
20	15:24	68.2						
21	15:25	68.7						
22	15:26	68.0						
23	15:27	68.5						
24	15:28	69.2						
25	15:29	69.8						
26	15:30	67.8						
27	15:31	69.1						
28	15:32	68.4						
29	15:33	68.5						
30	15:34	70.1						Cal check 114.0

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

PROJECT: PTC 320-326

JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MONITORING SITE LOG

NOISE STUDY AREA ID: NSA-58 MEASUREMENT SITE NO.: ST-24

ADDRESS: Glenhardie Condos (Geor. Washington)

OWNER:

DESCRIPTION: Condo complex

NOISE SOURCES: Turnpike 1422

NOISE MONITOR: LD870 #5 S/N: —

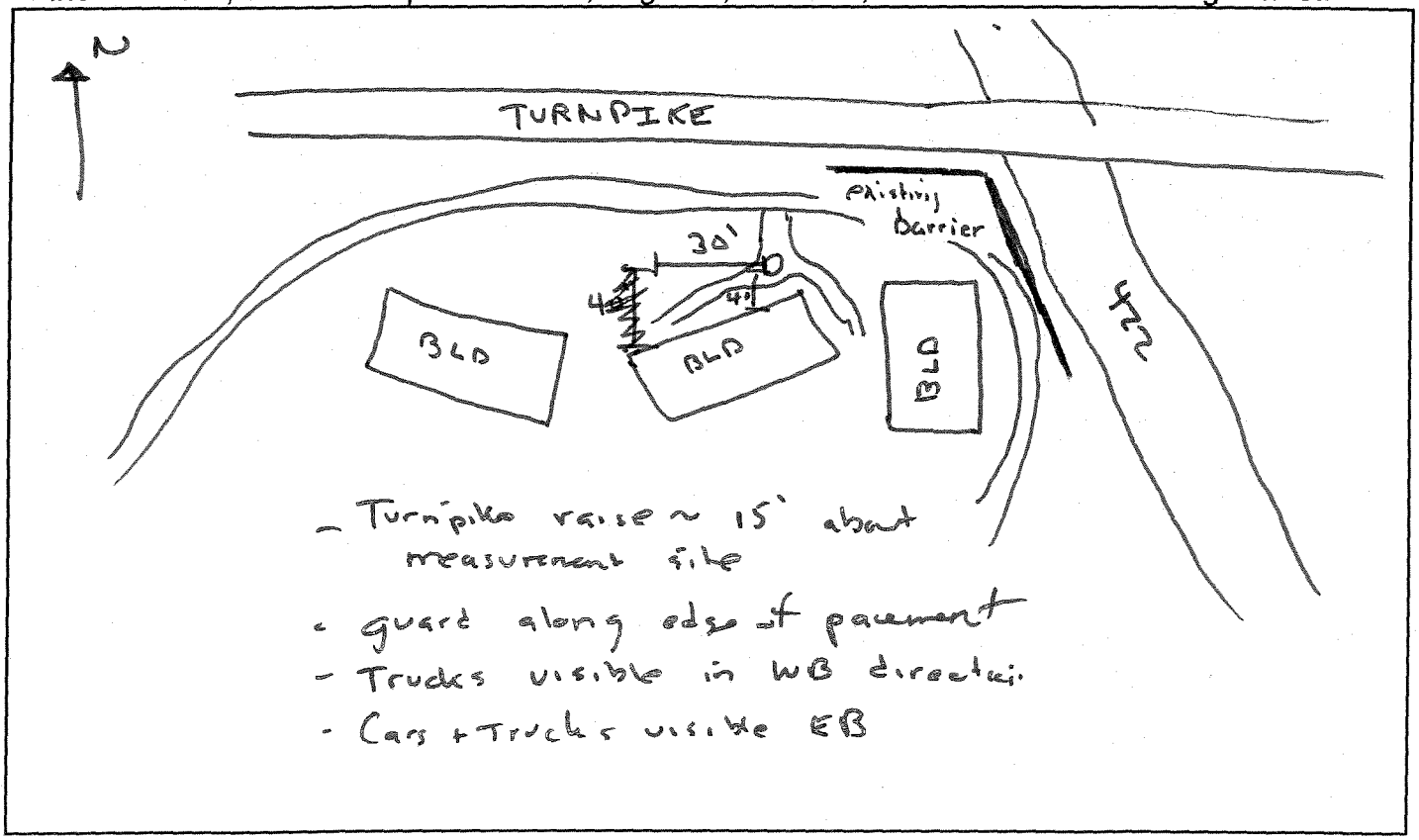
MICROPHONE: — S/N: —

CALIBRATOR: S/N:

TEMP. RANGE (°F): 30 WEATHER CONDITIONS: Overcast

light wind

SITE SKETCH: Show Turnpike, homes, local roads, reference distances, arrows for North & wind direction, where Turnpike is in cut, at grade, elevated, where direct lines of sight exist.



PENNSYLVANIA TURNPIKE MILEPOST 320-326
SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT & SITE NO.: PTC- 320-326 ST-24 PERSONNEL: JAC

LOCATION/ADDRESS: Glenhardie Condons (George Washington) DATE: 7/1/07

#	1 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	15:13	62.7						PRE-cal 114.0
2	15:14	63.4						post-cal 113.8
3	15:15	61.8						
4	15:16	62.0						
5	15:17	62.3						
6	15:18	64.8						Jake Brake (loud)
7	15:19	63.6						
8	15:20	62.2						
9	15:21	61.2						
10	15:22	61.4						
11	15:23	61.6						overflight
12	15:24	61.7						
13	15:25	62.8						
14	15:26	60.0						
15	15:27	63.0						
16	15:28	62.7						
17	15:29	63.6						
18	15:30	65.1						Jake Brake
19	15:31	63.0						
20	15:32	60.7						
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq = SUBSET Leq =

√ = Other sources contributed to Leq X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

1

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-S1
MEASUREMENT SITE NO.: ST-1
ADDRESS/DESCRIPTION: Just west of Mowe 115 Rd on westbound side

START TIME: 10:00am
END TIME: 10:30am
DATE: 1/31/07
PERSONNEL: BC

	DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (5 minutes)** Start Time: 10:00am		
Automobiles	71	
Medium Trucks (6 Tires)	3	
Heavy Trucks (>6 Tires)	17	
Roadway: **Second Sample (5 minutes)** Start Time: 10:05		
Automobiles		65
Medium Trucks (6 Tires)		2
Heavy Trucks (>6 Tires)		12
Roadway: **Third Sample (5 minutes)** Start Time: 10:20		
Automobiles	65	
Medium Trucks (6 Tires)	6	
Heavy Trucks (>6 Tires)	16	
Roadway: **Fourth Sample (5 minutes)** Start Time: 10:25		
Automobiles		67
Medium Trucks (6 Tires)		6
Heavy Trucks (>6 Tires)		16

Notes: Traffic free-flowing

HARRIS MILLER MILLER & HANSON INC.

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-S1 DATE: 1/31/07
MEASUREMENT SITE NO.: ST-1 PERSONNEL: BC

☑ Time OR ☐ Speed
seconds

First Sample

Roadway: 76
Start Time: 10:10am
End Time: 10:20am
If "Time," provide distance OR measurement endpoints: western edge of bridge over Howells Rd to mile marker 320 west of bridge

	EASTBOUND	WESTBOUND
1.	5.21	5.99
2.	6.24	3.40
3.	6.35	6.33
4.	5.79	5.42
5.		5.54
6.		5.77
7.		5.63
8.		5.93
9.		5.93
10.		5.39

Second Sample

Roadway:
Start Time:
End Time:
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

2

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-N1
MEASUREMENT SITE NO.: ST-2
ADDRESS/DESCRIPTION: At ST-2 location

START TIME: 11:03am
END TIME: 11:33am
DATE: 1/31/07
PERSONNEL: BC

	DIRECTION 1 (West)	DIRECTION 2 (East)
Roadway: **First Sample (5 minutes)** Start Time: 11:03am		
Automobiles	69	
Medium Trucks (6 Tires)	6	
Heavy Trucks (>6 Tires)	23	
Roadway: **Second Sample (5 minutes)** Start Time: 11:08am		
Automobiles		65
Medium Trucks (6 Tires)		6
Heavy Trucks (>6 Tires)		15
Roadway: **Third Sample (20 minutes)** Start Time: 11:13		
Automobiles	232	
Medium Trucks (6 Tires)	26	
Heavy Trucks (>6 Tires)	104	
Roadway: **Fourth Sample (10 minutes)** Start Time: 11:23		
Automobiles		123
Medium Trucks (6 Tires)		8
Heavy Trucks (>6 Tires)		35

Notes: Traffic Free-flowing

(3)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-S1
MEASUREMENT SITE NO.: ST-3
ADDRESS/DESCRIPTION: At ST-2 site

START TIME: 11:53
END TIME: 12:23
DATE: 1/31/07
PERSONNEL: BC

	DIRECTION 1 (West)	DIRECTION 2 (East)
Roadway: First Sample (7 minutes) Start Time: 11:53 am		
Automobiles	99	
Medium Trucks (6 Tires)	9	
Heavy Trucks (>6 Tires)	37	
Roadway: Second Sample (7 minutes) Start Time: 12:00 pm		
Automobiles		93
Medium Trucks (6 Tires)		2
Heavy Trucks (>6 Tires)		21
Roadway: Third Sample (8 minutes) Start Time: 12:07 pm		
Automobiles	92	
Medium Trucks (6 Tires)	8	
Heavy Trucks (>6 Tires)	39	
Roadway: Fourth Sample (8 minutes) Start Time: 12:15 pm		
Automobiles		100
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		15

Notes: Traffic free-flowing

6

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-N2
MEASUREMENT SITE NO.: ST-4
ADDRESS/DESCRIPTION: White Deer Trail

START TIME: 3:52
END TIME: 4:22
DATE: 1/31/07
PERSONNEL: BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (7 minutes)** Start Time: 3:52 pm	Automobiles	172	
	Medium Trucks (6 Tires)	4	
	Heavy Trucks (>6 Tires)	33	
Roadway: **Second Sample (7 minutes)** Start Time: 3:59 pm	Automobiles		146
	Medium Trucks (6 Tires)		8
	Heavy Trucks (>6 Tires)		15
Roadway: **Third Sample (8 minutes)** Start Time: 4:06 pm	Automobiles	202	
	Medium Trucks (6 Tires)	8	
	Heavy Trucks (>6 Tires)	24	
Roadway: **Fourth Sample (8 minutes)** Start Time: 4:14 pm	Automobiles		159
	Medium Trucks (6 Tires)		7
	Heavy Trucks (>6 Tires)		29

Notes: Traffic free-flowing

(5)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-N2
MEASUREMENT SITE NO.: ST-5
ADDRESS/DESCRIPTION: White Deer Trail

START TIME: 2:59pm
END TIME: 3:29pm
DATE: 1/31/07
PERSONNEL: BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (7 minutes)** Start Time: 2:59pm	Automobiles	121	
	Medium Trucks (6 Tires)	6	
	Heavy Trucks (>6 Tires)	27	
Roadway: **Second Sample (7 minutes)** Start Time: 3:06pm	Automobiles		106
	Medium Trucks (6 Tires)		10
	Heavy Trucks (>6 Tires)		22
Roadway: **Third Sample (8 minutes)** Start Time: 3:13pm	Automobiles	167	
	Medium Trucks (6 Tires)	7	
	Heavy Trucks (>6 Tires)	31	
Roadway: **Fourth Sample (8 minutes)** Start Time: 3:21pm	Automobiles		162
	Medium Trucks (6 Tires)		6
	Heavy Trucks (>6 Tires)		22

Notes: Traffic free-flowing

(4)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-S1
MEASUREMENT SITE NO.: ST-6
ADDRESS/DESCRIPTION: ~~White Deer Trail~~

START TIME: 2:09 pm
END TIME: 2:39 pm
DATE: 1/31/07
PERSONNEL: BC

	DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (7 minutes)** Start Time: 2:09 pm		
Automobiles	99	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	28	
Roadway: **Second Sample (7 minutes)** Start Time: 2:16 pm		
Automobiles		108
Medium Trucks (6 Tires)		8
Heavy Trucks (>6 Tires)		20
Roadway: **Third Sample (8 minutes)** Start Time: 2:23 pm		
Automobiles	118	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	45	
Roadway: **Fourth Sample (8 minutes)** Start Time: 2:31 pm		
Automobiles		129
Medium Trucks (6 Tires)		7
Heavy Trucks (>6 Tires)		30

Notes: Traffic free-flowing

HARRIS MILLER MILLER & HANSON INC.

(7)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	USA-52	START TIME:	8:57 am
MEASUREMENT SITE NO.:	ST-7	END TIME:	9:27 am
ADDRESS/DESCRIPTION:	White Deer Trail	DATE:	2/1/07
		PERSONNEL:	JC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway:			
First Sample (5 minutes)			
Start Time: 8:57am			
	Automobiles	100	
	Medium Trucks (6 Tires)	7	
	Heavy Trucks (>6 Tires)	17	
Roadway:			
Second Sample (5 minutes)			
Start Time: 9:02am			
	Automobiles		115
	Medium Trucks (6 Tires)		3
	Heavy Trucks (>6 Tires)		22
Roadway:			
Third Sample (5 minutes)			
Start Time: 9:17am			
	Automobiles	75	
	Medium Trucks (6 Tires)	5	
	Heavy Trucks (>6 Tires)	27	
Roadway:			
Fourth Sample (5 minutes)			
Start Time: 9:22am			
	Automobiles		94
	Medium Trucks (6 Tires)		9
	Heavy Trucks (>6 Tires)		28

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: USA-52 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-7 PERSONNEL: BC

☑ Time OR ☐ Speed
seconds

First Sample

Roadway: 76
Start Time: 9:08 am
End Time: 9:14 a.m
If "Time," provide distance OR measurement endpoints: on eastbound side call box ^ above N. Valley Rd. underpass to 2nd house west of bridge on the south side of 76.

	EASTBOUND	WESTBOUND
1.	3.50	3.10
2.	3.69	3.90
3.	2.94	3.81
4.	3.28	3.06
5.	3.50	3.50
6.	3.50	3.88
7.	3.50	3.47
8.	3.10	3.53
9.	3.54	3.38
10.	3.66	3.25

Second Sample

Roadway: 76
Start Time: 9:14am
End Time: 9:17am
If "Time," provide distance OR measurement endpoints: same as above

	EASTBOUND	WESTBOUND
1.	3.28	3.50
2.	3.72	3.29
3.	2.62	3.28
4.	3.60	4.00
5.	3.87	3.75
6.		
7.		
8.		
9.		
10.		

HARRIS MILLER MILLER & HANSON INC.

(8)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	NSA-N3	START TIME:	9:48am
MEASUREMENT SITE NO.:	ST-8	END TIME:	10:18am
ADDRESS/DESCRIPTION:	White Deer Trail	DATE:	2/1/07
		PERSONNEL:	BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway:			
First Sample (5 minutes)			
Start Time: 9:48am			
	Automobiles	51	
	Medium Trucks (6 Tires)	2	
	Heavy Trucks (>6 Tires)	13	
Roadway:			
Second Sample (5 minutes)			
Start Time: 9:53am			
1:58	Automobiles		73
	Medium Trucks (6 Tires)		7
	Heavy Trucks (>6 Tires)		16
Roadway:			
Third Sample (5 minutes)			
Start Time: 10:08am			
	Automobiles	71	
	Medium Trucks (6 Tires)	6	
	Heavy Trucks (>6 Tires)	20	
Roadway:			
Fourth Sample (5 minutes)			
Start Time: 10:13am			
	Automobiles		52
	Medium Trucks (6 Tires)		2
	Heavy Trucks (>6 Tires)		25

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: USA-03 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-8 PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway: 76
Start Time: 9:59am
End Time: 10:08am

If "Time," provide distance OR measurement endpoints: Callbox on eastbound side of 76 above N. Valley Rd underpass to 2nd house west of the bridge on the south side of 76.

	EASTBOUND	WESTBOUND
1.	3.25	3.19
2.	3.56	3.78
3.	3.07	3.60
4.	3.25	4.04
5.	3.03	3.35
6.	3.19	4.00
7.	3.63	3.59
8.	3.44	3.53
9.	3.72	3.72
10.	2.97	3.47

Second Sample

Roadway:
Start Time:
End Time:

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	3.03	3.34
2.	2.53	3.06
3.	3.44	3.63
4.	3.06	3.16
5.	3.31	2.81
6.		
7.		
8.		
9.		
10.		

HARRIS MILLER MILLER & HANSON INC.

(12)

PROJECT: NTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	ASA-N3	START TIME:	2:21 pm
MEASUREMENT SITE NO.:	ST-9	END TIME:	2:41 pm
ADDRESS/DESCRIPTION:	Mill Rd. overpass facing west	DATE:	2/1/07
		PERSONNEL:	BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway:			
First Sample (5 minutes) Start Time: 2:21 pm			
	Automobiles	58	
	Medium Trucks (6 Tires)	3	
	Heavy Trucks (>6 Tires)	20	
Roadway:			
Second Sample (5 minutes) Start Time: 2:26 pm			
	Automobiles		77
	Medium Trucks (6 Tires)		2
	Heavy Trucks (>6 Tires)		17
Roadway:			
Third Sample (5 minutes) Start Time: 2:31 pm			
	Automobiles	82	
	Medium Trucks (6 Tires)	8	
	Heavy Trucks (>6 Tires)	26	
Roadway:			
Fourth Sample (5 minutes) Start Time: 2:36 pm			
	Automobiles		76
	Medium Trucks (6 Tires)		2
	Heavy Trucks (>6 Tires)		22

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: USA-U3 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-9 PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway:
Start Time:
End Time:
If "Time," provide distance OR measurement endpoints:
- See speeds for ST-10

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Second Sample

Roadway:
Start Time:
End Time:
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

HARRIS MILLER MILLER & HANSON INC.

(1)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	USA-53	START TIME:	1:33pm
MEASUREMENT SITE NO.:	ST-10	END TIME:	2:03pm
ADDRESS/DESCRIPTION:	mill Rd. overpass facing west	DATE:	2/1/07
		PERSONNEL:	BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (5 minutes)** Start Time: 1:33pm	Automobiles	86	
	Medium Trucks (6 Tires)	3	
	Heavy Trucks (>6 Tires)	22	
Roadway: **Second Sample (5 minutes)** Start Time: 1:38pm	Automobiles		72
	Medium Trucks (6 Tires)		7
	Heavy Trucks (>6 Tires)		21
Roadway: **Third Sample (5 minutes)** Start Time: 1:53pm	Automobiles	83	
	Medium Trucks (6 Tires)	4	
	Heavy Trucks (>6 Tires)	25	
Roadway: **Fourth Sample (5 minutes)** Start Time: 1:58pm	Automobiles		52
	Medium Trucks (6 Tires)		2
	Heavy Trucks (>6 Tires)		18

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-53 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-10 PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway: 76
Start Time: 1:43pm
End Time: 1:53pm
If "Time," provide distance OR measurement endpoints: same as ST-12

	EASTBOUND	WESTBOUND
1.	9.72	10.84
2.	9.78	9.22
3.	9.84	11.10
4.	8.97	10.57
5.	9.69	9.29
6.	10.16	10.35
7.	9.34	9.41
8.	10.06	10.53
9.	8.56	9.94
10.	9.40	9.69

Second Sample

Roadway:
Start Time:
End Time:
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PROJECT: PTC 320 326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-53
MEASUREMENT SITE NO.: ST-11
ADDRESS/DESCRIPTION:

START TIME: 11:36
END TIME: 11:58
DATE: 2/1/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 11:36

	DIRECTION 1 (EB)	DIRECTION 2 (WB)
Automobiles	71	
Medium Trucks (6 Tires)	9	
Heavy Trucks (>6 Tires)	17	

Roadway:
Second Sample (5 minutes)
Start Time: 11:42

	DIRECTION 1	DIRECTION 2
Automobiles		52
Medium Trucks (6 Tires)		5
Heavy Trucks (>6 Tires)		30

Roadway:
Third Sample (5 minutes)
Start Time: 11:48

	DIRECTION 1	DIRECTION 2
Automobiles	70	
Medium Trucks (6 Tires)	3	
Heavy Trucks (>6 Tires)	22	

Roadway:
Fourth Sample (5 minutes)
Start Time: 11:53

	DIRECTION 1	DIRECTION 2
Automobiles		74
Medium Trucks (6 Tires)		0
Heavy Trucks (>6 Tires)		27

Notes:

PROJECT: PTC 320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA - 53 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-11 PERSONNEL: SC/SES

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 12:00 pm
End Time: 12:20 pm
If "Time," provide distance OR measurement endpoints:
Sam to ST 14, 9, 6

	EASTBOUND	WESTBOUND
1.	3.09	
2.	3.89	
3.	3.79	
4.	3.69	
5.	3.21	
6.	3.99	
7.	3.71	
8.	3.66	
9.	3.75	
10.	3.53	

Second Sample

Roadway:
Start Time: 12:03 pm
End Time: 12:40 pm
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		4.53
2.		3.72
3.		3.23
4.		3.96
5.		3.66
6.		4.01
7.		4.40
8.		3.58
9.		4.62
10.		3.09

(9)

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	NSA-N4	START TIME:	10:40am
MEASUREMENT SITE NO.:	ST-12	END TIME:	11:10 am
ADDRESS/DESCRIPTION:	on Mill Rd overpass facing west	DATE:	2/1/07
		PERSONNEL:	BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway:			
First Sample (5 minutes) Start Time: 10:40am			
	Automobiles	57	
	Medium Trucks (6 Tires)	4	
	Heavy Trucks (>6 Tires)	26	
Roadway:			
Second Sample (5 minutes) Start Time: 10:45			
	Automobiles		57
	Medium Trucks (6 Tires)		4
	Heavy Trucks (>6 Tires)		22
Roadway:			
Third Sample (5 minutes) Start Time: 11:00am			
	Automobiles	52	
	Medium Trucks (6 Tires)	3	
	Heavy Trucks (>6 Tires)	30	
Roadway:			
Fourth Sample (5 minutes) Start Time: 11:05 am			
	Automobiles		72
	Medium Trucks (6 Tires)		9
	Heavy Trucks (>6 Tires)		21

Notes:

PROJECT: PTC 320-326
JOB NO.: _____

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-NY
DATE: 2/1/07
MEASUREMENT SITE NO.: ST-12
PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway: _____
Start Time: 10:50am
End Time: 11:00am
If "Time," provide distance OR measurement endpoints: western side of milled bridge to end of pull-off area near access Rd on west bound side of 76

	EASTBOUND	WESTBOUND
1.	10.88	9.78
2.	10.25	9.75
3.	9.78	10.68
4.	10.10	9.38
5.	9.10	9.78
6.	9.03	10.04
7.	9.37	8.94
8.	11.19	10.81
9.	10.78	10.03
10.	10.31	11.44

Second Sample

Roadway: _____
Start Time: _____
End Time: _____
If "Time," provide distance OR measurement endpoints: _____

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

HARRIS MILLER MILLER & HANSON INC.

(10)

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: USA-U4
MEASUREMENT SITE NO.: ST-13
ADDRESS/DESCRIPTION: Mill Rd. Overpass facing west.

START TIME: 11:19am
END TIME: 11:49am
DATE: 2/1/07
PERSONNEL: BC

	DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway: **First Sample (5 minutes)** Start Time: 11:19am		
Automobiles	65	
Medium Trucks (6 Tires)	6	
Heavy Trucks (>6 Tires)	35	
Roadway: **Second Sample (5 minutes)** Start Time: 11:24am		
Automobiles		66
Medium Trucks (6 Tires)		6
Heavy Trucks (>6 Tires)		17
Roadway: **Third Sample (5 minutes)** Start Time: 11:39am		
Automobiles	63	
Medium Trucks (6 Tires)	4	
Heavy Trucks (>6 Tires)	29	
Roadway: **Fourth Sample (5 minutes)** Start Time: 11:44am		
Automobiles		73
Medium Trucks (6 Tires)		5
Heavy Trucks (>6 Tires)		21

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: USA-NY
MEASUREMENT SITE NO.: ST-13
DATE: 2/1/07
PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway: 76
Start Time: 11:29am
End Time: 11:39am
If "Time," provide distance OR measurement endpoints: same as ST-12

	EASTBOUND	WESTBOUND
1.	10.69	10.88
2.	9.00	10.75
3.	9.28	11.69
4.	10.18	9.88
5.	10.28	9.88
6.	9.78	11.09
7.	9.41	11.00
8.	9.40	10.56
9.	10.06	10.73
10.	9.93	9.59

Second Sample

Roadway:
Start Time:
End Time:
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PROJECT: PTC 320 326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-55
MEASUREMENT SITE NO.: ST-14
ADDRESS/DESCRIPTION:

START TIME: 10:38am
END TIME: 11:01
DATE: 2/11/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 10:38am

	DIRECTION 1 EB	DIRECTION 2 WB
Automobiles	49	
Medium Trucks (6 Tires)	6	
Heavy Trucks (>6 Tires)	19	

Roadway:
Second Sample (5 minutes)
Start Time: 10:44

Automobiles		53
Medium Trucks (6 Tires)		5
Heavy Trucks (>6 Tires)		22
		180 5

Roadway:
Third Sample (5 minutes)
Start Time: 10:50

Automobiles	78	
Medium Trucks (6 Tires)	4	
Heavy Trucks (>6 Tires)	17	

Roadway:
Fourth Sample (5 minutes)
Start Time: 10:56

Automobiles		46
Medium Trucks (6 Tires)		6
Heavy Trucks (>6 Tires)		26

Notes:

PROJECT: PTC 320 326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-55 DATE: 2/1/07
MEASUREMENT SITE NO.: ST-14 PERSONNEL: SC/SFS

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 11:03
End Time: 11:07

If "Time," provide distance OR measurement endpoints: [illegible] 895 ft

	EASTBOUND	WESTBOUND
1.	3.50	
2.	3.49	
3.	3.64	
4.	3.66	
5.	4.03	
6.	3.93	
7.	3.99	
8.	4.64	
9.	4.07	
10.	3.49	

Second Sample

Roadway:
Start Time: 11:08
End Time: 11:13

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		4.70
2.		4.18
3.		4.76
4.		4.64
5.		4.91
6.		3.90
7.		4.10
8.		4.60
9.		4.62
10.		4.07

PROJECT: PTC320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-56
MEASUREMENT SITE NO.: ST-15
ADDRESS/DESCRIPTION:

START TIME: 9:48 a.m.
END TIME: 10:41
DATE: 2/1/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 9:48

	DIRECTION 1	DIRECTION 2
	EB	WB
Automobiles	99	
Medium Trucks (6 Tires)	11	
Heavy Trucks (>6 Tires)	18	
	18 v 5	

Roadway:
Second Sample (5 minutes)
Start Time: 9:54

Automobiles		103
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		25

Roadway:
Third Sample (5 minutes)
Start Time: 10:00 am

Automobiles	74	
Medium Trucks (6 Tires)	3	
Heavy Trucks (>6 Tires)	24	

Roadway:
Fourth Sample (5 minutes)
Start Time: 10:06 am

Automobiles		70
Medium Trucks (6 Tires)		4
Heavy Trucks (>6 Tires)		19

Notes:

PROJECT: PTC320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-56 DATE: 2/1/07
MEASUREMENT SITE NO.: 9-15 PERSONNEL: SC/SES

☒ Time OR ☐ Speed

First Sample

Roadway: I-76
Start Time: 10:13 am
End Time: 10:15

If "Time," provide distance OR measurement endpoints:

1895 ft

	EASTBOUND	WESTBOUND
1.	5.24	
2.	4.90	
3.		
4.	3.91	
5.	3.61	
6.	4.03	
7.		
8.	3.97	
9.		
10.	4.16	

Second Sample

Roadway:
Start Time: 10:19
End Time: 10:23

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		5.66
2.		
3.		0.50
4.		4.30
5.		3.95
6.		4.36
7.		4.65
8.		4.56
9.		4.37
10.		4.84

PROJECT: PTC320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA - N5
MEASUREMENT SITE NO.: ST-16
ADDRESS/DESCRIPTION:

START TIME: 9:08
END TIME: 9:30
DATE: 2/1/07
PERSONNEL: SC/SFS

Roadway: I-76
First Sample (5 minutes)
Start Time: 9:08

	DIRECTION 1 EB	DIRECTION 2 WB
Automobiles	109	
Medium Trucks (6 Tires)	2	
Heavy Trucks (>6 Tires)	22	

Roadway:
Second Sample (5 minutes)
Start Time: 9:14

Automobiles		81
Medium Trucks (6 Tires)		2
Heavy Trucks (>6 Tires)		25

Roadway:
Third Sample (5 minutes)
Start Time: 9:20

Automobiles	105	
Medium Trucks (6 Tires)	3	
Heavy Trucks (>6 Tires)	26	

Roadway:
Fourth Sample (5 minutes)
Start Time: 9:25

Automobiles		87
Medium Trucks (6 Tires)		4
Heavy Trucks (>6 Tires)		22

Notes:

PENNA TURN-PIKE

PROJECT: PTC320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-N5 DATE: 2/11/07
MEASUREMENT SITE NO.: ST-16 PERSONNEL: SC/SFS

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 9:32
End Time: 9:36

If "Time," provide distance OR measurement endpoints:

Grassy spot [illegible]
[illegible]

895 ft

	EASTBOUND	WESTBOUND
1.	4.40	
2.	3.10	
3.	4.19	
4.	3.14	
5.	3.73	
6.	3.76	
7.	4.02	
8.	3.70	
9.	3.37	
10.	3.27	

Second Sample

Roadway:
Start Time: 9:37
End Time:

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		6.50
2.		4.35
3.		4.50
4.		4.17
5.		4.11
6.		4.71
7.		4.55
8.		4.83
9.		5.23
10.		4.22

HARRIS MILLER MILLER & HANSON INC.

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

No congestion

ASSESSMENT AREA ID: NSA-57
MEASUREMENT SITE NO.: ST-17
ADDRESS/DESCRIPTION:

START TIME:
END TIME:
DATE: 1/31/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 5:03 PM

	DIRECTION 1 NB	DIRECTION 2 EB
Automobiles	177	
Medium Trucks (6 Tires)	6	
Heavy Trucks (>6 Tires)	18	

1 Bus

Roadway:
Second Sample (5 minutes)
Start Time: 5:08

Automobiles		87
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		8

Roadway:
Third Sample (5 minutes)
Start Time: 5:14

Automobiles	144	
Medium Trucks (6 Tires)	4	
Heavy Trucks (>6 Tires)	14	

1 Bus

Roadway:
Fourth Sample (5 minutes)
Start Time: 5:20

Automobiles		105
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		13

Notes:

last site for Alex & Steve on the 31st

PENNA TURN-PIKE

PROJECT: _____
JOB NO.: _____

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: _____ DATE: 1/31/07

MEASUREMENT SITE NO.: ~~ST-~~ ST-17 PERSONNEL: BC

☑ Time OR ☐ Speed

First Sample

Roadway: I 76

Start Time: 5:10 pm

End Time: 5:18 pm

If "Time," provide distance OR measurement endpoints: East end of motorcycle blacktop to west end of Sunoco gas station roof.

- look for (#) sign close to another but shorter in front of the one, maybe 2nd one in from my view point

	EASTBOUND	WESTBOUND
1.	5.21	5.47
2.	5.56	5.91
3.	5.35	5.63
4.	5.77	5.44
5.	5.42	6.15
6.	4.42	6.37
7.	5.22	6.77
8.	5.34	5.64
9.	5.50	5.31
10.	5.67	5.72

Second Sample

Roadway: _____

Start Time: _____

End Time: _____

If "Time," provide distance OR measurement endpoints: _____

	EASTBOUND	WESTBOUND
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

HARRIS MILLER MILLER & HANSON INC.

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	NSA-57	START TIME:	4:00
MEASUREMENT SITE NO.:	ST-18	END TIME:	4:23
ADDRESS/DESCRIPTION:		DATE:	1/31/07
		PERSONNEL:	SC/SES

		DIRECTION 1 WB	DIRECTION 2 EB
Roadway: I-76			
First Sample (5 minutes)			
Start Time: 4:00			
	Automobiles	134	
	Medium Trucks (6 Tires)	5	
	Heavy Trucks (>6 Tires)	17	
Roadway:			
Second Sample (5 minutes)			
Start Time: 4:06			
	Automobiles		105
	Medium Trucks (6 Tires)		6
	Heavy Trucks (>6 Tires)		11
Roadway:			
Third Sample (5 minutes)			
Start Time: 4:12			
	Automobiles	141	
	Medium Trucks (6 Tires)	3	
	Heavy Trucks (>6 Tires)	19	
Roadway:			
Fourth Sample (5 minutes)			
Start Time: 4:18			
	Automobiles		108
	Medium Trucks (6 Tires)		4
	Heavy Trucks (>6 Tires)		19
			1 Bus

Notes:

PENNA TURN-PIKE

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-57
DATE: 1/31/07
MEASUREMENT SITE NO.: ST-18
PERSONNEL: SC / SES

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 4:27
End Time: 4:31

If "Time," provide distance OR measurement endpoints: Brookie Pommator WB (milemark) to Merging sign (427 bridge) [317 ft]

	EASTBOUND	WESTBOUND
1.		3.72
2.		4.29
3.		3.60
4.		3.58
5.		3.76
6.		3.54
7.		3.85
8.		3.83
9.		4.68 ← slowed when he saw me
10.		4.12

Second Sample

Roadway:
Start Time: 4:32
End Time: 4:36

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	3.45	
2.	4.08	
3.	2.83	
4.	3.45	
5.	3.62	
6.	2.98	
7.	3.39	
8.	3.39	
9.	3.97	
10.	3.94	

PROJECT: PTC-320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-N6
MEASUREMENT SITE NO.: ST-19
ADDRESS/DESCRIPTION:

START TIME: 12:05pm
END TIME: 12:42pm
DATE: 1/31/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 12:05pm

	DIRECTION 1 WB	DIRECTION 2 EB
Automobiles	57	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	29	
	5	

Roadway:
Second Sample (5 minutes)
Start Time: 12:10pm

	WB	
Automobiles	53	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	31	

Roadway:
Third Sample (5 minutes)
Start Time: 12:32

		EB
Automobiles		66
Medium Trucks (6 Tires)		2
Heavy Trucks (>6 Tires)		13

Roadway:
Fourth Sample (5 minutes)
Start Time: 12:37

		EB
Automobiles		58
Medium Trucks (6 Tires)		4
Heavy Trucks (>6 Tires)		17
		10

Notes:

PENNA TURN-PIKE

PROJECT: PTC 320-326
JOB NO.: _____

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-N6 DATE: 1/31/07
MEASUREMENT SITE NO.: ST-19 PERSONNEL: SC/SES

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 12:20 pm
End Time: 12:26 pm

If "Time," provide distance OR measurement endpoints: eastern edge of 252 bridge to end of motorcycle blacktop near service plaza (also third light pole from bridge) on Southside — where EB service center ramp is.

	EASTBOUND (seconds)	WESTBOUND
1.	9.80	
2.	7.35	
3.	8.27	
4.	7.27	
5.	7.10	
6.	6.14	
7.	7.56	
8.	8.69	
9.	8.15	
10.	8.27	

Second Sample

Roadway: I-76
Start Time: 12:26
End Time: 12:31

If "Time," provide distance OR measurement endpoints: _____

	EASTBOUND	WESTBOUND
1.		8.81
2.		7.80
3.		9.00
4.		8.20
5.		8.73
6.		8.50
7.		8.60
8.		7.60
9.		8.81
10.		7.11

PROJECT: PTC320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-57
MEASUREMENT SITE NO.: ST-20.
ADDRESS/DESCRIPTION:

START TIME: 2:32pm
END TIME: 2:55pm
DATE: 1/31/07
PERSONNEL: SC/SES

		DIRECTION 1	DIRECTION 2
Roadway:		WB	EB
First Sample (5 minutes)			
Start Time: 2:32	Automobiles	61	
	Medium Trucks (6 Tires)	2	
	Heavy Trucks (>6 Tires)	21	
Roadway:			
Second Sample (5 minutes)			
Start Time: 2:37	Automobiles		77
	Medium Trucks (6 Tires)		5
	Heavy Trucks (>6 Tires)		20
Roadway:		WB	
Third Sample (5 minutes)			
Start Time: 2:43	Automobiles	71	
	Medium Trucks (6 Tires)	0	
	Heavy Trucks (>6 Tires)	02	
Roadway:			EB
Fourth Sample (5 minutes)			
Start Time: 2:50	Automobiles		78
	Medium Trucks (6 Tires)		3
	Heavy Trucks (>6 Tires)		10

Notes:

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-57 DATE: 1/31/07
MEASUREMENT SITE NO.: ST-20 PERSONNEL: JC/JES

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 3:02pm
End Time: 3:04:30pm
If "Time," provide distance OR measurement endpoints: From brick on pavement on WB (north side) to sign crossing Rd (4472 bridge)

37

	EASTBOUND	WESTBOUND
1.		3.20 (5 mph)
2.		3.47
3.		3.26
4.		3.70
5.		3.72
6.		3.41
7.		3.25
8.		3.39
9.		3.42
10.		3.48

Second Sample

Roadway: I-76
Start Time: 3:05pm
End Time: 3:09pm
If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	4.34	
2.	3.64	
3.	2.99	
4.	3.24	
5.	3.60	
6.	2.99	
7.	4.12 (crossed gap)	
8.	2.99	
9.	3.46	
10.	4.24	

PROJECT: PTC-320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-57
MEASUREMENT SITE NO.: ST-21
ADDRESS/DESCRIPTION:

START TIME: 3:16
END TIME: 3:39
DATE: 1/31/07
PERSONNEL: SC/SES

		DIRECTION 1 (WB)	DIRECTION 2 (EB)
Roadway: I-76 **First Sample (5 minutes)** Start Time: 3:16	Automobiles	110	
	Medium Trucks (6 Tires)	6	
	Heavy Trucks (>6 Tires)	19	
Roadway: **Second Sample (5 minutes)** Start Time: 3:22	Automobiles		111
	Medium Trucks (6 Tires)		6
	Heavy Trucks (>6 Tires)		11
Roadway: **Third Sample (5 minutes)** Start Time: 3:28	Automobiles	117	
	Medium Trucks (6 Tires)	2	
	Heavy Trucks (>6 Tires)	21	
Roadway: **Fourth Sample (5 minutes)** Start Time: 3:34	Automobiles		71
	Medium Trucks (6 Tires)		4
	Heavy Trucks (>6 Tires)		16

Notes:

PROJECT: PTC320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-57 DATE: 1/31/07
MEASUREMENT SITE NO.: ST-21 PERSONNEL: SC/SES

Traffic picking up, but no congestion

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 3:43
End Time: 3:46

If "Time," provide distance OR measurement endpoints:
Break in pavement @ bridge WB (northside) to overhanging sign

	EASTBOUND	WESTBOUND
1.		2.95
2.		3.62
3.		2.80
4.		3.30
5.		4.20
6.		4.01
7.		3.71
8.		3.12
9.		3.58
10.		3.28

317

Second Sample

Roadway: I-76
Start Time: 3:47
End Time: 3:51

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	2.53	
2.	2.94	
3.	3.72	
4.	3.10	
5.	3.46	
6.	3.80	
7.	4.09	
8.	4.80	
9.	3.62	
10.	4.30	

PROJECT: PTC320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

Noise study location

ASSESSMENT AREA ID: NSA-N6
MEASUREMENT SITE NO.: ST-22
ADDRESS/DESCRIPTION:

START TIME: 11:04
END TIME: 11:43
DATE: 1/31/07
PERSONNEL: SC/SES

(4) 5 minute Samples

	DIRECTION 1 WB	DIRECTION 2 EB
Roadway: I-76 **First Sample (5 minutes)** Start Time: 11:04		
Automobiles	68	
Medium Trucks (6 Tires)	3	
Heavy Trucks (>6 Tires)	24	
Roadway: I-76 **Second Sample (5 minutes)** Start Time: 11:11		EB
Automobiles		62
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		18
Speed Measurements Roadway: I-76 **Third Sample (5 minutes)** Start Time: 11:32	WB	
Automobiles	65	
Medium Trucks (6 Tires)	8	
Heavy Trucks (>6 Tires)	31	
Roadway: I-76 **Fourth Sample (5 minutes)** Start Time: 11:38		EB
Automobiles		72
Medium Trucks (6 Tires)		4
Heavy Trucks (>6 Tires)		24
		1 Bus

Notes:

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSAN6 DATE: 1/31/07
MEASUREMENT SITE NO.: ST-22 PERSONNEL: SC/SES

☐ Time OR ☒ Speed

First Sample

Roadway: I-76
Start Time: 11:18
End Time: 11:22

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.		65
2.		52
3.		69
4.		58
5.		70
6.		46
7.		52
8.		60
9.		60
10.		56

Second Sample

Roadway: I-76
Start Time: 11:27
End Time: 11:32

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	60	
2.	45	
3.	62	
4.	66	
5.	68	
6.	62	
7.	63	
8.	54	
9.	66	
10.	60	

PROJECT: PTC 320-326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: NSA-N6
MEASUREMENT SITE NO.: ST-23
ADDRESS/DESCRIPTION:

START TIME: 3:09pm
END TIME:
DATE: 2/1/07
PERSONNEL: SC/SES

Roadway: I-76
First Sample (5 minutes)
Start Time: 3:05

	DIRECTION 1 (WB)	DIRECTION 2 (EB)
Automobiles	115	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	31	

Roadway:
Second Sample (5 minutes)
Start Time: 3:11

	DIRECTION 1	DIRECTION 2
Automobiles		93
Medium Trucks (6 Tires)		3
Heavy Trucks (>6 Tires)		19

Roadway:
Third Sample (5 minutes)
Start Time: 3:16

	DIRECTION 1	DIRECTION 2
Automobiles	92	
Medium Trucks (6 Tires)	5	
Heavy Trucks (>6 Tires)	26	

Roadway:
Fourth Sample (5 minutes)
Start Time: 3:22

	DIRECTION 1	DIRECTION 2
Automobiles		71
Medium Trucks (6 Tires)		5
Heavy Trucks (>6 Tires)		9

Notes:

PROJECT: PTC 320-326
JOB NO.: 301940

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID: S NSA-N6
MEASUREMENT SITE NO.: ST-23
ADDRESS/DESCRIPTION: 799 GULPH RD

START TIME: 15:06
END TIME: 15:29
DATE: 2/1/07
PERSONNEL: DLEB/AND

		DIRECTION 1 (WB / WEST)	DIRECTION 2 (SB / EAST)
Roadway: SR422 ~~SB~~ WB **First Sample (5 minutes)** Start Time: 15:06			
	Automobiles		247
	Medium Trucks (6 Tires)		7
	Heavy Trucks (>6 Tires)		5
Roadway: SR422 NB **Second Sample (5 minutes)** Start Time: 15:12			
	Automobiles	231	
	Medium Trucks (6 Tires)	8	
	Heavy Trucks (>6 Tires)	16	
Roadway: SR422 SB **Third Sample (5 minutes)** Start Time: 15:18			
	Automobiles		242
	Medium Trucks (6 Tires)		6
	Heavy Trucks (>6 Tires)		7
Roadway: SR422 NB **Fourth Sample (5 minutes)** Start Time: 15:24			
	Automobiles	226	
	Medium Trucks (6 Tires)	8	
	Heavy Trucks (>6 Tires)	12	

Notes: Traffic freely flowing both directions Est speed 55-65mph

PENNA TURN-PIKE

PROJECT: PTC320326
JOB NO.:

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC SPEED DATA SHEET

ASSESSMENT AREA ID: NSA-N6 DATE: 2/16/07
MEASUREMENT SITE NO.: ST-23 PERSONNEL: JC/DES

[X] Time OR [ ] Speed

First Sample

Roadway: I-76
Start Time: 3:30 pm
End Time: 3:33

If "Time," provide distance OR measurement endpoints:
Back up onto WB I-76 (@ 320 bridge)

3.17

	EASTBOUND	WESTBOUND
1.		4.16
2.		2.70
3.		3.27
4.		3.57
5.		3.50
6.		3.64
7.		2.96
8.		3.10
9.		3.87
10.		3.08

Second Sample

Roadway:
Start Time: 3:34
End Time: 3:38

If "Time," provide distance OR measurement endpoints:

	EASTBOUND	WESTBOUND
1.	3.59	
2.	3.50	
3.	3.93	
4.	3.57	
5.	4.33	
6.	3.21	
7.	2.94	
8.	2.72	
9.	3.72	
10.	2.43	

(13)

PROJECT: _____
JOB NO.: _____

PENNSYLVANIA TURNPIKE MILEPOST 320-326
TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA ID:	USA-58	START TIME:	3:15 pm
MEASUREMENT SITE NO.:	ST-24	END TIME:	3:35 pm
ADDRESS/DESCRIPTION:	Glenhardie Rd.	DATE:	2/1/07
	overpass	PERSONNEL:	BC

		DIRECTION 1 (west)	DIRECTION 2 (east)
Roadway:			
First Sample (5 minutes)			
Start Time: 3:15pm			
	Automobiles	87	
	Medium Trucks (6 Tires)	10	
	Heavy Trucks (>6 Tires)	18	
Roadway:			
Second Sample (5 minutes)			
Start Time: 3:20pm			
	Automobiles		77
	Medium Trucks (6 Tires)		5
	Heavy Trucks (>6 Tires)		12
Roadway:			
Third Sample (5 minutes)			
Start Time: 3:25pm			
	Automobiles	115	
	Medium Trucks (6 Tires)	5	
	Heavy Trucks (>6 Tires)	28	
Roadway:			
Fourth Sample (5 minutes)			
Start Time: 3:30pm			
	Automobiles		86
	Medium Trucks (6 Tires)		4
	Heavy Trucks (>6 Tires)		11

Notes:

APPENDIX E. PRELIMINARY NOISE BARRIER PERFORMANCE DATA

The following sections contain noise barrier performance tables for the preliminary barrier designs for all NSAs. The tables provide acoustical and cost data for each constant-height noise barrier design, ranging from 10 to 20 feet in height.

The first, second and third columns of each table indicate the receiver's name, number of represented receptor units, and approximate building row location that the receiver represents. The fourth column provides the Design Year no-barrier noise level and the fifth column indicates the number of receptor units exposed to noise impact. All of the following columns are grouped by barrier height, and provide the with-barrier sound level, insertion loss, and the number of units receiving 3 dB and 5 dB of noise reduction.

A summary, providing insertion loss average, maximum insertion loss, number of benefited units, and cost data is given for each constant-height barrier configuration at the bottom of the table.

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Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials **5/17/2007 ADD** **Revised 7/16/2007 JAC**

Preliminary Noise Barrier Analysis: NSA-N1

Receiver	No. of Dwelling Units	Description	No Barrier Leq(dBA)	No Barrier No. of DUs 66+ dBA	10-foot Barrier Leq(dBA)	10-foot Barrier IL (dB)	10-foot Barrier IL 3+ (dB)	10-foot Barrier IL 5+ (dB)	12-foot Barrier Leq(dBA)	12-foot Barrier IL (dB)	12-foot Barrier IL 3+ (dB)	12-foot Barrier IL 5+ (dB)	14-foot Barrier Leq(dBA)	14-foot Barrier IL (dB)	14-foot Barrier IL 3+ (dB)	14-foot Barrier IL 5+ (dB)	16-foot Barrier Leq(dBA)	16-foot Barrier IL (dB)	16-foot Barrier IL 3+ (dB)	16-foot Barrier IL 5+ (dB)	18-foot Barrier Leq(dBA)	18-foot Barrier IL (dB)	18-foot Barrier IL 3+ (dB)	18-foot Barrier IL 5+ (dB)	20-foot Barrier Leq(dBA)	20-foot Barrier IL (dB)	20-foot Barrier IL 3+ (dB)	20-foot Barrier IL 5+ (dB)
N1_01	1		73.1	1	66.7	6.4	1	1	64.8	8.3	1	1	65.3	7.8	1	1	68.6	4.5	1	1	68.6	4.5	1	1	68.5	4.6	1	1
N1_02	2		74.1	2	69.0	5.1	2	2	68.6	5.5	2	2	66.6	7.5	2	2	67.3	6.8	2	2	67.0	7.1	2	2	66.8	7.3	2	2
N1_03	1		73.3	1	68.7	4.6	1	1	67.8	5.5	1	1	67.3	6.0	1	1	68.8	4.5	1	1	68.5	4.8	1	1	68.4	4.9	1	1
N1_04_ST2	1		70.9	1	68.9	2.0	0	0	68.5	2.4	0	0	69.5	1.4	0	0	69.9	1.0	0	0	69.7	1.2	0	0	69.6	1.3	0	0
N1_05	1		66.4	1	65.1	1.3	0	0	64.8	1.6	0	0	65.6	0.8	0	0	65.5	0.9	0	0	65.3	1.1	0	0	65.1	1.3	0	0
N1_06	1		69.7	1	65.9	3.8	1	0	65.5	4.2	1	0	64.9	4.8	1	1	65.1	4.6	1	1	64.9	4.8	1	1	64.8	4.9	1	1
N1_07	1		66.2	1	63.5	2.7	1	0	63.1	3.1	1	0	62.6	3.6	1	0	62.9	3.3	1	0	62.6	3.6	1	0	62.5	3.7	1	0
N1_08	1		66.0	1	64.3	1.7	0	0	63.5	2.5	1	0	63.1	2.9	1	0	63.4	2.6	1	0	63.2	2.8	1	0	62.8	3.2	1	0

# of impacted DUs:	**9**	Avg. Insertion Loss:	3.6 dB		Avg. Insertion Loss:	4.3 dB			Avg. Insertion Loss:	4.7 dB			Avg. Insertion Loss:	3.9 dB			Avg. Insertion Loss:	4.1 dB			Avg. Insertion Loss:	4.3 dB		
		Max. Insertion Loss:	6.4 dB		Max. Insertion Loss:	8.3 dB			Max. Insertion Loss:	7.8 dB			Max. Insertion Loss:	6.8 dB			Max. Insertion Loss:	7.1 dB			Max. Insertion Loss:	7.3 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	6 DUs		[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs		
		Impctd w/ 5 dB IL:	4 DUs		Impctd w/ 5 dB IL:	4 DUs			Impctd w/ 5 dB IL:	5 DUs			Impctd w/ 5 dB IL:	5 DUs			Impctd w/ 5 dB IL:	5 DUs			Impctd w/ 5 dB IL:	5 DUs		
		% Impctd DUs w/ 5 dB IL:	44.4%		% Impctd DUs w/ 5 dB IL:	44.4%			% Impctd DUs w/ 5 dB IL:	55.6%			% Impctd DUs w/ 5 dB IL:	55.6%			% Impctd DUs w/ 5 dB IL:	55.6%			% Impctd DUs w/ 5 dB IL:	55.6%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0 DUs		[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	6 DUs		Total [1]+[2] for cost:	7 DUs			Total [1]+[2] for cost:	7 DUs			Total [1]+[2] for cost:	7 DUs			Total [1]+[2] for cost:	7 DUs			Total [1]+[2] for cost:	7 DUs		
		Approx. Cost:	$773,451		Approx. Cost:	$928,142			Approx. Cost:	$405,895			Approx. Cost:	$325,479			Approx. Cost:	$366,164			Approx. Cost:	$773,451		
		Approx Cost per DU:	$128,909		Approx Cost per DU:	$132,592			Approx Cost per DU:	$57,985			Approx Cost per DU:	$46,497			Approx Cost per DU:	$52,309			Approx Cost per DU:	$110,493		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials 5/21/2007 JAC

Preliminary Noise Barrier Analysis: NSA-N2

Receiver	No. of Dwelling Units	Description	No Barrier Leq(dBA)	No Barrier No. of DUs 66+ dBA	10-foot Barrier Leq(dBA)	10-foot Barrier IL (dB)	10-foot Barrier IL 3+ (dB)	10-foot Barrier IL 5+ (dB)	12-foot Barrier Leq(dBA)	12-foot Barrier IL (dB)	12-foot Barrier IL 3+ (dB)	12-foot Barrier IL 5+ (dB)	14-foot Barrier Leq(dBA)	14-foot Barrier IL (dB)	14-foot Barrier IL 3+ (dB)	14-foot Barrier IL 5+ (dB)	16-foot Barrier Leq(dBA)	16-foot Barrier IL (dB)	16-foot Barrier IL 3+ (dB)	16-foot Barrier IL 5+ (dB)	18-foot Barrier Leq(dBA)	18-foot Barrier IL (dB)	18-foot Barrier IL 3+ (dB)	18-foot Barrier IL 5+ (dB)	20-foot Barrier Leq(dBA)	20-foot Barrier IL (dB)	20-foot Barrier IL 3+ (dB)	20-foot Barrier IL 5+ (dB)
N2_1	1		72.8	1	69.5	3.3	1	0	68.5	4.3	1	0	67.3	5.5	1	1	66.0	6.8	1	1	64.6	8.2	1	1	63.2	9.6	1	1
N2_2	1		66.6	1	64.1	2.5	1	0	63.6	3.0	1	0	63.0	3.6	1	0	62.2	4.4	1	0	61.3	5.3	1	1	60.6	6.0	1	1
N2_3_ST5	1		68.4	1	64.5	3.9	1	0	63.2	5.2	1	1	61.8	6.6	1	1	60.9	7.5	1	1	60.0	8.4	1	1	59.3	9.1	1	1
N2_4	1		69.8	1	67.8	2.0	0	0	67.2	2.6	1	0	66.4	3.4	1	0	65.5	4.3	1	0	64.6	5.2	1	1	63.7	6.1	1	1
N2_5	1		69.4	1	68.1	1.3	0	0	67.9	1.5	0	0	67.6	1.8	0	0	67.4	2.0	0	0	67.0	2.4	0	0	66.9	2.5	1	0
N2_6_ST4	1		59.1	0	59.1	0.0	0	0	59.1	0.0	0	0	59.0	0.1	0	0	59.0	0.1	0	0	59.0	0.1	0	0	58.9	0.2	0	0
N2_7	1		59.9	0	59.4	0.5	0	0	59.2	0.7	0	0	59.0	0.9	0	0	58.7	1.2	0	0	58.3	1.6	0	0	58.1	1.8	0	0
N2_8	1		56.1	0	55.7	0.4	0	0	55.6	0.5	0	0	55.5	0.6	0	0	55.4	0.7	0	0	55.3	0.8	0	0	55.2	0.9	0	0
N2_9	4		59.5	0	58.7	0.8	0	0	58.3	1.2	0	0	58.0	1.5	0	0	57.7	1.8	0	0	57.4	2.1	0	0	57.1	2.4	0	0
N2_10	1		65.5	1	64.8	0.7	0	0	64.6	0.9	0	0	64.3	1.2	0	0	64.0	1.5	0	0	63.7	1.8	0	0	63.3	2.2	0	0
N2_11	1		62.8	0	62.7	0.1	0	0	62.6	0.2	0	0	62.6	0.2	0	0	62.5	0.3	0	0	62.5	0.3	0	0	62.4	0.4	0	0

# of impacted DUs:	**6**	Avg. Insertion Loss:	1.3 dB		Avg. Insertion Loss:	1.7 dB			Avg. Insertion Loss:	2.1 dB			Avg. Insertion Loss:	2.6 dB			Avg. Insertion Loss:	3.0 dB			Avg. Insertion Loss:	3.5 dB		
		Max. Insertion Loss:	3.9 dB		Max. Insertion Loss:	5.2 dB			Max. Insertion Loss:	6.6 dB			Max. Insertion Loss:	7.5 dB			Max. Insertion Loss:	8.4 dB			Max. Insertion Loss:	9.6 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	3 DUs		[1] Impctd w/ 3 dB IL:	4 DUs			[1] Impctd w/ 3 dB IL:	4 DUs			[1] Impctd w/ 3 dB IL:	4 DUs			[1] Impctd w/ 3 dB IL:	4 DUs			[1] Impctd w/ 3 dB IL:	5 DUs		
		Impctd w/ 5 dB IL:	0 DUs		Impctd w/ 5 dB IL:	1 DUs			Impctd w/ 5 dB IL:	2 DUs			Impctd w/ 5 dB IL:	2 DUs			Impctd w/ 5 dB IL:	4 DUs			Impctd w/ 5 dB IL:	4 DUs		
		% Impctd DUs w/ 5 dB IL:	0.0%		% Impctd DUs w/ 5 dB IL:	16.7%			% Impctd DUs w/ 5 dB IL:	33.3%			% Impctd DUs w/ 5 dB IL:	33.3%			% Impctd DUs w/ 5 dB IL:	66.7%			% Impctd DUs w/ 5 dB IL:	66.7%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0 DUs		[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	0 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	3 DUs		Total [1]+[2] for cost:	4 DUs			Total [1]+[2] for cost:	4 DUs			Total [1]+[2] for cost:	4 DUs			Total [1]+[2] for cost:	4 DUs			Total [1]+[2] for cost:	5 DUs		
		Approx. Cost:	$843,427		Approx. Cost:	$1,012,113			Approx. Cost:	$1,180,798			Approx. Cost:	$1,349,483			Approx. Cost:	$1,518,169			Approx. Cost:	$1,686,855		
		Approx Cost per DU:	$281,142		Approx Cost per DU:	$253,028			Approx Cost per DU:	$295,200			Approx Cost per DU:	$337,371			Approx Cost per DU:	$379,542			Approx Cost per DU:	$337,371		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials 4/20/2007 JAC

Preliminary Noise Barrier Analysis: NSA-N3

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
N3_01	1		72.8	1	65.8	7.0	1	1	63.4	9.4	1	1	62.4	10.4	1	1	61.8	11.0	1	1	61.3	11.5	1	1	60.8	12.0	1	1
N3_02	1		72.6	1	67.1	5.5	1	1	63.3	9.3	1	1	61.9	10.7	1	1	60.9	11.7	1	1	60.0	12.6	1	1	59.3	13.3	1	1
N3_03_ST8	1		73.8	1	70.2	3.6	1	0	68.4	5.4	1	1	66.9	6.9	1	1	65.6	8.2	1	1	62.8	11.0	1	1	61.6	12.2	1	1
N3_04	1		68.5	1	65.8	2.7	1	0	64.7	3.8	1	0	63.6	4.9	1	1	62.6	5.9	1	1	61.6	6.9	1	1	60.9	7.6	1	1
N3_11	2		65.0	0	62.1	2.9	2	0	61.6	3.4	2	0	60.8	4.2	2	0	59.9	5.1	2	2	58.6	6.4	2	2	57.2	7.8	2	2
N3_05	1		64.8	0	62.6	2.2	0	0	61.6	3.2	1	0	60.9	3.9	1	0	60.3	4.5	1	1	59.5	5.3	1	1	58.9	5.9	1	1
N3_06	1		66.1	1	63.2	2.9	1	0	62.8	3.3	1	0	62.1	4.0	1	0	61.5	4.6	1	1	60.9	5.2	1	1	60.3	5.8	1	1
N3_07	1		65.3	0	62.7	2.6	1	0	61.9	3.4	1	0	60.8	4.5	1	1	59.4	5.9	1	1	58.1	7.2	1	1	57.4	7.9	1	1
N3_08	1		66.2	1	64.5	1.7	0	0	63.6	2.6	1	0	62.8	3.4	1	0	62.0	4.2	1	0	60.9	5.3	1	1	60.1	6.1	1	1
N3_12	2		62.5	0	59.9	2.6	2	0	59.4	3.1	2	0	58.8	3.7	2	0	58.2	4.3	2	0	57.5	5.0	2	2	56.7	5.8	2	2
N3_10	1		66.4	1	64.2	2.2	0	0	63.6	2.8	1	0	63.0	3.4	1	0	62.5	3.9	1	0	61.9	4.5	1	1	61.6	4.8	1	1
N3_09	1		62.6	0	60.1	2.5	1	0	59.8	2.8	1	0	59.0	3.6	1	0	58.1	4.5	1	1	57.6	5.0	1	1	57.3	5.3	1	1

# of impacted DUs:	**7**	Avg. Insertion Loss:	3.1 dB		Avg. Insertion Loss:	4.2 dB			Avg. Insertion Loss:	5.1 dB			Avg. Insertion Loss:	5.9 dB			Avg. Insertion Loss:	7.0 dB			Avg. Insertion Loss:	7.7 dB		
		Max. Insertion Loss:	7.0 dB		Max. Insertion Loss:	9.4 dB			Max. Insertion Loss:	10.7 dB			Max. Insertion Loss:	11.7 dB			Max. Insertion Loss:	12.6 dB			Max. Insertion Loss:	13.3 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	5 DUs		[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs			[1] Impctd w/ 3 dB IL:	7 DUs		
		Impctd w/ 5 dB IL:	2 DUs		Impctd w/ 5 dB IL:	3 DUs			Impctd w/ 5 dB IL:	4 DUs			Impctd w/ 5 dB IL:	5 DUs			Impctd w/ 5 dB IL:	7 DUs			Impctd w/ 5 dB IL:	7 DUs		
		% Impctd DUs w/ 5 dB IL:	28.6%		% Impctd DUs w/ 5 dB IL:	42.9%			% Impctd DUs w/ 5 dB IL:	57.1%			% Impctd DUs w/ 5 dB IL:	71.4%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0 DUs		[2] Non-impctd w/ 5 dB IL:	0 DUs			[2] Non-impctd w/ 5 dB IL:	1 DUs			[2] Non-impctd w/ 5 dB IL:	5 DUs			[2] Non-impctd w/ 5 dB IL:	7 DUs			[2] Non-impctd w/ 5 dB IL:	7 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	5 DUs		Total [1]+[2] for cost:	7 DUs			Total [1]+[2] for cost:	8 DUs			Total [1]+[2] for cost:	12 DUs			Total [1]+[2] for cost:	14 DUs			Total [1]+[2] for cost:	14 DUs		
		Approx. Cost:	$1,315,096		Approx. Cost:	$1,578,116			Approx. Cost:	$1,841,135			Approx. Cost:	$2,104,154			Approx. Cost:	$2,367,174			Approx. Cost:	$2,630,194		
		Approx Cost per DU:	$263,019		Approx Cost per DU:	$225,445			Approx Cost per DU:	$230,142			Approx Cost per DU:	$175,346			Approx Cost per DU:	$169,084			Approx Cost per DU:	$187,871		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials ADD 5/17/2007

Preliminary Noise Barrier Analysis: NSA-N4

Receiver	No. of Dwelling Units	Description	No Barrier Leq(dBA)	No Barrier No. of DUs 66+ dBA	10-foot Barrier Leq(dBA)	10-foot Barrier IL (dB)	10-foot Barrier IL 3+ (dB)	10-foot Barrier IL 5+ (dB)	12-foot Barrier Leq(dBA)	12-foot Barrier IL (dB)	12-foot Barrier IL 3+ (dB)	12-foot Barrier IL 5+ (dB)	14-foot Barrier Leq(dBA)	14-foot Barrier IL (dB)	14-foot Barrier IL 3+ (dB)	14-foot Barrier IL 5+ (dB)	16-foot Barrier Leq(dBA)	16-foot Barrier IL (dB)	16-foot Barrier IL 3+ (dB)	16-foot Barrier IL 5+ (dB)	18-foot Barrier Leq(dBA)	18-foot Barrier IL (dB)	18-foot Barrier IL 3+ (dB)	18-foot Barrier IL 5+ (dB)	20-foot Barrier Leq(dBA)	20-foot Barrier IL (dB)	20-foot Barrier IL 3+ (dB)	20-foot Barrier IL 5+ (dB)
N4_01	1		71.7	1	66.5	5.2	1	1	65.8	5.9	1	1	63.6	8.1	1	1	62.4	9.3	1	1	61.7	10.0	1	1	61.2	10.5	1	1
N4_02	1		72.1	1	67.6	4.5	1	1	67.0	5.1	1	1	65.6	6.5	1	1	62.7	9.4	1	1	61.7	10.4	1	1	60.8	11.3	1	1
N4_03_LT2	1		71.0	1	66.2	4.8	1	1	65.1	5.9	1	1	62.3	8.7	1	1	61.3	9.7	1	1	60.5	10.5	1	1	59.8	11.2	1	1
N4_04	1		73.9	1	67.2	6.7	1	1	66.0	7.9	1	1	64.7	9.2	1	1	63.4	10.5	1	1	62.6	11.3	1	1	61.6	12.3	1	1
N4_05_ST13	3		67.2	3	63.7	3.5	3	0	63.2	4.0	3	0	62.1	5.1	3	3	60.8	6.4	3	3	60.1	7.1	3	3	59.6	7.6	3	3
N4_06	1		65.0	0	63.5	1.5	0	0	62.8	2.2	0	0	62.3	2.7	1	0	62.0	3.0	1	0	61.7	3.3	1	0	61.4	3.6	1	0
N4_07	5		66.0	5	64.2	1.8	0	0	64.0	2.0	0	0	63.6	2.4	0	0	63.2	2.8	5	0	62.8	3.2	5	0	62.7	3.3	5	0
N4_08	2		64.2	0	62.6	1.6	0	0	62.4	1.8	0	0	62.0	2.2	0	0	61.7	2.5	2	0	61.5	2.7	2	0	61.4	2.8	2	0
N4_09	2		64.9	0	62.2	2.7	2	0	61.6	3.3	2	0	60.9	4.0	2	0	60.0	4.9	2	2	59.4	5.5	2	2	59.0	5.9	2	2
N4_10	2		63.7	0	60.4	3.3	2	0	59.8	3.9	2	0	57.8	5.9	2	2	56.7	7.0	2	2	55.9	7.8	2	2	55.2	8.5	2	2
N4_11	2		60.0	0	58.4	1.6	0	0	58.2	1.8	0	0	57.9	2.1	0	0	57.5	2.5	2	0	57.3	2.7	2	0	57.0	3.0	2	0
N4_12	1		58.8	0	57.9	0.9	0	0	57.7	1.1	0	0	57.5	1.3	0	0	57.4	1.4	0	0	57.3	1.5	0	0	57.2	1.6	0	0
N4_13	1		60.8	0	59.9	0.9	0	0	59.8	1.0	0	0	59.7	1.1	0	0	59.5	1.3	0	0	59.3	1.5	0	0	59.2	1.6	0	0
N4_14	1		59.2	0	57.3	1.9	0	0	56.9	2.3	0	0	56.3	2.9	1	0	55.6	3.6	1	0	55.1	4.1	1	0	54.6	4.6	1	1
N4_15_ST12	4		61.6	0	60.1	1.5	0	0	59.9	1.7	0	0	59.6	2.0	0	0	59.1	2.5	4	0	58.8	2.8	4	0	58.7	2.9	4	0

# of impacted DUs:	**12**					
		Avg. Insertion Loss: 2.5 dB	Avg. Insertion Loss: 2.9 dB	Avg. Insertion Loss: 3.7 dB	Avg. Insertion Loss: 4.5 dB	Avg. Insertion Loss: 4.9 dB	Avg. Insertion Loss: 5.3 dB
		Max. Insertion Loss: 6.7 dB	Max. Insertion Loss: 7.9 dB	Max. Insertion Loss: 9.2 dB	Max. Insertion Loss: 10.5 dB	Max. Insertion Loss: 11.3 dB	Max. Insertion Loss: 12.3 dB
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL: 7 DUs	[1] Impctd w/ 3 dB IL: 7 DUs	[1] Impctd w/ 3 dB IL: 7 DUs	[1] Impctd w/ 3 dB IL: 12 DUs	[1] Impctd w/ 3 dB IL: 12 DUs	[1] Impctd w/ 3 dB IL: 12 DUs
		Impctd w/ 5 dB IL: 4 DUs	Impctd w/ 5 dB IL: 4 DUs	Impctd w/ 5 dB IL: 7 DUs	Impctd w/ 5 dB IL: 7 DUs	Impctd w/ 5 dB IL: 7 DUs	Impctd w/ 5 dB IL: 7 DUs
		% Impctd DUs w/ 5 dB IL: 33.3%	% Impctd DUs w/ 5 dB IL: 33.3%	% Impctd DUs w/ 5 dB IL: 58.3%	% Impctd DUs w/ 5 dB IL: 58.3%	% Impctd DUs w/ 5 dB IL: 58.3%	% Impctd DUs w/ 5 dB IL: 58.3%
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL: 0 DUs	[2] Non-impctd w/ 5 dB IL: 0 DUs	[2] Non-impctd w/ 5 dB IL: 2 DUs	[2] Non-impctd w/ 5 dB IL: 4 DUs	[2] Non-impctd w/ 5 dB IL: 4 DUs	[2] Non-impctd w/ 5 dB IL: 5 DUs
Total DUs for cost reasonableness:		Total [1]+[2] for cost: 7 DUs	Total [1]+[2] for cost: 7 DUs	Total [1]+[2] for cost: 9 DUs	Total [1]+[2] for cost: 16 DUs	Total [1]+[2] for cost: 16 DUs	Total [1]+[2] for cost: 17 DUs
		Approx. Cost: $917,147	Approx. Cost: $1,100,577	Approx. Cost: $1,284,006	Approx. Cost: $1,467,436	Approx. Cost: $1,650,865	Approx. Cost: $1,834,295
		Approx Cost per DU: $131,021	Approx Cost per DU: $157,225	Approx Cost per DU: $142,667	Approx Cost per DU: $91,715	Approx Cost per DU: $103,179	Approx Cost per DU: $107,900

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
4/17/2007 ADD

Preliminary Noise Barrier Analysis: NSA-N5

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
N5_01_ST16	0		72.7	0	66.6	6.1	0	0	65.9	6.8	0	0	65.4	7.3	0	0	65.0	7.7	0	0	64.8	7.9	0	0	64.5	8.2	0	0
N5_02	0		73.4	0	66.1	7.3	0	0	64.1	9.3	0	0	63.3	10.1	0	0	62.7	10.7	0	0	62.3	11.1	0	0	61.9	11.5	0	0
N5_P1	0		74.6	0	74.6	0.0	0	0	74.6	0.0	0	0	74.6	0.0	0	0	74.6	0.0	0	0	74.6	0.0	0	0	74.6	0.0	0	0
N5_P2	0		67.6	0	67.6	0.0	0	0	67.6	0.0	0	0	67.6	0.0	0	0	67.6	0.0	0	0	67.6	0.0	0	0	67.6	0.0	0	0
N5_P3	0		62.2	0	62.1	0.1	0	0	62.1	0.1	0	0	62.1	0.1	0	0	62.1	0.1	0	0	62.0	0.2	0	0	62.0	0.2	0	0
N5_P4	0		70.2	0	70.2	0.0	0	0	70.2	0.0	0	0	70.2	0.0	0	0	70.2	0.0	0	0	70.2	0.0	0	0	70.2	0.0	0	0
N5_P5	0		68.1	0	68.1	0.0	0	0	68.1	0.0	0	0	68.1	0.0	0	0	68.1	0.0	0	0	68.1	0.0	0	0	68.1	0.0	0	0
N5_P6	0		62.9	0	62.9	0.0	0	0	62.9	0.0	0	0	62.9	0.0	0	0	62.9	0.0	0	0	62.9	0.0	0	0	62.9	0.0	0	0
N5_P7	0		59.4	0	59.2	0.2	0	0	59.2	0.2	0	0	59.2	0.2	0	0	59.2	0.2	0	0	59.1	0.3	0	0	59.1	0.3	0	0
N5_P8	0		59.1	0	59.1	0.0	0	0	59.1	0.0	0	0	59.1	0.0	0	0	59.1	0.0	0	0	59.1	0.0	0	0	59.1	0.0	0	0

# of impacted DUs:	**0**	Avg. Insertion Loss:		dB	Avg. Insertion Loss:		dB		Avg. Insertion Loss:		dB		Avg. Insertion Loss:		dB		Avg. Insertion Loss:		dB		Avg. Insertion Loss:		dB		Avg. Insertion Loss:		dB	
		Max. Insertion Loss:	7.3	dB	Max. Insertion Loss:	9.3	dB		Max. Insertion Loss:	10.1	dB		Max. Insertion Loss:	10.7	dB		Max. Insertion Loss:	11.1	dB		Max. Insertion Loss:	11.5	dB	
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	0	DUs	[1] Impctd w/ 3 dB IL:	0	DUs		[1] Impctd w/ 3 dB IL:	0	DUs		[1] Impctd w/ 3 dB IL:	0	DUs		[1] Impctd w/ 3 dB IL:	0	DUs		[1] Impctd w/ 3 dB IL:	0	DUs		[1] Impctd w/ 3 dB IL:	0	DUs	
		Impctd w/ 5 dB IL:	0	DUs	Impctd w/ 5 dB IL:	0	DUs		Impctd w/ 5 dB IL:	0	DUs		Impctd w/ 5 dB IL:	0	DUs		Impctd w/ 5 dB IL:	0	DUs		Impctd w/ 5 dB IL:	0	DUs		Impctd w/ 5 dB IL:	0	DUs	
		% Impctd DUs w/ 5 dB IL:	0.0%		% Impctd DUs w/ 5 dB IL:	0.0%			% Impctd DUs w/ 5 dB IL:	0.0%			% Impctd DUs w/ 5 dB IL:	0.0%			% Impctd DUs w/ 5 dB IL:	0.0%			% Impctd DUs w/ 5 dB IL:	0.0%			% Impctd DUs w/ 5 dB IL:	0.0%	
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0	DUs	[2] Non-impctd w/ 5 dB IL:	0	DUs		[2] Non-impctd w/ 5 dB IL:	0	DUs		[2] Non-impctd w/ 5 dB IL:	0	DUs		[2] Non-impctd w/ 5 dB IL:	0	DUs		[2] Non-impctd w/ 5 dB IL:	0	DUs		[2] Non-impctd w/ 5 dB IL:	0	DUs	
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	0	DUs	Total [1]+[2] for cost:	0	DUs		Total [1]+[2] for cost:	0	DUs		Total [1]+[2] for cost:	0	DUs		Total [1]+[2] for cost:	0	DUs		Total [1]+[2] for cost:	0	DUs		Total [1]+[2] for cost:	0	DUs	
		Approx. Cost:	$357,952		Approx. Cost:	$429,542			Approx. Cost:	$501,132			Approx. Cost:	$572,723			Approx. Cost:	$644,313			Approx. Cost:	$715,904		
		Approx Cost per DU:	NA		Approx Cost per DU:	NA			Approx Cost per DU:	NA			Approx Cost per DU:	NA			Approx Cost per DU:	NA			Approx Cost per DU:	NA		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials 5/16/2007 ADD

Preliminary Noise Barrier Analysis: NSA-N6

Receiver	No. of Dwelling Units	Description	No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
			Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
N6_01	1		65.4	0	62.2	3.2	1	0	61.1	4.3	1	0	60.8	4.6	1	1	60.5	4.9	1	1	60.3	5.1	1	1	60.1	5.3	1	1
N6_02	1		72.8	1	65.7	7.1	1	1	63.9	8.9	1	1	63.1	9.7	1	1	62.6	10.2	1	1	62.1	10.7	1	1	61.7	11.1	1	1
N6_03	3		70.8	3	65.0	5.8	3	3	62.9	7.9	3	3	62.1	8.7	3	3	61.5	9.3	3	3	60.9	9.9	3	3	60.4	10.4	3	3
N6_04_LT4	4		69.7	4	64.7	5.0	4	4	62.4	7.3	4	4	61.5	8.2	4	4	60.8	8.9	4	4	60.1	9.6	4	4	59.5	10.2	4	4
N6_05	3		67.5	3	62.6	4.9	3	3	60.5	7.0	3	3	59.4	8.1	3	3	58.7	8.8	3	3	58.1	9.4	3	3	57.5	10.0	3	3
N6_06	1		66.4	1	61.6	4.8	1	1	59.6	6.8	1	1	58.8	7.6	1	1	58.1	8.3	1	1	57.5	8.9	1	1	56.9	9.5	1	1
N6_07	2		64.7	0	60.0	4.7	2	2	58.4	6.3	2	2	57.6	7.1	2	2	56.9	7.8	2	2	56.4	8.3	2	2	55.8	8.9	2	2
N6_08	1		70.4	1	63.0	7.4	1	1	62.1	8.3	1	1	61.3	9.1	1	1	60.6	9.8	1	1	60.1	10.3	1	1	59.5	10.9	1	1
N6_09	1		65.7	1	59.9	5.8	1	1	58.5	7.2	1	1	57.6	8.1	1	1	56.9	8.8	1	1	56.3	9.4	1	1	55.7	10.0	1	1
N6_10	1		67.7	1	61.1	6.6	1	1	60.1	7.6	1	1	59.4	8.3	1	1	58.8	8.9	1	1	58.2	9.5	1	1	57.7	10.0	1	1
N6_11	2		67.9	2	61.7	6.2	2	2	60.9	7.0	2	2	60.3	7.6	2	2	59.7	8.2	2	2	59.3	8.6	2	2	58.8	9.1	2	2
N6_12_ST22	3		72.5	3	65.4	7.1	3	3	63.3	9.2	3	3	62.3	10.2	3	3	61.5	11.0	3	3	60.7	11.8	3	3	60.1	12.4	3	3
N6_13	3		71.1	3	64.3	6.8	3	3	63.2	7.9	3	3	62.3	8.8	3	3	61.6	9.5	3	3	61.0	10.1	3	3	60.4	10.7	3	3
N6_14	1		71.6	1	65.8	5.8	1	1	63.8	7.8	1	1	62.9	8.7	1	1	62.3	9.3	1	1	61.7	9.9	1	1	61.2	10.4	1	1
N6_15_ST23	1		67.1	1	64.6	2.5	1	0	63.7	3.4	1	0	63.3	3.8	1	0	63.0	4.1	1	0	62.8	4.3	1	0	62.6	4.5	1	1
N6_16	2		61.3	0	58.1	3.2	2	0	57.0	4.3	2	0	56.7	4.6	2	2	56.4	4.9	2	2	56.2	5.1	2	2	56.0	5.3	2	2
N6_17	4		65.2	0	61.0	4.2	4	0	58.9	6.3	4	4	58.3	6.9	4	4	57.8	7.4	4	4	57.4	7.8	4	4	57.1	8.1	4	4
N6_18_ST19	4		64.1	0	60.6	3.5	4	0	58.0	6.1	4	4	57.0	7.1	4	4	56.2	7.9	4	4	55.7	8.4	4	4	55.3	8.8	4	4
N6_19	2		63.9	0	60.9	3.0	2	0	58.2	5.7	2	2	57.2	6.7	2	2	56.5	7.4	2	2	55.9	8.0	2	2	55.4	8.5	2	2
N6_20	2		63.1	0	59.1	4.0	2	0	57.1	6.0	2	2	56.2	6.9	2	2	55.6	7.5	2	2	55.1	8.0	2	2	54.6	8.5	2	2
N6_21	2		62.0	0	58.0	4.0	2	0	56.0	6.0	2	2	55.1	6.9	2	2	54.5	7.5	2	2	54.0	8.0	2	2	53.5	8.5	2	2
N6_22	6		66.3	6	62.1	4.2	6	0	60.2	6.1	6	6	59.1	7.2	6	6	58.3	8.0	6	6	57.5	8.8	6	6	56.8	9.5	6	6
N6_23	2		65.4	0	62.6	2.8	2	0	61.2	4.2	2	0	60.7	4.7	2	2	60.3	5.1	2	2	59.9	5.5	2	2	59.7	5.7	2	2
N6_24	1		66.3	1	63.4	2.9	1	0	62.2	4.1	1	0	61.6	4.7	1	1	61.1	5.2	1	1	60.7	5.6	1	1	60.4	5.9	1	1
N6_25	3		65.3	0	61.4	3.9	3	0	59.3	6.0	3	3	58.8	6.5	3	3	58.4	6.9	3	3	58.2	7.1	3	3	57.9	7.4	3	3
N6_26	3		61.7	0	58.4	3.3	3	0	56.3	5.4	3	3	55.6	6.1	3	3	55.1	6.6	3	3	54.7	7.0	3	3	54.8	6.9	3	3
N6_27	3		64.5	0	61.0	3.5	3	0	58.3	6.2	3	3	56.4	8.1	3	3	55.5	9.0	3	3	54.9	9.6	3	3	54.3	10.2	3	3
N6_28	4		61.8	0	58.2	3.6	4	0	56.5	5.3	4	4	55.3	6.5	4	4	54.6	7.2	4	4	54.2	7.6	4	4	53.7	8.1	4	4
N6_29	3		60.0	0	57.0	3.0	3	0	56.1	3.9	3	0	55.3	4.7	3	3	54.8	5.2	3	3	54.4	5.6	3	3	53.9	6.1	3	3
N6_30	4		60.5	0	57.5	3.0	4	0	56.4	4.1	4	0	55.8	4.7	4	4	55.3	5.2	4	4	54.9	5.6	4	4	54.7	5.8	4	4
N6_31	4		59.9	0	58.3	1.6	0	0	57.7	2.2	0	0	57.5	2.4	0	0	57.3	2.6	4	0	57.0	2.9	4	0	56.9	3.0	4	0

# of impacted DUs:	**32**	Avg. Insertion Loss:	4.2 dB	Avg. Insertion Loss:	6.0 dB	Avg. Insertion Loss:	6.8 dB	Avg. Insertion Loss:	7.4 dB	Avg. Insertion Loss:	7.9 dB	Avg. Insertion Loss:	8.3 dB
		Max. Insertion Loss:	7.4 dB	Max. Insertion Loss:	9.2 dB	Max. Insertion Loss:	10.2 dB	Max. Insertion Loss:	11.0 dB	Max. Insertion Loss:	11.8 dB	Max. Insertion Loss:	12.4 dB
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	32 DUs	[1] Impctd w/ 3 dB IL:	32 DUs	[1] Impctd w/ 3 dB IL:	32 DUs	[1] Impctd w/ 3 dB IL:	32 DUs	[1] Impctd w/ 3 dB IL:	32 DUs	[1] Impctd w/ 3 dB IL:	32 DUs
		Impctd w/ 5 dB IL:	24 DUs	Impctd w/ 5 dB IL:	30 DUs	Impctd w/ 5 dB IL:	31 DUs	Impctd w/ 5 dB IL:	31 DUs	Impctd w/ 5 dB IL:	31 DUs	Impctd w/ 5 dB IL:	32 DUs
		% Impctd DUs w/ 5 dB IL:	75.0%	% Impctd DUs w/ 5 dB IL:	93.8%	% Impctd DUs w/ 5 dB IL:	96.9%	% Impctd DUs w/ 5 dB IL:	96.9%	% Impctd DUs w/ 5 dB IL:	96.9%	% Impctd DUs w/ 5 dB IL:	100.0%
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	2 DUs	[2] Non-impctd w/ 5 dB IL:	29 DUs	[2] Non-impctd w/ 5 dB IL:	41 DUs	[2] Non-impctd w/ 5 dB IL:	41 DUs	[2] Non-impctd w/ 5 dB IL:	41 DUs	[2] Non-impctd w/ 5 dB IL:	41 DUs
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	34 DUs	Total [1]+[2] for cost:	61 DUs	Total [1]+[2] for cost:	73 DUs	Total [1]+[2] for cost:	73 DUs	Total [1]+[2] for cost:	73 DUs	Total [1]+[2] for cost:	73 DUs
		Approx. Cost:	$1,190,481	Approx. Cost:	$1,428,576	Approx. Cost:	$1,666,673	Approx. Cost:	$1,904,770	Approx. Cost:	$2,142,865	Approx. Cost:	$2,380,961
		Approx Cost per DU:	$35,014	Approx Cost per DU:	$23,419	Approx Cost per DU:	$22,831	Approx Cost per DU:	$26,093	Approx Cost per DU:	$29,354	Approx Cost per DU:	$32,616

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials JAC 4/18/2007

Preliminary Noise Barrier Analysis: NSA-S1

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S1_01	2		66.1	2	60.5	5.6	2	2	60.0	6.1	2	2	62.5	3.6	2	0	59.4	6.7	2	2	59.2	6.9	2	2	59.0	7.1	2	2
S1_02_ST1	3		67.5	3	62.0	5.5	3	3	61.6	5.9	3	3	61.6	5.9	3	3	61.1	6.4	3	3	60.9	6.6	3	3	60.7	6.8	3	3
S1_03	6		67.3	6	61.4	5.9	6	6	60.9	6.4	6	6	60.6	6.7	6	6	60.3	7.0	6	6	60.1	7.2	6	6	59.9	7.4	6	6
S1_04	1		68.0	1	62.9	5.1	1	1	62.5	5.5	1	1	62.2	5.8	1	1	62.0	6.0	1	1	61.8	6.2	1	1	61.7	6.3	1	1
S1_05	1		67.8	1	64.6	3.2	1	0	64.4	3.4	1	0	64.2	3.6	1	0	64.1	3.7	1	0	64.0	3.8	1	0	63.9	3.9	1	0
S1_06	1		68.2	1	63.1	5.1	1	1	62.2	6.0	1	1	61.6	6.6	1	1	61.1	7.1	1	1	60.7	7.5	1	1	60.3	7.9	1	1
S1_07_ST3	1		69.7	1	63.8	5.9	1	1	62.7	7.0	1	1	61.9	7.8	1	1	61.3	8.4	1	1	60.8	8.9	1	1	60.3	9.4	1	1
S1_08	1		65.0	0	61.2	3.8	1	0	60.7	4.3	1	0	60.3	4.7	1	1	60.1	4.9	1	1	59.9	5.1	1	1	59.7	5.3	1	1
S1_09	1		66.4	1	60.4	6.0	1	1	59.7	6.7	1	1	59.2	7.2	1	1	58.9	7.5	1	1	58.5	7.9	1	1	58.2	8.2	1	1
S1_10	1		67.5	1	61.5	6.0	1	1	60.9	6.6	1	1	60.4	7.1	1	1	60.1	7.4	1	1	59.8	7.7	1	1	59.5	8.0	1	1
S1_11	1		70.5	1	63.6	6.9	1	1	62.8	7.7	1	1	62.0	8.5	1	1	61.5	9.0	1	1	61.0	9.5	1	1	60.6	9.9	1	1
S1_12	4		68.6	4	62.9	5.7	4	4	62.0	6.6	4	4	61.4	7.2	4	4	61.0	7.6	4	4	60.6	8.0	4	4	60.2	8.4	4	4
S1_13	1		68.8	1	63.2	5.6	1	1	62.0	6.8	1	1	61.2	7.6	1	1	60.6	8.2	1	1	60.0	8.8	1	1	59.6	9.2	1	1
S1_14	1		67.1	1	60.7	6.4	1	1	59.8	7.3	1	1	59.2	7.9	1	1	58.7	8.4	1	1	58.2	8.9	1	1	57.9	9.2	1	1
S1_15_LT1	3		66.4	3	60.5	5.9	3	3	59.5	6.9	3	3	58.8	7.6	3	3	58.3	8.1	3	3	57.8	8.6	3	3	57.4	9.0	3	3
S1_16	5		63.9	0	59.5	4.4	5	0	58.3	5.6	5	5	57.6	6.3	5	5	57.1	6.8	5	5	56.7	7.2	5	5	56.3	7.6	5	5
S1_17	1		69.1	1	62.3	6.8	1	1	61.6	7.5	1	1	61.0	8.1	1	1	60.5	8.6	1	1	60.2	8.9	1	1	59.7	9.4	1	1
S1_18	1		59.2	0	53.1	6.1	1	1	52.1	7.1	1	1	51.5	7.7	1	1	51.0	8.2	1	1	50.6	8.6	1	1	50.3	8.9	1	1
S1_19	2		69.1	2	67.4	1.7	0	0	67.3	1.8	0	0	67.2	1.9	0	0	67.2	1.9	0	0	67.2	1.9	0	0	67.1	2.0	0	0
S1_20	4		63.4	0	60.2	3.2	4	0	59.7	3.7	4	0	59.4	4.0	4	0	59.2	4.2	4	0	59.1	4.3	4	0	58.9	4.5	4	4
S1_21	2		65.0	0	63.5	1.5	0	0	63.3	1.7	0	0	63.2	1.8	0	0	63.1	1.9	0	0	63.0	2.0	0	0	63.0	2.0	0	0
S1_22	1		62.5	0	60.1	2.4	0	0	59.8	2.7	1	0	59.6	2.9	1	0	59.5	3.0	1	0	59.4	3.1	1	0	59.3	3.2	1	0
S1_23	1		66.8	1	64.7	2.1	0	0	64.5	2.3	0	0	64.4	2.4	0	0	64.3	2.5	1	0	64.3	2.5	1	0	64.2	2.6	1	0
S1_24	1		66.9	1	64.2	2.7	1	0	63.9	3.0	1	0	63.8	3.1	1	0	63.7	3.2	1	0	63.6	3.3	1	0	63.5	3.4	1	0
S1_25	2		65.4	0	61.9	3.5	2	0	61.5	3.9	2	0	61.2	4.2	2	0	61.1	4.3	2	0	60.9	4.5	2	2	60.8	4.6	2	2
S1_26	2		64.6	0	62.0	2.6	2	0	61.6	3.0	2	0	61.4	3.2	2	0	61.3	3.3	2	0	61.2	3.4	2	0	61.1	3.5	2	0
S1_27	1		64.8	0	61.8	3.0	1	0	61.4	3.4	1	0	61.2	3.6	1	0	61.1	3.7	1	0	61.0	3.8	1	0	60.9	3.9	1	0
S1_28	2		61.6	0	56.2	5.4	2	2	55.3	6.3	2	2	54.7	6.9	2	2	54.3	7.3	2	2	54.0	7.6	2	2	53.8	7.8	2	2
S1_29	2		63.4	0	61.0	2.4	0	0	60.8	2.6	2	0	60.6	2.8	2	0	60.5	2.9	2	0	60.4	3.0	2	0	60.3	3.1	2	0
S1_30	2		59.7	0	54.1	5.6	2	2	53.2	6.5	2	2	52.6	7.1	2	2	52.3	7.4	2	2	51.9	7.8	2	2	51.8	7.9	2	2
S1_31	1		60.7	0	56.6	4.1	1	0	55.9	4.8	1	1	55.5	5.2	1	1	55.2	5.5	1	1	55.0	5.7	1	1	54.9	5.8	1	1
S1_32_ST6	5		60.8	0	58.7	2.1	0	0	58.4	2.4	0	0	58.3	2.5	5	0	58.2	2.6	5	0	58.1	2.7	5	0	58.0	2.8	5	0
S1_33	1		64.3	0	60.8	3.5	1	0	60.4	3.9	1	0	60.2	4.1	1	0	60.1	4.2	1	0	60.0	4.3	1	0	59.9	4.4	1	0
S1_34	2		60.7	0	57.1	3.6	2	0	54.5	6.2	2	2	53.7	7.0	2	2	53.1	7.6	2	2	52.6	8.1	2	2	52.2	8.5	2	2
S1_35	1		59.7	0	54.5	5.2	1	1	53.6	6.1	1	1	53.1	6.6	1	1	52.7	7.0	1	1	52.4	7.3	1	1	52.2	7.5	1	1
S1_36	2		60.5	0	56.7	3.8	2	0	54.0	6.5	2	2	53.2	7.3	2	2	52.6	7.9	2	2	52.1	8.4	2	2	51.7	8.8	2	2
S1_37	2		58.5	0	53.1	5.4	2	2	51.6	6.9	2	2	50.9	7.6	2	2	50.5	8.0	2	2	50.1	8.4	2	2	49.9	8.6	2	2
S1_38	6		57.8	0	55.0	2.8	6	0	53.5	4.3	6	0	53.1	4.7	6	6	52.9	4.9	6	6	52.7	5.1	6	6	52.5	5.3	6	6
S1_39	1		60.8	0	56.0	4.8	1	1	55.3	5.5	1	1	55.0	5.8	1	1	54.7	6.1	1	1	54.5	6.3	1	1	54.4	6.4	1	1

# of impacted DUs:	**32**	Avg. Insertion Loss:	4.2 dB	Avg. Insertion Loss:	5.1 dB	Avg. Insertion Loss:	5.4 dB	Avg. Insertion Loss:	5.8 dB	Avg. Insertion Loss:	6.0 dB	Avg. Insertion Loss:	6.3 dB
		Max. Insertion Loss:	6.9 dB	Max. Insertion Loss:	7.7 dB	Max. Insertion Loss:	8.5 dB	Max. Insertion Loss:	9.0 dB	Max. Insertion Loss:	9.5 dB	Max. Insertion Loss:	9.9 dB
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	29 DUs	[1] Impctd w/ 3 dB IL:	29 DUs	[1] Impctd w/ 3 dB IL:	29 DUs	[1] Impctd w/ 3 dB IL:	30 DUs	[1] Impctd w/ 3 dB IL:	30 DUs	[1] Impctd w/ 3 dB IL:	30 DUs
		Impctd w/ 5 dB IL:	27 DUs	Impctd w/ 5 dB IL:	27 DUs	Impctd w/ 5 dB IL:	25 DUs	Impctd w/ 5 dB IL:	27 DUs	Impctd w/ 5 dB IL:	27 DUs	Impctd w/ 5 dB IL:	27 DUs
		% Impctd DUs w/ 5 dB IL:	84.4%	% Impctd DUs w/ 5 dB IL:	84.4%	% Impctd DUs w/ 5 dB IL:	78.1%	% Impctd DUs w/ 5 dB IL:	84.4%	% Impctd DUs w/ 5 dB IL:	84.4%	% Impctd DUs w/ 5 dB IL:	84.4%
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	9 DUs	[2] Non-impctd w/ 5 dB IL:	19 DUs	[2] Non-impctd w/ 5 dB IL:	26 DUs	[2] Non-impctd w/ 5 dB IL:	26 DUs	[2] Non-impctd w/ 5 dB IL:	28 DUs	[2] Non-impctd w/ 5 dB IL:	32 DUs
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	38 DUs	Total [1]+[2] for cost:	48 DUs	Total [1]+[2] for cost:	55 DUs	Total [1]+[2] for cost:	56 DUs	Total [1]+[2] for cost:	58 DUs	Total [1]+[2] for cost:	62 DUs
		Approx. Cost:	$2,004,836	Approx. Cost:	$2,405,803	Approx. Cost:	$2,709,496	Approx. Cost:	$3,207,737	Approx. Cost:	$3,608,704	Approx. Cost:	$4,009,671
		Approx Cost per DU:	$52,759	Approx Cost per DU:	$50,121	Approx Cost per DU:	$49,264	Approx Cost per DU:	$57,281	Approx Cost per DU:	$62,219	Approx Cost per DU:	$64,672

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials **JAC 4/20/2007** **Revised 8/10/2007 JAC**

Preliminary Noise Barrier Analysis: NSA-S2

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S2_01	1		67.1	1	59.9	7.2	1	1	59.1	8.0	1	1	58.5	8.6	1	1	58.1	9.0	1	1	57.7	9.4	1	1	57.3	9.8	1	1
S2_02_ST7	0		70.3	0	63.3	7.0	0	0	62.0	8.3	0	0	61.1	9.2	0	0	60.4	9.9	0	0	59.7	10.6	0	0	59.2	11.1	0	0
S2_03	0		67.1	0	61.5	5.6	0	0	60.2	6.9	0	0	59.2	7.9	0	0	58.3	8.8	0	0	57.8	9.3	0	0	57.2	9.9	0	0
S2_04	1		63.4	0	57.5	5.9	1	1	56.8	6.6	1	1	56.3	7.1	1	1	56.0	7.4	1	1	55.7	7.7	1	1	55.4	8.0	1	1
S2_05	1		61.5	0	56.0	5.5	1	1	55.2	6.3	1	1	54.7	6.8	1	1	54.4	7.1	1	1	54.1	7.4	1	1	53.9	7.6	1	1
S2_06	1		58.1	0	55.8	2.3	0	0	53.8	4.3	1	0	53.0	5.1	1	1	52.5	5.6	1	1	52.0	6.1	1	1	51.7	6.4	1	1
S2_07	3		56.8	0	54.5	2.3	0	0	52.2	4.6	3	3	51.5	5.3	3	3	51.0	5.8	3	3	50.7	6.1	3	3	50.3	6.5	3	3
S2_08	1		54.7	0	52.5	2.2	0	0	51.1	3.6	1	0	50.5	4.2	1	0	50.1	4.6	1	1	49.7	5.0	1	1	49.4	5.3	1	1
S2_09	0		58.6	0	54.7	3.9	0	0	53.0	5.6	0	0	52.5	6.1	0	0	52.2	6.4	0	0	51.9	6.7	0	0	51.7	6.9	0	0
S2_10	0		62.3	0	58.9	3.4	0	0	56.3	6.0	0	0	55.5	6.8	0	0	54.9	7.4	0	0	54.4	7.9	0	0	54.0	8.3	0	0

# of impacted DUs:	**1**	Avg. Insertion Loss:	3.8	dB	Avg. Insertion Loss:	5.3	dB	Avg. Insertion Loss:	6.0	dB	Avg. Insertion Loss:	6.4	dB	Avg. Insertion Loss:	6.7	dB	Avg. Insertion Loss:	7.1	dB
		Max. Insertion Loss:	7.2	dB	Max. Insertion Loss:	8.3	dB	Max. Insertion Loss:	9.2	dB	Max. Insertion Loss:	9.9	dB	Max. Insertion Loss:	10.6	dB	Max. Insertion Loss:	11.1	dB
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	1	DUs	[1] Impctd w/ 3 dB IL:	1	DUs	[1] Impctd w/ 3 dB IL:	1	DUs	[1] Impctd w/ 3 dB IL:	1	DUs	[1] Impctd w/ 3 dB IL:	1	DUs	[1] Impctd w/ 3 dB IL:	1	DUs
		Impctd w/ 5 dB IL:	1	DUs	Impctd w/ 5 dB IL:	1	DUs	Impctd w/ 5 dB IL:	1	DUs	Impctd w/ 5 dB IL:	1	DUs	Impctd w/ 5 dB IL:	1	DUs	Impctd w/ 5 dB IL:	1	DUs
		% Impctd DUs w/ 5 dB IL:	100.0%		% Impctd DUs w/ 5 dB IL:	100.0%		% Impctd DUs w/ 5 dB IL:	100.0%		% Impctd DUs w/ 5 dB IL:	100.0%		% Impctd DUs w/ 5 dB IL:	100.0%		% Impctd DUs w/ 5 dB IL:	100.0%	
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	2	DUs	[2] Non-impctd w/ 5 dB IL:	5	DUs	[2] Non-impctd w/ 5 dB IL:	6	DUs	[2] Non-impctd w/ 5 dB IL:	7	DUs	[2] Non-impctd w/ 5 dB IL:	7	DUs	[2] Non-impctd w/ 5 dB IL:	7	DUs
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	3	DUs	Total [1]+[2] for cost:	6	DUs	Total [1]+[2] for cost:	7	DUs	Total [1]+[2] for cost:	8	DUs	Total [1]+[2] for cost:	8	DUs	Total [1]+[2] for cost:	8	DUs
		Approx. Cost:	$549,878		Approx. Cost:	$659,853		Approx. Cost:	$769,829		Approx. Cost:	$879,804		Approx. Cost:	$989,780		Approx. Cost:	$1,099,755	
		Approx Cost per DU:	$183,293		Approx Cost per DU:	$109,976		Approx Cost per DU:	$109,976		Approx Cost per DU:	$109,976		Approx Cost per DU:	$123,723		Approx Cost per DU:	$137,469	

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials JAC 5/16/2007

Preliminary Noise Barrier Analysis: NSA-S3

Receiver	No. of Dwelling Units	Description	No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
			Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S3_01	1		65.3	0	62.3	3.0	1	0	61.8	3.5	1	0	61.1	4.2	1	0	60.5	4.8	1	1	60.0	5.3	1	1	59.6	5.7	1	1
S3_02_ST9	2		68.6	2	64.7	3.9	2	0	63.4	5.2	2	2	61.9	6.7	2	2	60.7	7.9	2	2	59.8	8.8	2	2	59.0	9.6	2	2
S3_03	2		70.0	2	65.4	4.6	2	2	64.2	5.8	2	2	60.8	9.2	2	2	59.7	10.3	2	2	58.7	11.3	2	2	58.0	12.0	2	2
S3_04	1		69.1	1	64.0	5.1	1	1	60.4	8.7	1	1	59.0	10.1	1	1	58.0	11.1	1	1	57.2	11.9	1	1	56.4	12.7	1	1
S3_05	1		68.8	1	62.7	6.1	1	1	61.3	7.5	1	1	60.4	8.4	1	1	59.6	9.2	1	1	58.9	9.9	1	1	58.3	10.5	1	1
S3_06	4		64.2	0	60.5	3.7	4	0	59.5	4.7	4	4	58.8	5.4	4	4	57.9	6.3	4	4	57.1	7.1	4	4	56.4	7.8	4	4
S3_07	1		63.6	0	59.5	4.1	1	0	56.4	7.2	1	1	55.4	8.2	1	1	54.8	8.8	1	1	54.2	9.4	1	1	53.6	10.0	1	1
S3_08_ST10	1		68.2	1	63.3	4.9	1	1	60.1	8.1	1	1	59.0	9.2	1	1	58.2	10.0	1	1	57.4	10.8	1	1	56.8	11.4	1	1
S3_09	2		74.5	2	67.5	7.0	2	2	64.0	10.5	2	2	62.6	11.9	2	2	61.7	12.8	2	2	60.8	13.7	2	2	60.1	14.4	2	2
S3_10	2		60.7	0	59.3	1.4	0	0	59.0	1.7	0	0	58.5	2.2	0	0	58.2	2.5	2	0	58.0	2.7	2	0	57.9	2.8	2	0
S3_11	1		64.3	0	61.5	2.8	1	0	60.8	3.5	1	0	58.1	6.2	1	1	57.0	7.3	1	1	56.2	8.1	1	1	55.5	8.8	1	1
S3_12	3		64.8	0	60.8	4.0	3	0	60.4	4.4	3	0	56.9	7.9	3	3	56.0	8.8	3	3	55.5	9.3	3	3	54.9	9.9	3	3
S3_13	3		63.1	0	60.3	2.8	3	0	57.7	5.4	3	3	56.7	6.4	3	3	56.0	7.1	3	3	55.2	7.9	3	3	54.6	8.5	3	3
S3_14	3		61.3	0	58.5	2.8	3	0	55.4	5.9	3	3	54.4	6.9	3	3	53.7	7.6	3	3	53.1	8.2	3	3	52.5	8.8	3	3
S3_15	2		63.9	0	60.3	3.6	2	0	57.7	6.2	2	2	56.5	7.4	2	2	55.7	8.2	2	2	55.0	8.9	2	2	54.4	9.5	2	2
S3_16	1		67.0	1	63.1	3.9	1	0	62.6	4.4	1	0	61.2	5.8	1	1	60.8	6.2	1	1	60.4	6.6	1	1	60.2	6.8	1	1
S3_17	3		59.2	0	56.5	2.7	3	0	56.4	2.8	3	0	54.6	4.6	3	3	54.4	4.8	3	3	54.1	5.1	3	3	53.8	5.4	3	3
S3_18	2		63.3	0	59.4	3.9	2	0	59.1	4.2	2	0	56.0	7.3	2	2	55.2	8.1	2	2	54.7	8.6	2	2	54.3	9.0	2	2
S3_19	4		64.1	0	59.8	4.3	4	0	56.2	7.9	4	4	54.6	9.5	4	4	53.6	10.5	4	4	52.7	11.4	4	4	52.0	12.1	4	4
S3_20	2		57.4	0	54.2	3.2	2	0	51.2	6.2	2	2	50.1	7.3	2	2	49.6	7.8	2	2	49.3	8.1	2	2	49.1	8.3	2	2
S3_21	3		56.9	0	54.0	2.9	3	0	51.3	5.6	3	3	50.4	6.5	3	3	49.8	7.1	3	3	49.2	7.7	3	3	48.9	8.0	3	3
S3_22	3		61.6	0	58.2	3.4	3	0	56.1	5.5	3	3	55.0	6.6	3	3	54.4	7.2	3	3	53.8	7.8	3	3	53.4	8.2	3	3
S3_23	2		62.1	0	59.9	2.2	0	0	59.5	2.6	2	0	58.9	3.2	2	0	58.7	3.4	2	0	58.5	3.6	2	0	58.4	3.7	2	0
S3_24	5		55.9	0	53.9	2.0	0	0	52.7	3.2	5	0	52.3	3.6	5	0	51.9	4.0	5	0	51.6	4.3	5	0	51.3	4.6	5	5

# of impacted DUs:	**10**	Avg. Insertion Loss:	3.5 dB		Avg. Insertion Loss:	5.2 dB			Avg. Insertion Loss:	6.6 dB			Avg. Insertion Loss:	7.3 dB			Avg. Insertion Loss:	7.9 dB			Avg. Insertion Loss:	8.4 dB		
		Max. Insertion Loss:	7.0 dB		Max. Insertion Loss:	10.5 dB			Max. Insertion Loss:	11.9 dB			Max. Insertion Loss:	12.8 dB			Max. Insertion Loss:	13.7 dB			Max. Insertion Loss:	14.4 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	10 DUs		[1] Impctd w/ 3 dB IL:	10 DUs			[1] Impctd w/ 3 dB IL:	10 DUs			[1] Impctd w/ 3 dB IL:	10 DUs			[1] Impctd w/ 3 dB IL:	10 DUs			[1] Impctd w/ 3 dB IL:	10 DUs		
		Impctd w/ 5 dB IL:	7 DUs		Impctd w/ 5 dB IL:	9 DUs			Impctd w/ 5 dB IL:	10 DUs			Impctd w/ 5 dB IL:	10 DUs			Impctd w/ 5 dB IL:	10 DUs			Impctd w/ 5 dB IL:	10 DUs		
		% Impctd DUs w/ 5 dB IL:	70.0%		% Impctd DUs w/ 5 dB IL:	90.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0 DUs		[2] Non-impctd w/ 5 dB IL:	25 DUs			[2] Non-impctd w/ 5 dB IL:	34 DUs			[2] Non-impctd w/ 5 dB IL:	35 DUs			[2] Non-impctd w/ 5 dB IL:	35 DUs			[2] Non-impctd w/ 5 dB IL:	40 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	10 DUs		Total [1]+[2] for cost:	35 DUs			Total [1]+[2] for cost:	44 DUs			Total [1]+[2] for cost:	45 DUs			Total [1]+[2] for cost:	45 DUs			Total [1]+[2] for cost:	50 DUs		
		Approx. Cost:	$608,426		Approx. Cost:	$730,111			Approx. Cost:	$851,796			Approx. Cost:	$973,481			Approx. Cost:	$1,095,166			Approx. Cost:	$1,216,852		
		Approx Cost per DU:	$60,843		Approx Cost per DU:	$20,860			Approx Cost per DU:	$19,359			Approx Cost per DU:	$21,633			Approx Cost per DU:	$24,337			Approx Cost per DU:	$24,337		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials JAC 4/13/2007

Preliminary Noise Barrier Analysis: NSA-S4

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S4_1	2		75.6	2	67.6	8.0	2	2	65.4	10.2	2	2	64.1	11.5	2	2	63.1	12.5	2	2	62.3	13.3	2	2	61.5	14.1	2	2
S4_2	2		73.0	2	65.4	7.6	2	2	63.3	9.7	2	2	62.3	10.7	2	2	61.4	11.6	2	2	60.7	12.3	2	2	60.1	12.9	2	2
S4_3	1		74.9	1	67.9	7.0	1	1	64.3	10.6	1	1	62.9	12.0	1	1	61.9	13.0	1	1	61.0	13.9	1	1	60.4	14.5	1	1
S4_4	3		76.5	3	69.6	6.9	3	3	65.9	10.6	3	3	64.3	12.2	3	3	63.2	13.3	3	3	62.2	14.3	3	3	61.5	15.0	3	3
S4_5_ST11	10		70.3	10	64.1	6.2	10	10	62.3	8.0	10	10	61.1	9.2	10	10	60.2	10.1	10	10	59.4	10.9	10	10	58.6	11.7	10	10
S4_6	6		76.7	6	68.5	8.2	6	6	65.0	11.7	6	6	63.7	13.0	6	6	62.8	13.9	6	6	61.9	14.8	6	6	61.2	15.5	6	6
S4_7	2		76.3	2	68.2	8.1	2	2	64.9	11.4	2	2	63.6	12.7	2	2	62.7	13.6	2	2	61.9	14.4	2	2	61.3	15.0	2	2
S4_8	2		65.3	0	62.3	3.0	2	0	61.9	3.4	2	0	61.6	3.7	2	0	61.3	4.0	2	0	61.2	4.1	2	0	61.0	4.3	2	0
S4_9	1		67.8	1	61.7	6.1	1	1	60.9	6.9	1	1	59.2	8.6	1	1	58.3	9.5	1	1	57.6	10.2	1	1	57.0	10.8	1	1
S4_10	2		69.6	2	64.3	5.3	2	2	60.5	9.1	2	2	58.9	10.7	2	2	57.8	11.8	2	2	56.9	12.7	2	2	56.1	13.5	2	2
S4_11	6		70.7	6	65.9	4.8	6	6	62.0	8.7	6	6	60.4	10.3	6	6	59.3	11.4	6	6	58.3	12.4	6	6	57.5	13.2	6	6
S4_12	14		66.2	14	61.8	4.4	14	0	58.4	7.8	14	14	57.1	9.1	14	14	56.2	10.0	14	14	55.5	10.7	14	14	54.9	11.3	14	14
S4_13	6		63.8	0	57.8	6.0	6	6	56.1	7.7	6	6	55.4	8.4	6	6	54.9	8.9	6	6	54.2	9.6	6	6	53.8	10.0	6	6
S4_14	3		59.1	0	55.6	3.5	3	0	54.2	4.9	3	3	53.3	5.8	3	3	52.7	6.4	3	3	52.3	6.8	3	3	52.1	7.0	3	3
S4_15	2		61.7	0	57.6	4.1	2	0	57.3	4.4	2	0	54.7	7.0	2	2	54.3	7.4	2	2	53.9	7.8	2	2	53.7	8.0	2	2
S4_16	6		63.4	0	59.5	3.9	6	0	56.3	7.1	6	6	55.1	8.3	6	6	54.4	9.0	6	6	53.7	9.7	6	6	53.2	10.2	6	6
S4_17	6		61.2	0	58.1	3.1	6	0	56.1	5.1	6	6	55.0	6.2	6	6	54.3	6.9	6	6	53.6	7.6	6	6	53.1	8.1	6	6
S4_18	3		55.2	0	52.7	2.5	3	0	52.6	2.6	3	0	51.6	3.6	3	0	51.6	3.6	3	0	51.4	3.8	3	0	51.1	4.1	3	0
S4_19	4		60.3	0	56.3	4.0	4	0	55.9	4.4	4	0	52.4	7.9	4	4	51.7	8.6	4	4	51.3	9.0	4	4	50.9	9.4	4	4
S4_20	11		66.5	11	61.5	5.0	11	11	61.3	5.2	11	11	56.3	10.2	11	11	55.3	11.2	11	11	54.7	11.8	11	11	54.4	12.1	11	11
S4_21	13		62.2	0	56.9	5.3	13	13	53.8	8.4	13	13	53.0	9.2	13	13	52.5	9.7	13	13	52.2	10.0	13	13	52.0	10.2	13	13
S4_22	5		63.8	0	58.6	5.2	5	5	55.6	8.2	5	5	54.6	9.2	5	5	54.0	9.8	5	5	53.6	10.2	5	5	53.3	10.5	5	5
S4_23	9		60.0	0	55.5	4.5	9	9	55.4	4.6	9	9	51.7	8.3	9	9	51.2	8.8	9	9	51.0	9.0	9	9	50.7	9.3	9	9
S4_24	6		60.4	0	55.5	4.9	6	6	55.5	4.9	6	6	52.1	8.3	6	6	51.7	8.7	6	6	51.4	9.0	6	6	51.2	9.2	6	6
S4_25	6		62.5	0	57.3	5.2	6	6	57.1	5.4	6	6	54.0	8.5	6	6	53.5	9.0	6	6	53.1	9.4	6	6	52.9	9.6	6	6

# of impacted DUs:	**60**	Avg. Insertion Loss:	5.1 dB		Avg. Insertion Loss:	7.1 dB			Avg. Insertion Loss:	9.0 dB			Avg. Insertion Loss:	9.7 dB			Avg. Insertion Loss:	10.3 dB			Avg. Insertion Loss:	10.8 dB		
		Max. Insertion Loss:	8.2 dB		Max. Insertion Loss:	11.7 dB			Max. Insertion Loss:	13.0 dB			Max. Insertion Loss:	13.9 dB			Max. Insertion Loss:	14.8 dB			Max. Insertion Loss:	15.5 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	60 DUs		[1] Impctd w/ 3 dB IL:	60 DUs			[1] Impctd w/ 3 dB IL:	60 DUs			[1] Impctd w/ 3 dB IL:	60 DUs			[1] Impctd w/ 3 dB IL:	60 DUs			[1] Impctd w/ 3 dB IL:	60 DUs		
		Impctd w/ 5 dB IL:	46 DUs		Impctd w/ 5 dB IL:	60 DUs			Impctd w/ 5 dB IL:	60 DUs			Impctd w/ 5 dB IL:	60 DUs			Impctd w/ 5 dB IL:	60 DUs			Impctd w/ 5 dB IL:	60 DUs		
		% Impctd DUs w/ 5 dB IL:	76.7%		% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	45 DUs		[2] Non-impctd w/ 5 dB IL:	60 DUs			[2] Non-impctd w/ 5 dB IL:	66 DUs			[2] Non-impctd w/ 5 dB IL:	66 DUs			[2] Non-impctd w/ 5 dB IL:	66 DUs			[2] Non-impctd w/ 5 dB IL:	66 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	105 DUs		Total [1]+[2] for cost:	120 DUs			Total [1]+[2] for cost:	126 DUs			Total [1]+[2] for cost:	126 DUs			Total [1]+[2] for cost:	126 DUs			Total [1]+[2] for cost:	126 DUs		
		Approx. Cost:	$482,517		Approx. Cost:	$579,020			Approx. Cost:	$675,523			Approx. Cost:	$772,026			Approx. Cost:	$868,530			Approx. Cost:	$965,033		
		Approx Cost per DU:	$4,595		Approx Cost per DU:	$4,825			Approx Cost per DU:	$5,361			Approx Cost per DU:	$6,127			Approx Cost per DU:	$6,893			Approx Cost per DU:	$7,659		

Pennsylvania Turnpike MP320-326 Reconstruction
PTC Ref.:05-045-RD4C, HMMH Job No.301940
Date and Initials JAC 5/15/2007

Preliminary Noise Barrier Analysis: NSA-S5

Receiver	No. of Dwelling Units	Description	No Barrier	No. of DUs 66+ dBA	10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
			Leq(dBA)		Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S5_1-1	2		70.6	2	64.9	5.7	2	2	63.7	6.9	2	2	63.1	7.5	2	2	62.8	7.8	2	2	62.4	8.2	2	2	62.2	8.4	2	2
S5_1-2	2		74.8	2	68.8	6.0	2	2	66.3	8.5	2	2	65.6	9.2	2	2	65.3	9.5	2	2	64.9	9.9	2	2	64.6	10.2	2	2
S5_2-1	2		73.1	2	64.8	8.3	2	2	62.6	10.5	2	2	61.6	11.5	2	2	60.9	12.2	2	2	60.4	12.7	2	2	59.9	13.2	2	2
S5_2-2	2		75.2	2	69.4	5.8	2	2	67.0	8.2	2	2	65.7	9.5	2	2	65.1	10.1	2	2	64.6	10.6	2	2	64.2	11.0	2	2
S5_3-1	2		72.6	2	66.3	6.3	2	2	63.9	8.7	2	2	63.0	9.6	2	2	62.3	10.3	2	2	61.8	10.8	2	2	61.3	11.3	2	2
S5_3-2	2		74.9	2	68.7	6.2	2	2	67.6	7.3	2	2	65.8	9.1	2	2	64.7	10.2	2	2	63.9	11.0	2	2	63.4	11.5	2	2
S5_3-3	2		75.8	2	72.1	3.7	2	0	70.8	5.0	2	2	68.7	7.1	2	2	66.8	9.0	2	2	65.6	10.2	2	2	64.4	11.4	2	2
S5_4-1	2		71.1	2	64.9	6.2	2	2	63.8	7.3	2	2	62.6	8.5	2	2	62.0	9.1	2	2	61.4	9.7	2	2	60.8	10.3	2	2
S5_4-2	2		74.5	2	68.0	6.5	2	2	66.7	7.8	2	2	65.3	9.2	2	2	64.2	10.3	2	2	63.1	11.4	2	2	62.5	12.0	2	2
S5_5-1	2		65.5	2	61.0	4.5	2	2	59.6	5.9	2	2	58.8	6.7	2	2	58.2	7.3	2	2	57.6	7.9	2	2	57.1	8.4	2	2
S5_5-2	2		69.2	2	63.5	5.7	2	2	62.7	6.5	2	2	60.8	8.4	2	2	60.1	9.1	2	2	59.5	9.7	2	2	59.0	10.2	2	2
S5_6-1	2		72.0	2	65.4	6.6	2	2	62.6	9.4	2	2	61.4	10.6	2	2	60.5	11.5	2	2	59.8	12.2	2	2	59.1	12.9	2	2
S5_6-2	2		73.7	2	67.5	6.2	2	2	66.5	7.2	2	2	63.6	10.1	2	2	62.4	11.3	2	2	61.6	12.1	2	2	60.8	12.9	2	2
S5_7-1	5		69.3	5	63.8	5.5	5	5	60.2	9.1	5	5	59.1	10.2	5	5	58.3	11.0	5	5	57.7	11.6	5	5	57.1	12.2	5	5
S5_7-2	5		73.9	5	67.4	6.5	5	5	63.3	10.6	5	5	61.8	12.1	5	5	60.9	13.0	5	5	60.1	13.8	5	5	59.3	14.6	5	5
S5_8-1	5		72.3	5	66.2	6.1	5	5	62.0	10.3	5	5	60.6	11.7	5	5	59.6	12.7	5	5	58.8	13.5	5	5	58.1	14.2	5	5
S5_8-2	5		74.0	5	68.2	5.8	5	5	67.8	6.2	5	5	63.8	10.2	5	5	62.6	11.4	5	5	61.5	12.5	5	5	60.6	13.4	5	5
S5_9-1	4		72.3	4	64.3	8.0	4	4	63.0	9.3	4	4	61.9	10.4	4	4	61.1	11.2	4	4	60.5	11.8	4	4	59.9	12.4	4	4
S5_9-2	4		76.1	4	68.9	7.2	4	4	64.8	11.3	4	4	63.3	12.8	4	4	62.1	14.0	4	4	61.3	14.8	4	4	60.5	15.6	4	4
S5_10-1	5		70.8	5	63.8	7.0	5	5	62.4	8.4	5	5	61.4	9.4	5	5	60.6	10.2	5	5	59.9	10.9	5	5	59.4	11.4	5	5
S5_10-2	5		75.4	5	67.2	8.2	5	5	64.1	11.3	5	5	62.8	12.6	5	5	62.0	13.4	5	5	61.1	14.3	5	5	60.4	15.0	5	5
S5_11-1	6		69.1	6	64.1	5.0	6	6	61.2	7.9	6	6	60.2	8.9	6	6	59.6	9.5	6	6	59.1	10.0	6	6	58.7	10.4	6	6
S5_11-2	6		73.0	6	66.0	7.0	6	6	62.7	10.3	6	6	61.5	11.5	6	6	60.8	12.2	6	6	60.2	12.8	6	6	59.8	13.2	6	6
S5_12-1	2		65.4	0	63.0	2.4	0	0	61.6	3.8	2	0	61.2	4.2	2	0	60.9	4.5	2	2	60.7	4.7	2	2	60.6	4.8	2	2
S5_12-2	2		70.0	2	65.4	4.6	2	2	63.9	6.1	2	2	63.5	6.5	2	2	63.3	6.7	2	2	63.1	6.9	2	2	63.0	7.0	2	2
S5_13-1	2		66.2	2	62.4	3.8	2	0	60.0	6.2	2	2	59.2	7.0	2	2	58.7	7.5	2	2	58.2	8.0	2	2	57.8	8.4	2	2
S5_13-2	2		72.1	2	66.7	5.4	2	2	64.5	7.6	2	2	63.8	8.3	2	2	63.4	8.7	2	2	63.1	9.0	2	2	62.9	9.2	2	2
S5_14-1	2		61.1	0	58.9	2.2	0	0	57.8	3.3	2	0	57.2	3.9	2	0	56.8	4.3	2	0	56.4	4.7	2	2	56.1	5.0	2	2
S5_14-2	2		65.4	0	61.8	3.6	2	0	60.2	5.2	2	2	59.6	5.8	2	2	59.1	6.3	2	2	58.7	6.7	2	2	58.4	7.0	2	2
S5_14-3	2		69.8	2	64.2	5.6	2	2	63.7	6.1	2	2	61.9	7.9	2	2	61.2	8.6	2	2	60.8	9.0	2	2	60.5	9.3	2	2
S5_15-1	2		64.1	0	59.8	4.3	2	0	58.0	6.1	2	2	57.2	6.9	2	2	56.6	7.5	2	2	56.1	8.0	2	2	55.7	8.4	2	2
S5_15-2	2		68.2	2	62.8	5.4	2	2	62.3	5.9	2	2	59.8	8.4	2	2	59.0	9.2	2	2	58.5	9.7	2	2	58.0	10.2	2	2
S5_15-3	2		70.3	2	65.1	5.2	2	2	64.3	6.0	2	2	62.8	7.5	2	2	61.7	8.6	2	2	61.2	9.1	2	2	60.7	9.6	2	2
S5_16-1	2		62.2	0	58.4	3.8	2	0	56.8	5.4	2	2	56.0	6.2	2	2	55.4	6.8	2	2	54.9	7.3	2	2	54.3	7.9	2	2
S5_16-2	2		66.0	2	61.2	4.8	2	2	60.1	5.9	2	2	59.2	7.8	2	2	57.6	8.4	2	2	57.0	9.0	2	2	56.6	9.4	2	2
S5_17-1	2		68.7	2	63.0	5.7	2	2	60.1	8.6	2	2	58.9	9.8	2	2	58.1	10.6	2	2	57.4	11.3	2	2	56.9	11.8	2	2
S5_17-2	2		70.7	2	64.7	6.0	2	2	64.2	6.5	2	2	60.6	10.1	2	2	59.6	11.1	2	2	58.9	11.8	2	2	58.2	12.5	2	2
S5_18-1	5		67.3	5	63.4	3.9	5	0	59.4	7.9	5	5	58.3	9.0	5	5	57.5	9.8	5	5	56.8	10.5	5	5	56.2	11.1	5	5
S5_18-2	5		72.3	5	65.8	6.5	5	5	61.5	10.8	5	5	60.1	12.2	5	5	59.2	13.1	5	5	58.5	13.8	5	5	58.0	14.3	5	5
S5_19-1	6		68.4	6	63.9	4.5	6	6	59.6	8.8	6	6	58.2	10.2	6	6	57.2	11.2	6	6	56.4	12.0	6	6	55.7	12.7	6	6
S5_19-2	6		71.8	6	65.5	6.3	6	6	61.4	10.4	6	6	59.9	11.9	6	6	59.0	12.8	6	6	58.2	13.6	6	6	57.6	14.2	6	6
S5_20-1	5		67.9	5	63.1	4.8	5	5	59.5	8.4	5	5	58.3	9.6	5	5	57.4	10.5	5	5	56.6	11.3	5	5	56.1	11.8	5	5
S5_20-2	5		72.4	5	65.4	7.0	5	5	61.4	11.0	5	5	60.0	12.4	5	5	59.0	13.4	5	5	58.1	14.3	5	5	57.4	15.0	5	5
S5_21-1	5		60.6	0	56.2	4.4	5	0	53.7	6.9	5	5	52.9	7.7	5	5	52.3	8.3	5	5	51.7	8.9	5	5	51.3	9.3	5	5
S5_21-2	5		69.6	5	62.4	7.2	5	5	57.3	12.3	5	5	56.2	13.4	5	5	55.9	13.7	5	5	55.4	14.2	5	5	55.4	14.2	5	5
S5_22-1	4		59.9	0	55.8	4.1	4	0	53.3	6.6	4	4	52.5	7.4	4	4	52.0	7.9	4	4	51.5	8.4	4	4	51.0	8.9	4	4
S5_22-2	4		69.0	4	61.5	7.5	4	4	57.1	11.9	4	4	56.0	13.0	4	4	55.8	13.2	4	4	55.4	13.6	4	4	55.4	13.6	4	4
S5_23-1	6		63.2	0	58.7	4.5	6	6	56.0	7.2	6	6	55.2	8.0	6	6	54.8	8.4	6	6	54.4	8.8	6	6	54.2	9.0	6	6
S5_23-2	6		67.9	6	61.8	6.1	6	6	58.3	9.6	6	6	57.5	10.4	6	6	57.1	10.8	6	6	56.7	11.2	6	6	56.5	11.4	6	6
S5_24-1	2		61.4	0	59.7	1.7	0	0	58.6	2.8	2	0	58.3	3.1	2	0	58.1	3.3	2	0	57.9	3.5	2	0	57.8	3.6	2	0
S5_24-2	2		66.3	2	63.1	3.2	2	0	61.8	4.5	2	2	61.6	4.7	2	2	61.4	4.9	2	2	61.3	5.0	2	2	61.2	5.1	2	2
S5_24-3	2		69.6	2	65.1	4.5	2	2	64.5	5.1	2	2	63.2	6.4	2	2	63.0	6.6	2	2	62.9	6.7	2	2	62.8	6.8	2	2
S5_25-1	2		65.4	0	61.8	3.6	2	0	59.3	6.1	2	2	58.6	6.8	2	2	58.1	7.3	2	2	57.6	7.8	2	2	57.3	8.1	2	2
S5_25-2	2		70.1	2	65.1	5.0	2	2	63.3	6.8	2	2	62.6	7.5	2	2	62.3	7.8	2	2	62.0	8.1	2	2	61.8	8.3	2	2
S5_25-3	2		71.0	2	66.0	5.0	2	2	65.5	5.5	2	2	64.1	6.9	2	2	63.5	7.5	2	2	63.2	7.8	2	2	63.0	8.0	2	2
S5_26-1	2		59.1	0	57.1	2.0	0	0	56.3	2.8	2	0	56.0	3.1	2	0	55.8	3.3	2	0	55.6	3.5	2	0	55.5	3.6	2	0
S5_26-2	2		63.2	0	60.4	2.8	2	0	59.3	3.9	2	0	59.1	4.1	2	0	58.9	4.3	2	0	58.8	4.4	2	0	58.7	4.5	2	2
S5_27-1	2		62.4	0	60.1	2.3	0	0	58.4	4.0	2	0	57.9	4.5	2	2	57.5	4.9	2	2	57.2	5.2	2	2	57.0	5.4	2	2
S5_27-2	2		67.7	2	63.3	4.4	2	0	61.3	6.4	2	2	60.7	7.0	2	2	60.3	7.4	2	2	60.1	7.6	2	2	59.8	7.9	2	2
S5_28-1	2		61.4	0	58.4	3.0	2	0	56.7	4.7	2	2	56.1	5.3	2	2	55.8	5.6	2	2	55.4	6.0	2	2	55.1	6.3	2	2
S5_28-2	2		66.2	2	61.9	4.3	2	0	59.7	6.5	2	2	59.1	7.1	2	2	58.6	7.6	2	2	58.3	7.9	2	2	58.0	8.2	2	2
S5_29-1	2		59.0	0	56.7	2.3	0	0	55.0	4.0	2	0	54.5	4.5	2	2	54.1	4.9	2	2	53.8	5.2	2	2	53.5	5.5	2	2
S5_29-2	2		64.1	0	60.5	3.6	2	0	58.1	6.0	2	2	57.3	6.8	2	2	56.8	7.3	2	2	56.3	7.8	2	2	55.9	8.2	2	2
S5_29-3	2		67.0	2	62.1	4.9	2	2	61.4	5.6	2	2	59.3	7.7	2	2	58.8	8.2	2	2	58.4	8.6	2	2	58.1	8.9	2	2
S5_30-1	2		58.9	0	56.3	2.6	2	0	54.3	4.6	2	2	53.6	5.3	2	2	53.2	5.7	2	2	52.8	6.1	2	2	52.5	6.4	2	2
S5_30-2	2		63.5	0	59.5	4.0	2	0	56.7	6.8	2	2	55.8	7.7	2	2	55.3	8.2	2	2	54.8	8.7	2	2	54.5	9.0	2	2
S5_30-3	2		66.1	2	61.0	5.1	2	2	59.9	6.2	2	2	57.7	8.4	2	2	57.2	8.9	2	2	56.8	9.3	2	2	56.5	9.6	2	2
S5_31-1	2		59.7	0	57.0	2.7	2	0	54.4	5.3	2	2	53.7	6.0	2	2	53.2	6.5	2	2	52.8	6.9	2	2	52.5	7.2	2	2
S5_31-2	2		64.8	0	59.9	4.9	2	2	56.6	8.2	2	2	55.7	9.1	2	2	55.1	9.7	2	2	54.6	10.2	2	2	54.3	10.5	2	2
S5_31-3	2		66.5	2	61.1	5.4	2	2	60.7	5.8	2	2	57.9	8.6	2	2	57.4	9.1	2	2	56.9	9.6	2	2	56.5	10.0	2	2
S5_32-1	2		60.4	0	57.0	3.4	2	0	55.5	4.9	2	2	54.7	5.7	2	2	54.3	6.1	2	2	53.8	6.6	2	2	53.4	7.0	2	2
S5_32-2	2		64.7	0	60.3	4.4	2	0	58.2	6.5	2	2	57.4	7.3	2	2	56.9	7.8	2	2	56.5	8.2	2	2	56.2	8.5	2	2
S5_32-3	2		69.1	2	63.4	5.7	2	2	62.9	6.2	2	2	59.9	9.2	2	2	59.2	9.9	2	2	58.6	10.5	2	2	58.2	10.9	2	2
S5_33-1	5		63.1	0	58.5	4.6	5	5	55.3	7.8	5	5	54.3	8.8	5	5	53.7	9.4	5	5	53.2	9.9	5	5	52.9	10.2	5	5
S5_33-2	5		67.3	5	61.4	5.9	5	5	57.7	9.6	5	5	56.7	10.6	5	5	56.2	11.1	5	5	55.8	11.5	5	5	55.3	12.0	5	5
S5_34-1	5		65.3	0	60.0	5.3	5	5	56.1	9.2	5	5	54.9	10.4	5	5	54.1	11.2	5	5	53.6	11.7	5	5	53.3	12.0	5	5
S5_34-2	5		68.5	5	62.3	6.2	5	5	58.3	10.2	5	5	56.9	11.6	5	5	56.4	12.1	5	5	55.9	12.6	5	5	55.5	13.0	5	5
S5_35-1	6		60.3	0	56.1	4.2	6	0	53.0	7.3	6	6	52.5	7.8	6	6	52.1	8.2	6	6	51.9	8.4	6	6	51.6	8.7	6	6
S5_35-2	6		65.0	0	59.7	5.3	6	6	56.2	8.8	6	6	55.4	9.6	6	6	55.1	9.9	6	6	54.8	10.2	6	6	54.5	10.5	6	6
S5_36-1	6		65.5	6	60.7	4.8	6	6	56.4	9.1	6	6	55.1	10.4	6	6	54.6	10.9	6	6	54.0	11.5	6	6	53.5	12.0	6	6
S5_36-2	6		68.4	6	62.6	5.8	6	6	60.6	7.8	6	6	58.0	10.4	6	6	57.1	11.3	6	6	56.3	12.1	6	6	55.7	12.7	6	6
S5_37-1	6		62.1	0	59.0	3.1	6	0	55.3	6.8	6	6	54.0	8.1	6	6	53.3	8.8	6	6	52.6	9.5	6	6	52.4	9.7	6	6
S5_37-2	6		68.2	6	62.0	6.2	6	6	57.5	10.7	6	6	56.3	11.9	6	6	55.7	12.5	6	6	54.9	13.3	6	6	54.3	13.9	6	6
S5_38-1	4		64.2	0	59.0	5.2	4	4	55.4	8.8	4	4	54.4	9.8	4	4	54.0	10.2	4	4	53.7	10.5	4	4	53.5	10.7	4	4
S5_38-2	4		67.8	4	61.8	6.0	4	4	58.1	9.7	4	4	57.0	10.8	4	4	56.3	11.5	4	4	55.7	12.1	4	4	55.2	12.6	4	4
S5_39-1	5		61.1	0	57.0	4.1	5	0	54.1	7.0	5	5	53.3	7.8	5	5	52.9	8.2	5	5	52.7	8.4	5	5	52.5	8.6	5	5
S5_39-2	5		65.3	0	59.9	5.4	5	5	56.5	8.8	5	5	55.7	9.6	5	5	55.2	10.1	5	5	54.8	10.5	5	5	54.5	10.8	5	5
S5_40_ST14	0		73.8	0	66.2	7.6	0	0	63.5	10.3	0	0	62.3	11.5	0	0	61.5	12.3	0	0	60.8	13.0	0	0	60.2	13.6	0	0

# of impacted DUs:	193	Avg. Insertion Loss:	5.3 dB		Avg. Insertion Loss:	8.0 dB			Avg. Insertion Loss:	9.2 dB			Avg. Insertion Loss:	9.9 dB			Avg. Insertion Loss:	10.4 dB			Avg. Insertion Loss:	10.8 dB		
		Max. Insertion Loss:	8.3 dB		Max. Insertion Loss:	12.3 dB			Max. Insertion Loss:	13.4 dB			Max. Insertion Loss:	14.0 dB			Max. Insertion Loss:	14.8 dB			Max. Insertion Loss:	15.6 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	193 DUs		[1] Impctd w/ 3 dB IL:	193 DUs			[1] Impctd w/ 3 dB IL:	193 DUs			[1] Impctd w/ 3 dB IL:	193 DUs			[1] Impctd w/ 3 dB IL:	193 DUs			[1] Impctd w/ 3 dB IL:	193 DUs		
		Impctd w/ 5 dB IL:	178 DUs		Impctd w/ 5 dB IL:	193 DUs			Impctd w/ 5 dB IL:	193 DUs			Impctd w/ 5 dB IL:	193 DUs			Impctd w/ 5 dB IL:	193 DUs			Impctd w/ 5 dB IL:	193 DUs		
		% Impctd DUs w/ 5 dB IL:	92.2%		% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	33 DUs		[2] Non-impctd w/ 5 dB IL:	81 DUs			[2] Non-impctd w/ 5 dB IL:	85 DUs			[2] Non-impctd w/ 5 dB IL:	87 DUs			[2] Non-impctd w/ 5 dB IL:	89 DUs			[2] Non-impctd w/ 5 dB IL:	91 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	226 DUs		Total [1]+[2] for cost:	274 DUs			Total [1]+[2] for cost:	278 DUs			Total [1]+[2] for cost:	280 DUs			Total [1]+[2] for cost:	282 DUs			Total [1]+[2] for cost:	284 DUs		
		Approx. Cost	$632,862		Approx. Cost	$759,434			Approx. Cost	$886,007			Approx. Cost	$1,012,579			Approx. Cost	$1,139,151			Approx. Cost	$1,265,724		
		Approx Costper DU:	$2,800		Approx Costper DU:	$2,772			Approx Costper DU:	$3,187			Approx Costper DU:	$3,616			Approx Costper DU:	$4,040			Approx Costper DU:	$4,457		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials JAC 5/15/2007

Preliminary Noise Barrier Analysis: NSA-S6

Receiver	No. of Dwelling Units	script	No Barrier Leq(dBA)	No. of DUs 66+ dBA	10-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	12-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	14-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	16-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	18-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	20-foot Barrier Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S6_1	3		74.3	3	68.2	6.1	3	3	64.5	9.8	3	3	63.0	11.3	3	3	62.0	12.3	3	3	61.3	13.0	3	3	60.7	13.6	3	3
S6_2	11		74.7	11	68.8	5.9	11	11	68.0	6.7	11	11	64.4	10.3	11	11	63.1	11.6	11	11	62.2	12.5	11	11	61.5	13.2	11	11
S6_3	6		75.2	6	70.2	5.0	6	6	68.5	6.7	6	6	67.0	8.2	6	6	65.3	9.9	6	6	64.0	11.2	6	6	63.0	12.2	6	6
S6_4_ST15	4		75.2	4	67.7	7.5	4	4	66.6	8.6	4	4	65.8	9.4	4	4	65.0	10.2	4	4	64.2	11.0	4	4	63.4	11.8	4	4
S6_5	3		67.5	3	61.6	5.9	3	3	60.9	6.6	3	3	60.1	7.4	3	3	59.5	8.0	3	3	58.9	8.6	3	3	58.2	9.3	3	3
S6_6	4		73.9	4	68.3	5.6	4	4	67.5	6.4	4	4	66.5	7.4	4	4	65.1	8.8	4	4	63.9	10.0	4	4	63.1	10.8	4	4
S6_7	5		70.5	5	67.2	3.3	5	0	66.2	4.3	5	0	65.2	5.3	5	5	63.3	7.2	5	5	61.8	8.7	5	5	60.3	10.2	5	5
S6_8	5		73.5	5	69.1	4.4	5	0	68.2	5.3	5	5	66.7	6.8	5	5	64.5	9.0	5	5	62.2	11.3	5	5	61.1	12.4	5	5
S6_9	1		75.7	1	72.7	3.0	1	0	70.6	5.1	1	1	69.6	6.1	1	1	67.1	8.6	1	1	64.6	11.1	1	1	63.3	12.4	1	1
S6_10	2		72.2	2	66.3	5.9	2	2	65.3	6.9	2	2	64.0	8.2	2	2	62.6	9.6	2	2	61.7	10.5	2	2	61.0	11.2	2	2
S6_11	2		73.2	2	65.1	8.1	2	2	64.3	8.9	2	2	63.4	9.8	2	2	62.5	10.7	2	2	61.8	11.4	2	2	61.1	12.1	2	2
S6_12	2		74.1	2	65.2	8.9	2	2	64.2	9.9	2	2	63.4	10.7	2	2	62.6	11.5	2	2	62.0	12.1	2	2	61.3	12.8	2	2
S6_13_LT3	3		74.3	3	65.1	9.2	3	3	64.1	10.2	3	3	63.2	11.1	3	3	62.5	11.8	3	3	61.8	12.5	3	3	61.1	13.2	3	3
S6_14	3		71.9	3	65.1	6.8	3	3	63.7	8.2	3	3	62.4	9.5	3	3	61.6	10.3	3	3	60.9	11.0	3	3	60.2	11.7	3	3
S6_15	2		72.1	2	65.5	6.6	2	2	62.5	9.6	2	2	61.4	10.7	2	2	60.5	11.6	2	2	59.8	12.3	2	2	59.1	13.0	2	2
S6_16	2		76.6	2	66.8	9.8	2	2	65.5	11.1	2	2	64.4	12.2	2	2	63.5	13.1	2	2	62.8	13.8	2	2	62.1	14.5	2	2
S6_17	1		68.2	1	63.1	5.1	1	1	61.8	6.4	1	1	60.9	7.3	1	1	60.3	7.9	1	1	59.7	8.5	1	1	59.2	9.0	1	1
S6_18	2		65.7	2	62.9	2.8	2	0	62.1	3.6	2	0	61.7	4.0	2	0	61.4	4.3	2	0	61.2	4.5	2	2	61.0	4.7	2	2
S6_19	7		71.9	7	65.3	6.6	7	7	62.0	9.9	7	7	60.7	11.2	7	7	59.8	12.1	7	7	59.2	12.7	7	7	58.7	13.2	7	7
S6_20	12		66.4	12	62.4	4.0	12	0	61.8	4.6	12	12	61.0	5.4	12	12	60.2	6.2	12	12	59.1	7.3	12	12	58.5	7.9	12	12
S6_21	6		62.8	0	60.0	2.8	6	0	59.5	3.3	6	0	59.3	3.5	6	0	58.8	4.0	6	0	58.3	4.5	6	6	57.6	5.2	6	6
S6_22	4		66.8	4	62.1	4.7	4	4	61.4	5.4	4	4	60.7	6.1	4	4	59.9	6.9	4	4	59.1	7.7	4	4	58.3	8.5	4	4
S6_23	7		60.4	0	58.5	1.9	0	0	58.0	2.4	0	0	57.7	2.7	7	0	57.3	3.1	7	0	56.9	3.5	7	0	56.2	4.2	7	0
S6_24	8		65.1	0	61.6	3.5	8	0	60.9	4.2	8	0	59.9	5.2	8	8	58.4	6.7	8	8	56.5	8.6	8	8	55.6	9.5	8	8
S6_25	3		65.5	3	61.1	4.4	3	0	60.2	5.3	3	3	59.3	6.2	3	3	58.1	7.4	3	3	57.4	8.1	3	3	56.5	9.0	3	3
S6_26	6		70.9	6	65.1	5.8	6	6	64.8	6.1	6	6	60.5	10.4	6	6	59.2	11.7	6	6	58.1	12.8	6	6	57.1	13.8	6	6
S6_27	3		66.0	3	61.8	4.2	3	0	61.2	4.8	3	3	58.0	8.0	3	3	57.1	8.9	3	3	56.4	9.6	3	3	55.8	10.2	3	3
S6_28	4		62.3	0	57.4	4.9	4	4	57.0	5.3	4	4	56.5	5.8	4	4	55.9	6.4	4	4	55.4	6.9	4	4	54.9	7.4	4	4
S6_29	3		63.0	0	58.8	4.2	3	0	57.9	5.1	3	3	56.8	6.2	3	3	56.0	7.0	3	3	55.4	7.6	3	3	54.8	8.2	3	3
S6_30	1		60.9	0	57.4	3.5	1	0	54.8	6.1	1	1	54.0	6.9	1	1	53.5	7.4	1	1	52.8	8.1	1	1	52.4	8.5	1	1
S6_31	2		64.7	0	60.2	4.5	2	2	57.9	6.8	2	2	57.1	7.6	2	2	56.4	8.3	2	2	55.8	8.9	2	2	55.2	9.5	2	2
S6_32	4		60.4	0	57.7	2.7	4	0	56.8	3.6	4	0	56.3	4.1	4	0	56.0	4.4	4	0	55.7	4.7	4	4	55.4	5.0	4	4
S6_33	1		62.5	0	61.8	0.7	0	0	61.6	0.9	0	0	61.5	1.0	0	0	61.4	1.1	0	0	61.4	1.1	0	0	61.3	1.2	0	0
S6_34	4		65.5	4	58.3	7.2	4	4	58.2	7.3	4	4	55.7	9.8	4	4	55.3	10.2	4	4	54.9	10.6	4	4	54.7	10.8	4	4
S6_35	11		56.5	0	51.2	5.3	11	11	51.1	5.4	11	11	50.9	5.6	11	11	50.7	5.8	11	11	50.6	5.9	11	11	50.5	6.0	11	11
S6_36	16		57.1	0	54.7	2.4	0	0	54.4	2.7	16	0	54.1	3.0	16	0	53.5	3.6	16	0	53.0	4.1	16	0	52.4	4.7	16	16
S6_37	4		61.7	0	57.7	4.0	4	0	57.4	4.3	4	0	54.1	7.6	4	4	53.2	8.5	4	4	52.4	9.3	4	4	51.7	10.0	4	4
S6_38	7		59.8	0	55.8	4.0	7	0	55.3	4.5	7	7	54.7	5.1	7	7	53.9	5.9	7	7	53.4	6.4	7	7	52.9	6.9	7	7
S6_39	4		59.6	0	56.4	3.2	4	0	54.2	5.4	4	4	53.6	6.0	4	4	53.1	6.5	4	4	52.7	6.9	4	4	52.2	7.4	4	4
S6_40	4		58.1	0	55.9	2.2	0	0	55.1	3.0	4	0	54.7	3.4	4	0	54.4	3.7	4	0	54.1	4.0	4	0	53.9	4.2	4	0
S6_41	1		61.5	0	61.2	0.3	0	0	61.0	0.5	0	0	61.0	0.5	0	0	60.9	0.6	0	0	60.9	0.6	0	0	60.9	0.6	0	0
S6_42	6		63.4	0	56.1	7.3	6	6	55.9	7.5	6	6	54.0	9.4	6	6	53.6	9.8	6	6	53.3	10.1	6	6	53.2	10.2	6	6
S6_43	12		61.6	0	55.9	5.7	12	12	55.8	5.8	12	12	55.4	6.2	12	12	55.2	6.4	12	12	54.8	6.8	12	12	54.7	6.9	12	12
S6_44	7		59.8	0	56.2	3.6	7	0	55.9	3.9	7	0	55.6	4.2	7	0	55.1	4.7	7	7	54.8	5.0	7	7	54.4	5.4	7	7
S6_45	16		61.7	0	57.5	4.2	16	0	56.9	4.8	16	16	55.6	6.1	16	16	53.5	8.2	16	16	51.5	10.2	16	16	50.8	10.9	16	16
S6_46	6		64.9	0	60.0	4.9	6	6	59.6	5.3	6	6	56.5	8.4	6	6	54.6	10.3	6	6	53.5	11.4	6	6	52.7	12.2	6	6
S6_47	2		56.8	0	54.0	2.8	2	0	52.4	4.4	2	0	50.3	6.5	2	2	49.5	7.3	2	2	49.0	7.8	2	2	48.5	8.3	2	2
S6_48	6		56.1	0	52.5	3.6	6	0	52.4	3.7	6	0	51.5	4.6	6	6	50.7	5.4	6	6	50.3	5.8	6	6	50.1	6.0	6	6
S6_49	2		53.2	0	51.0	2.2	0	0	49.0	4.2	2	0	48.3	4.9	2	2	48.0	5.2	2	2	48.0	5.2	2	2	48.1	5.1	2	2
S6_50	11		55.9	0	54.1	1.8	0	0	53.4	2.5	11	0	53.1	2.8	11	0	52.8	3.1	11	0	52.7	3.2	11	0	52.4	3.5	11	0

# of impacted DUs	**100**	Avg. Insertion Loss:	4.5 dB	Avg. Insertion Loss:	5.3 dB	Avg. Insertion Loss:	6.4 dB	Avg. Insertion Loss:	7.3 dB	Avg. Insertion Loss:	8.1 dB	Avg. Insertion Loss:	8.7 dB
		Max. Insertion Loss:	9.8 dB	Max. Insertion Loss:	11.1 dB	Max. Insertion Loss:	12.2 dB	Max. Insertion Loss:	13.1 dB	Max. Insertion Loss:	13.8 dB	Max. Insertion Loss:	14.5 dB
Impacted receptors w/ min. 3 d		[1] Impctd w/ 3 dB IL:	100 DUs	[1] Impctd w/ 3 dB IL:	100 DUs	[1] Impctd w/ 3 dB IL:	100 DUs	[1] Impctd w/ 3 dB IL:	100 DUs	[1] Impctd w/ 3 dB IL:	100 DUs	[1] Impctd w/ 3 dB IL:	100 DUs
		Impctd w/ 5 dB IL:	69 DUs	Impctd w/ 5 dB IL:	93 DUs	Impctd w/ 5 dB IL:	98 DUs	Impctd w/ 5 dB IL:	98 DUs	Impctd w/ 5 dB IL:	100 DUs	Impctd w/ 5 dB IL:	100 DUs
		% Impctd DUs w/ 5 dB IL:	69.0%	% Impctd DUs w/ 5 dB IL:	93.0%	% Impctd DUs w/ 5 dB IL:	98.0%	% Impctd DUs w/ 5 dB IL:	98.0%	% Impctd DUs w/ 5 dB IL:	100.0%	% Impctd DUs w/ 5 dB IL:	100.0%
Benefited (non-impacted) recep		[2] Non-impctd w/ 5 dB IL:	41 DUs	[2] Non-impctd w/ 5 dB IL:	72 DUs	[2] Non-impctd w/ 5 dB IL:	94 DUs	[2] Non-impctd w/ 5 dB IL:	101 DUs	[2] Non-impctd w/ 5 dB IL:	111 DUs	[2] Non-impctd w/ 5 dB IL:	127 DUs
Total DUs for cost reasonablen		Total [1]+[2] for cost:	141 DUs	Total [1]+[2] for cost:	172 DUs	Total [1]+[2] for cost:	194 DUs	Total [1]+[2] for cost:	201 DUs	Total [1]+[2] for cost:	211 DUs	Total [1]+[2] for cost:	227 DUs
		Approx. Cost:	$1,147,822	Approx. Cost:	$1,377,388	Approx. Cost:	$1,606,952	Approx. Cost:	$1,836,516	Approx. Cost:	$2,066,081	Approx. Cost:	$2,295,645
		Approx Cost per DU:	$8,141	Approx Cost per DU:	$8,008	Approx Cost per DU:	$8,283	Approx Cost per DU:	$9,137	Approx Cost per DU:	$9,792	Approx Cost per DU:	$10,113

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials 05/15/07 ADD Revised 8/17/2007 JAC

Preliminary Noise Barrier Analysis: NSA-S7

Receiver	No. of Dwelling Units	Description	No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
			Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S7_01	0		60.8	0	57.9	2.9	0	0	57.5	3.3	0	0	57.0	3.8	0	0	56.7	4.1	0	0	56.3	4.5	0	0	55.9	4.9	0	0
S7_02	2		66.4	2	61.8	4.6	2	2	60.6	5.8	2	2	59.5	6.9	2	2	58.7	7.7	2	2	57.9	8.5	2	2	57.2	9.2	2	2
S7_03_ST17	6		59.6	0	57.1	2.5	6	0	56.6	3.0	6	0	56.2	3.4	6	0	55.7	3.9	6	0	55.3	4.3	6	0	54.9	4.7	6	6
S7_04	2		64.1	0	58.8	5.3	2	2	58.3	5.8	2	2	57.8	6.3	2	2	57.3	6.8	2	2	56.7	7.4	2	2	56.2	7.9	2	2
S7_05	2		66.2	2	60.2	6.0	2	2	59.5	6.7	2	2	58.8	7.4	2	2	58.1	8.1	2	2	57.4	8.8	2	2	56.9	9.3	2	2
S7_06	3		67.6	3	61.9	5.7	3	3	61.1	6.5	3	3	60.0	7.6	3	3	59.3	8.3	3	3	58.7	8.9	3	3	58.1	9.5	3	3
S7_07_ST18	1		69.0	1	62.8	6.2	1	1	62.1	6.9	1	1	60.8	8.2	1	1	59.9	9.1	1	1	59.3	9.7	1	1	58.7	10.3	1	1
S7_08	1		71.9	1	66.9	5.0	1	1	66.4	5.5	1	1	65.3	6.6	1	1	64.9	7.0	1	1	64.5	7.4	1	1	64.3	7.6	1	1
S7_09	1		61.8	0	59.6	2.2	0	0	58.2	3.6	1	0	57.8	4.0	1	0	57.5	4.3	1	0	57.2	4.6	1	1	57.0	4.8	1	1
S7_10	2		67.3	2	64.0	3.3	2	0	63.8	3.5	2	0	60.3	7.0	2	2	59.6	7.7	2	2	59.1	8.2	2	2	58.6	8.7	2	2
S7_11	1		75.6	1	70.5	5.1	1	1	70.1	5.5	1	1	65.9	9.7	1	1	64.9	10.7	1	1	64.2	11.4	1	1	63.6	12.0	1	1
S7_12	2		74.4	2	69.3	5.1	2	2	65.7	8.7	2	2	64.0	10.4	2	2	62.9	11.5	2	2	62.0	12.4	2	2	61.3	13.1	2	2
S7_13_ST20	2		70.5	2	63.3	7.2	2	2	62.3	8.2	2	2	61.4	9.1	2	2	60.8	9.7	2	2	60.1	10.4	2	2	59.7	10.8	2	2
S7_14	1		69.9	1	62.5	7.4	1	1	61.6	8.3	1	1	60.8	9.1	1	1	60.2	9.7	1	1	59.6	10.3	1	1	59.1	10.8	1	1
S7_15	1		68.9	1	62.1	6.8	1	1	60.7	8.2	1	1	59.8	9.1	1	1	59.0	9.9	1	1	58.4	10.5	1	1	58.0	10.9	1	1
S7_16	2		67.7	2	62.8	4.9	2	2	59.1	8.6	2	2	57.7	10.0	2	2	56.7	11.0	2	2	55.9	11.8	2	2	55.4	12.3	2	2
S7_17	2		71.8	2	65.8	6.0	2	2	62.1	9.7	2	2	60.8	11.0	2	2	60.0	11.8	2	2	59.4	12.4	2	2	58.8	13.0	2	2
S7_18	2		76.0	2	70.2	5.8	2	2	67.9	8.1	2	2	65.6	10.4	2	2	64.7	11.3	2	2	64.0	12.0	2	2	63.5	12.5	2	2
S7_19	1		76.9	1	71.5	5.4	1	1	70.1	6.8	1	1	69.6	7.3	1	1	69.4	7.5	1	1	69.3	7.6	1	1	69.2	7.7	1	1
S7_20	2		57.4	0	55.4	2.0	0	0	55.2	2.2	0	0	55.0	2.4	0	0	54.7	2.7	2	0	54.5	2.9	2	0	54.2	3.2	2	0
S7_21	3		56.3	0	54.4	1.9	0	0	54.2	2.1	0	0	53.9	2.4	0	0	53.6	2.7	3	0	53.2	3.1	3	0	52.8	3.5	3	0
S7_22	2		54.5	0	54.2	0.3	0	0	54.1	0.4	0	0	53.8	0.7	0	0	53.6	0.9	0	0	53.3	1.2	0	0	53.0	1.5	0	0
S7_23	1		57.4	0	56.0	1.4	0	0	55.8	1.6	0	0	55.4	2.0	0	0	55.1	2.3	0	0	54.8	2.6	1	0	54.4	3.0	1	0
S7_24	1		58.0	0	56.4	1.6	0	0	56.2	1.8	0	0	55.8	2.2	0	0	55.5	2.5	1	0	55.1	2.9	1	0	54.7	3.3	1	0
S7_25	1		55.8	0	55.2	0.6	0	0	55.1	0.7	0	0	54.8	1.0	0	0	54.5	1.3	0	0	54.1	1.7	0	0	53.7	2.1	0	0
S7_26	1		56.9	0	56.6	0.3	0	0	56.4	0.5	0	0	55.9	1.0	0	0	55.5	1.4	0	0	55.1	1.8	0	0	54.7	2.2	0	0
S7_27	2		64.7	0	62.8	1.9	0	0	61.3	3.4	2	0	60.3	4.4	2	0	59.8	4.9	2	2	59.4	5.3	2	2	59.1	5.6	2	2
S7_28	4		66.3	4	61.9	4.4	4	0	58.6	7.7	4	4	57.4	8.9	4	4	56.8	9.5	4	4	56.0	10.3	4	4	55.6	10.7	4	4
S7_29	3		68.8	3	63.6	5.2	3	3	63.4	5.4	3	3	61.1	7.7	3	3	59.4	9.4	3	3	58.9	9.9	3	3	58.5	10.3	3	3
S7_30	1		70.1	1	64.5	5.6	1	1	64.4	5.7	1	1	62.1	8.0	1	1	61.7	8.4	1	1	61.4	8.7	1	1	61.2	8.9	1	1
S7_31	2		54.9	0	53.1	1.8	0	0	53.0	1.9	0	0	52.8	2.1	0	0	52.6	2.3	0	0	52.3	2.6	2	0	52.1	2.8	2	0
S7_32	2		54.2	0	54.1	0.1	0	0	54.2	0.0	0	0	54.1	0.1	0	0	53.8	0.4	0	0	53.5	0.7	0	0	53.1	1.1	0	0
S7_33	2		51.8	0	52.3	-0.5	0	0	52.0	-0.2	0	0	51.7	0.1	0	0	51.5	0.3	0	0	51.2	0.6	0	0	50.9	0.9	0	0
S7_34	2		56.6	0	55.7	0.9	0	0	55.6	1.0	0	0	55.0	1.6	0	0	54.6	2.0	0	0	54.3	2.3	0	0	53.9	2.7	2	0
S7_35	3		56.9	0	56.3	0.6	0	0	55.6	1.3	0	0	55.2	1.7	0	0	54.8	2.1	0	0	54.4	2.5	3	0	54.1	2.8	3	0
S7_36	3		59.3	0	57.5	1.8	0	0	56.1	3.2	3	0	55.5	3.8	3	0	55.3	4.0	3	0	55.1	4.2	3	0	54.8	4.5	3	3
S7_37	4		57.7	0	55.0	2.7	4	0	52.8	4.9	4	4	52.3	5.4	4	4	51.9	5.8	4	4	51.6	6.1	4	4	51.5	6.2	4	4
S7_38_ST21	3		60.1	0	57.4	2.7	3	0	53.9	6.2	3	3	52.8	7.3	3	3	52.0	8.1	3	3	51.4	8.7	3	3	51.0	9.1	3	3
S7_39	2		65.8	2	60.1	5.7	2	2	60.0	5.8	2	2	58.0	7.8	2	2	57.1	8.7	2	2	56.8	9.0	2	2	56.6	9.2	2	2
S7_40	4		54.1	0	53.2	0.9	0	0	52.5	1.6	0	0	52.1	2.0	0	0	51.8	2.3	0	0	51.5	2.6	4	0	51.3	2.8	4	0
S7_41	5		63.7	0	58.6	5.1	5	5	58.4	5.3	5	5	56.1	7.6	5	5	55.5	8.2	5	5	55.2	8.5	5	5	54.9	8.8	5	5

# of impacted DUs:	**35**	Avg. Insertion Loss:	3.4 dB		Avg. Insertion Loss:	4.5 dB			Avg. Insertion Loss:	5.5 dB			Avg. Insertion Loss:	6.1 dB			Avg. Insertion Loss:	6.5 dB			Avg. Insertion Loss:	6.9 dB		
		Max. Insertion Loss:	7.4 dB		Max. Insertion Loss:	9.7 dB			Max. Insertion Loss:	11.0 dB			Max. Insertion Loss:	11.8 dB			Max. Insertion Loss:	12.4 dB			Max. Insertion Loss:	13.1 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	35 DUs		[1] Impctd w/ 3 dB IL:	35 DUs			[1] Impctd w/ 3 dB IL:	35 DUs			[1] Impctd w/ 3 dB IL:	35 DUs			[1] Impctd w/ 3 dB IL:	35 DUs			[1] Impctd w/ 3 dB IL:	35 DUs		
		Impctd w/ 5 dB IL:	29 DUs		Impctd w/ 5 dB IL:	33 DUs			Impctd w/ 5 dB IL:	35 DUs			Impctd w/ 5 dB IL:	35 DUs			Impctd w/ 5 dB IL:	35 DUs			Impctd w/ 5 dB IL:	35 DUs		
		% Impctd DUs w/ 5 dB IL:	82.9%		% Impctd DUs w/ 5 dB IL:	94.3%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%			% Impctd DUs w/ 5 dB IL:	100.0%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	7 DUs		[2] Non-impctd w/ 5 dB IL:	14 DUs			[2] Non-impctd w/ 5 dB IL:	14 DUs			[2] Non-impctd w/ 5 dB IL:	16 DUs			[2] Non-impctd w/ 5 dB IL:	17 DUs			[2] Non-impctd w/ 5 dB IL:	26 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	42 DUs		Total [1]+[2] for cost:	49 DUs			Total [1]+[2] for cost:	49 DUs			Total [1]+[2] for cost:	51 DUs			Total [1]+[2] for cost:	52 DUs			Total [1]+[2] for cost:	61 DUs		
		Approx. Cost:	$1,691,096		Approx. Cost:	$2,029,315			Approx. Cost:	$2,367,534			Approx. Cost:	$2,705,754			Approx. Cost:	$3,043,973			Approx. Cost:	$3,382,191		
		Approx Cost per DU:	$40,264		Approx Cost per DU:	$41,415			Approx Cost per DU:	$48,317			Approx Cost per DU:	$53,054			Approx Cost per DU:	$58,538			Approx Cost per DU:	$55,446		

Pennsylvania Turnpike MP 320-326 Reconstruction
PTC Ref. 05-045-RD4C, HMMH Job No. 301940
Date and Initials 5/15/2007 ADD

Preliminary Noise Barrier Analysis: NSA-S8

			No Barrier		10-foot Barrier				12-foot Barrier				14-foot Barrier				16-foot Barrier				18-foot Barrier				20-foot Barrier			
Receiver	No. of Dwelling Units	Description	Leq(dBA)	No. of DUs 66+ dBA	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)	Leq(dBA)	IL (dB)	IL 3+ (dB)	IL 5+ (dB)
S8_1-1	3		66.8	3	62.1	4.7	3	3	59.2	7.6	3	3	58.2	8.6	3	3	57.5	9.3	3	3	56.8	10.0	3	3	56.3	10.5	3	3
S8_1-2	4		69.3	4	63.7	5.6	4	4	61.0	8.3	4	4	59.7	9.6	4	4	58.8	10.5	4	4	58.1	11.2	4	4	57.5	11.8	4	4
S8_1-3	4		72.5	4	65.8	6.7	4	4	62.7	9.8	4	4	61.3	11.2	4	4	60.3	12.2	4	4	59.5	13.0	4	4	58.9	13.6	4	4
S8_2-1	4		65.8	4	59.8	6.0	4	4	58.5	7.3	4	4	57.6	8.2	4	4	56.9	8.9	4	4	56.3	9.5	4	4	55.9	9.9	4	4
S8_2-2	4		68.0	4	62.9	5.1	4	4	60.0	8.0	4	4	58.9	9.1	4	4	58.3	9.7	4	4	57.6	10.4	4	4	57.1	10.9	4	4
S8_2-3	4		72.6	4	65.9	6.7	4	4	62.7	9.9	4	4	61.5	11.1	4	4	60.6	12.0	4	4	59.9	12.7	4	4	59.3	13.3	4	4
S8_3-1	4		64.9	0	60.5	4.4	4	0	58.2	6.7	4	4	57.3	7.6	4	4	56.8	8.1	4	4	56.3	8.6	4	4	55.9	9.0	4	4
S8_3-2	4		67.9	4	62.3	5.6	4	4	59.9	8.0	4	4	58.8	9.1	4	4	58.1	9.8	4	4	57.5	10.4	4	4	57.0	10.9	4	4
S8_3-3	4		72.3	4	65.8	6.5	4	4	62.7	9.6	4	4	61.6	10.7	4	4	60.8	11.5	4	4	60.2	12.1	4	4	59.7	12.6	4	4
S8_4-1	3		67.6	3	61.5	6.1	3	3	60.2	7.4	3	3	59.4	8.2	3	3	58.8	8.8	3	3	58.3	9.3	3	3	57.9	9.7	3	3
S8_4-2	4		69.8	4	64.5	5.3	4	4	61.9	7.9	4	4	60.9	8.9	4	4	60.3	9.5	4	4	59.7	10.1	4	4	59.3	10.5	4	4
S8_4-3	4		73.1	4	66.6	6.5	4	4	63.4	9.7	4	4	62.2	10.9	4	4	61.5	11.6	4	4	60.7	12.4	4	4	60.2	12.9	4	4
S8_5-1	3		66.4	3	61.3	5.1	3	3	60.0	6.4	3	3	59.2	7.2	3	3	58.7	7.7	3	3	58.3	8.1	3	3	57.9	8.5	3	3
S8_5-2	4		68.4	4	63.9	4.5	4	4	61.8	6.6	4	4	61.0	7.4	4	4	60.5	7.9	4	4	60.2	8.2	4	4	59.9	8.5	4	4
S8_5-3	4		71.5	4	65.4	6.1	4	4	63.0	8.5	4	4	62.1	9.4	4	4	61.6	9.9	4	4	61.1	10.4	4	4	60.7	10.8	4	4
S8_6-1	3		67.3	3	62.6	4.7	3	3	61.6	5.7	3	3	61.0	6.3	3	3	60.6	6.7	3	3	60.2	7.1	3	3	59.9	7.4	3	3
S8_6-2	4		69.2	4	65.1	4.1	4	0	63.4	5.8	4	4	62.7	6.5	4	4	62.3	6.9	4	4	62.0	7.2	4	4	61.7	7.5	4	4
S8_6-3	4		72.4	4	66.7	5.7	4	4	64.6	7.8	4	4	63.8	8.6	4	4	63.4	9.0	4	4	63.0	9.4	4	4	62.7	9.7	4	4
S8_7-1	3		66.7	3	63.0	3.7	3	0	62.4	4.3	3	0	62.0	4.7	3	3	61.8	4.9	3	3	61.6	5.1	3	3	61.4	5.3	3	3
S8_7-2	4		67.9	4	63.8	4.1	4	0	62.0	5.9	4	4	61.4	6.5	4	4	61.0	6.9	4	4	60.7	7.2	4	4	60.5	7.4	4	4
S8_7-3	4		71.9	4	66.8	5.1	4	4	65.2	6.7	4	4	64.7	7.2	4	4	64.4	7.5	4	4	64.2	7.7	4	4	64.0	7.9	4	4
S8_8-1	2		65.7	2	62.9	2.8	2	0	62.2	3.5	2	0	61.9	3.8	2	0	61.8	3.9	2	0	61.6	4.1	2	0	61.5	4.2	2	0
S8_8-2	4		67.8	4	65.2	2.6	4	0	64.3	3.5	4	0	64.1	3.7	4	0	63.9	3.9	4	0	63.8	4.0	4	0	63.7	4.1	4	0
S8_8-3	4		71.0	4	67.2	3.8	4	0	66.0	5.0	4	4	65.6	5.4	4	4	65.4	5.6	4	4	65.3	5.7	4	4	65.2	5.8	4	4
S8_9	1		63.0	0	60.4	2.6	1	0	58.5	4.5	1	1	57.5	5.5	1	1	57.0	6.0	1	1	56.7	6.3	1	1	56.4	6.6	1	1
S8_10	0		63.4	0	59.9	3.5	0	0	56.9	6.5	0	0	55.9	7.5	0	0	55.1	8.3	0	0	54.5	8.9	0	0	54.0	9.4	0	0
S8_11	0		70.0	0	62.5	7.5	0	0	61.3	8.7	0	0	60.3	9.7	0	0	59.7	10.3	0	0	59.0	11.0	0	0	58.5	11.5	0	0
S8_12-1	4		60.1	0	57.8	2.3	0	0	54.9	5.2	4	4	54.0	6.1	4	4	53.5	6.6	4	4	53.1	7.0	4	4	52.8	7.3	4	4
S8_12-2	4		63.3	0	59.6	3.7	4	0	56.7	6.6	4	4	55.6	7.7	4	4	54.9	8.4	4	4	54.4	8.9	4	4	54.0	9.3	4	4
S8_12-3	4		65.8	4	60.9	4.9	4	4	58.6	7.2	4	4	57.5	8.3	4	4	57.0	8.8	4	4	56.7	9.1	4	4	56.4	9.4	4	4
S8_13-1	3		60.4	0	57.9	2.5	3	0	55.3	5.1	3	3	54.6	5.8	3	3	54.2	6.2	3	3	53.9	6.5	3	3	53.7	6.7	3	3
S8_13-2	4		63.0	0	59.5	3.5	4	0	57.2	5.8	4	4	56.4	6.6	4	4	56.1	6.9	4	4	55.8	7.2	4	4	55.6	7.4	4	4
S8_13-3	4		65.5	4	61.0	4.5	4	4	58.6	6.9	4	4	57.7	7.8	4	4	57.4	8.1	4	4	57.1	8.4	4	4	56.9	8.6	4	4
S8_14-1	4		63.2	0	59.8	3.4	4	0	57.7	5.5	4	4	57.1	6.1	4	4	56.6	6.6	4	4	56.3	6.9	4	4	56.0	7.2	4	4
S8_14-2	4		66.1	4	62.3	3.8	4	0	60.0	6.1	4	4	59.2	6.9	4	4	58.7	7.4	4	4	58.3	7.8	4	4	58.0	8.1	4	4
S8_14-3	4		69.0	4	63.4	5.6	4	4	61.2	7.8	4	4	60.3	8.7	4	4	59.8	9.2	4	4	59.4	9.6	4	4	59.1	9.9	4	4
S8_15-1	4		61.2	0	58.6	2.6	4	0	56.2	5.0	4	4	55.5	5.7	4	4	55.2	6.0	4	4	54.9	6.3	4	4	54.7	6.5	4	4
S8_15-2	4		64.2	0	60.6	3.6	4	0	58.4	5.8	4	4	57.7	6.5	4	4	57.3	6.9	4	4	57.1	7.1	4	4	56.9	7.3	4	4
S8_15-3	4		65.8	4	61.3	4.5	4	4	59.3	6.5	4	4	58.7	7.1	4	4	58.4	7.4	4	4	58.1	7.7	4	4	57.9	7.9	4	4
S8_16-1	4		62.3	0	59.3	3.0	4	0	57.9	4.4	4	0	57.5	4.8	4	4	57.2	5.1	4	4	56.9	5.4	4	4	56.8	5.5	4	4
S8_16-2	4		65.7	4	62.5	3.2	4	0	60.7	5.0	4	4	60.0	5.7	4	4	59.7	6.0	4	4	59.4	6.3	4	4	59.2	6.5	4	4
S8_16-3	4		69.1	4	63.9	5.2	4	4	61.8	7.3	4	4	61.2	7.9	4	4	60.8	8.3	4	4	60.5	8.6	4	4	60.3	8.8	4	4
S8_17-1	3		58.8	0	56.2	2.6	3	0	55.1	3.7	3	0	54.7	4.1	3	0	54.5	4.3	3	0	54.3	4.5	3	3	54.2	4.6	3	3
S8_17-2	4		61.2	0	58.2	3.0	4	0	56.8	4.4	4	0	56.2	5.0	4	4	55.9	5.3	4	4	55.8	5.4	4	4	55.6	5.6	4	4
S8_17-3	3		64.1	0	60.8	3.3	3	0	59.5	4.6	3	3	59.1	5.0	3	3	58.9	5.2	3	3	58.8	5.3	3	3	58.7	5.4	3	3
S8_18-1	2		61.4	0	58.8	2.6	2	0	57.7	3.7	2	0	57.3	4.1	2	0	57.1	4.3	2	0	56.9	4.5	2	2	56.8	4.6	2	2
S8_18-2	4		64.5	0	61.7	2.8	4	0	60.4	4.1	4	0	60.0	4.5	4	4	59.8	4.7	4	4	59.6	4.9	4	4	59.6	4.9	4	4
S8_18-3	4		65.2	0	62.2	3.0	4	0	61.0	4.2	4	0	60.6	4.6	4	4	60.5	4.7	4	4	60.4	4.8	4	4	60.3	4.9	4	4
S8_19-1	3		63.1	0	60.7	2.4	0	0	59.8	3.3	3	0	59.4	3.7	3	0	59.2	3.9	3	0	59.1	4.0	3	0	59.0	4.1	3	0
S8_19-2	3		65.4	0	63.1	2.3	0	0	62.2	3.2	3	0	61.8	3.6	3	0	61.7	3.7	3	0	61.6	3.8	3	0	61.5	3.9	3	0
S8_19-3	4		67.6	4	64.9	2.7	4	0	64.2	3.4	4	0	64.0	3.6	4	0	63.8	3.8	4	0	63.7	3.9	4	0	63.7	3.9	4	0
S8_20-1	4		60.7	0	59.9	0.8	0	0	59.6	1.1	0	0	59.4	1.3	0	0	59.4	1.3	0	0	59.3	1.4	0	0	59.3	1.4	0	0
S8_20-2	3		63.1	0	62.3	0.8	0	0	62.0	1.1	0	0	61.8	1.3	0	0	61.8	1.3	0	0	61.7	1.4	0	0	61.7	1.4	0	0
S8_20-3	4		67.0	4	64.9	2.1	0	0	64.3	2.7	4	0	64.2	2.8	4	0	64.1	2.9	4	0	64.0	3.0	4	0	64.0	3.0	4	0
S8_21	0		70.3	0	65.7	4.6	0	0	65.3	5.0	0	0	65.0	5.3	0	0	64.8	5.5	0	0	64.6	5.7	0	0	64.5	5.8	0	0
S8_22_ST24	0		69.2	0	64.1	5.1	0	0	63.1	6.1	0	0	62.6	6.6	0	0	62.2	7.0	0	0	61.8	7.4	0	0	61.5	7.7	0	0

# of impacted DUs:	**121**	Avg. Insertion Loss:	4.1 dB		Avg. Insertion Loss:	6.0 dB			Avg. Insertion Loss:	6.7 dB			Avg. Insertion Loss:	7.1 dB			Avg. Insertion Loss:	7.5 dB			Avg. Insertion Loss:	7.7 dB		
		Max. Insertion Loss:	7.5 dB		Max. Insertion Loss:	9.9 dB			Max. Insertion Loss:	11.2 dB			Max. Insertion Loss:	12.2 dB			Max. Insertion Loss:	13.0 dB			Max. Insertion Loss:	13.6 dB		
Impacted receptors w/ min. 3 dB IL:		[1] Impctd w/ 3 dB IL:	117 DUs		[1] Impctd w/ 3 dB IL:	121 DUs			[1] Impctd w/ 3 dB IL:	121 DUs			[1] Impctd w/ 3 dB IL:	121 DUs			[1] Impctd w/ 3 dB IL:	121 DUs			[1] Impctd w/ 3 dB IL:	121 DUs		
		Impctd w/ 5 dB IL:	84 DUs		Impctd w/ 5 dB IL:	104 DUs			Impctd w/ 5 dB IL:	107 DUs			Impctd w/ 5 dB IL:	107 DUs			Impctd w/ 5 dB IL:	107 DUs			Impctd w/ 5 dB IL:	107 DUs		
		% Impctd DUs w/ 5 dB IL:	69.4%		% Impctd DUs w/ 5 dB IL:	86.0%			% Impctd DUs w/ 5 dB IL:	88.4%			% Impctd DUs w/ 5 dB IL:	88.4%			% Impctd DUs w/ 5 dB IL:	88.4%			% Impctd DUs w/ 5 dB IL:	88.4%		
Benefited (non-impacted) receptors:		[2] Non-impctd w/ 5 dB IL:	0 DUs		[2] Non-impctd w/ 5 dB IL:	35 DUs			[2] Non-impctd w/ 5 dB IL:	51 DUs			[2] Non-impctd w/ 5 dB IL:	51 DUs			[2] Non-impctd w/ 5 dB IL:	56 DUs			[2] Non-impctd w/ 5 dB IL:	56 DUs		
Total DUs for cost reasonableness:		Total [1]+[2] for cost:	117 DUs		Total [1]+[2] for cost:	156 DUs			Total [1]+[2] for cost:	172 DUs			Total [1]+[2] for cost:	172 DUs			Total [1]+[2] for cost:	177 DUs			Total [1]+[2] for cost:	177 DUs		
		Approx. Cost:	$525,897		Approx. Cost:	$631,076			Approx. Cost:	$736,256			Approx. Cost:	$841,436			Approx. Cost:	$946,615			Approx. Cost:	$1,051,794		
		Approx Cost per DU:	$4,495		Approx Cost per DU:	$4,045			Approx Cost per DU:	$4,281			Approx Cost per DU:	$4,892			Approx Cost per DU:	$5,348			Approx Cost per DU:	$5,942		