NAVARRO & WRIGHT
CONSULTING ENGINEERS, INC.
151 Reno Avenue, New Cumberland, PA 17070

DRAFT FINAL DESIGN NOISE ANALYSIS REPORT

I-95/I-276 (PA TURNPIKE) INTERCHANGE PROJECT
SECTION I-95-C
Bensalem Township, Bucks County, PA

Prepared For: **Pennsylvania Turnpike Commission**

Report Issued: **April 2025**

SUBMITTED TO:
WSP
350 Eagleview Boulevard, Suite 250
Exton, PA 19341

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1.0 EXECUTIVE SUMMARY

The Pennsylvania Turnpike Commission (PTC) is currently in the final design engineering phase for Section I-95-C of the I-95/I-276 Interchange project in Bensalem Township, Bucks County, Pennsylvania. **Figure 1** provides a Project Location Map to present the limits of the project area.

To support the project's 2001 Final Environmental Impact Statement, a 2006 Preliminary Engineering Noise Analysis (PENA) report was developed and approved for the project. The PENA provides a complete assessment of the noise environment and traffic noise abatement recommendations considered during the preliminary engineering design phase. This Draft Final Design Noise Analysis Report documents refinements to the project engineering that have occurred subsequent to the 2006 PENA.

The project proposes to widen and reconstruct the Pennsylvania Turnpike (I-276) from the Galloway Road overpass to the Bensalem Boulevard overpass. The current four-lane configuration will be widened to six lanes (three in each direction). Corresponding improvements to medians, shoulders, grading, and drainage features will also be included as part of the project.

The proposed project is considered a Type 1 Transportation Improvement Project and is eligible for consideration of noise abatement, if warranted, following the final design noise analyses and community input regarding the desire for noise abatement in the corridor. The "Type 1" determination is based on the magnitude of the proposed improvements, as described below:

- The addition of through traffic lanes,
- substantial vertical alteration by altering the topography between the highway noise source and the receptor(s).

This final design analysis documents existing (2023) and design year (2050) traffic noise conditions within the Section I-95-C corridor. The noise analysis incorporated noise monitoring data, as well as noise modeling of existing and future conditions using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), version 2.5. Noise modeling was performed to predict noise levels throughout the project area under worst-case, peak-hour traffic conditions associated with existing conditions, the design year No-Build Alternative, and the design year Build Alternative.

The PENA identified five (5) Noise Study Areas (NSAs) where noise abatement was found to be warranted, feasible, and reasonable (see **Figure 2**). The results of the draft final design analysis indicate that noise levels are still anticipated to approach or exceed the PennDOT/FHWA Noise Abatement Criteria (NAC) at multiple noise sensitive receptors within NSAs 13, 14, 15, 16 and 29 in the design year. Therefore, an evaluation of noise abatement for these NSAs is warranted. Abatement in the form of vertical noise barriers

and barrier systems have been identified to be both feasible and reasonable for impacted receptors in all five (5) NSAs.

Following PTC/FHWA review and approval of the Draft Final Design Highway Traffic Noise Report, the project team will initiate noise-specific public involvement activities. This allows the community the opportunity to provide input based on the proposed location, type, height, length, and other aesthetic considerations of the noise abatement feature.

A Final Report will be developed to comprehensively document reasonableness of the proposed abatement alternatives shown on **Figures 7 - 10** of this report, including barrier-specific feedback received as a result of public outreach.

2.0 INTRODUCTION

The PTC has authorized the development of final design engineering for Section I-95-C of the I-95/I-276 Interchange project, located in Bensalem Township, Bucks County, Pennsylvania. **Figure 1** provides a Project Location Map to present the limits of the project area.

The Section I-95-C project involves the widening and reconstruction of an approximate 2.1-mile, limited access expressway (I-276). The project study area extends from the Galloway Road overpass in the west to the Bensalem Boulevard overpass in the east. The existing I-276 roadway consists of four lanes (two in each direction), traversing both cut and fill conditions on both sides of the highway through the corridor. The proposed design would widen the roadway to accommodate six lanes of traffic (three in each direction). Additional design features include revised medians, shoulders, grading, and drainage features within the right-of-way.

Note that the I-276 section west of the Galloway Road overpass was evaluated as part of the Section I-95-B analysis. The I-276 mainline section east of the Bensalem Boulevard overpass was evaluated as part of the Section I-95-D analysis.

Project engineering refinements have advanced in the time that has elapsed since the 2001 FEIS and 2006 PENA. A higher level of detail has been developed related to the right-of-way, roadway, and grading plans. Additionally, traffic data projections have been updated for the existing (base) and design (future) years. The purpose of the final design noise analysis is to review the engineering and traffic changes that have occurred over time, along with any potential changes to noise sensitive land use, and to verify and refine the abatement recommendations of the PENA. Additional required elements including solicitation and documentation of input from the affected communities will occur once the proposed final design abatement features have been approved.

Noise sensitive land use in the corridor is primarily composed of residences, as well as recreational spaces including a bocci court and dog park. Residential unit types are of varying density including apartment complexes and detached single- and multi-unit homes. Active sports areas include multi-use sports fields and a walking trail associated with the Bensalem Township Community Park at the western end of the project area.

A comprehensive noise analysis of the project area was conducted during the preliminary engineering phase of the project. This assessment is documented in the "I-95/I-276 (Pennsylvania Turnpike) Interchange, Central Turnpike Widening Section, Contract I-95-C, Preliminary Engineering Noise Study", dated August 2006. A digital copy of that report is available upon request. Public outreach occurred following approval of that report, during which the public provided an initial response to the results of the analysis.

As documented in the preliminary design noise analysis, design year (2025) noise levels were projected to approach or exceed the PennDOT/FHWA Noise Abatement Criteria

(NAC) at various locations throughout the limits of the project area. NSAs 13, 14, 15, 16, and 29 were found to contain impacts in the preliminary engineering assessment. Based on the presence of impacts and the scale of subsequent changes to the interchange design, this final design noise analysis focuses only on these NSAs. No intervening changes to land use have been identified that necessitate addition or modification of project NSAs.

The following sections of this report provide a complete assessment of the noise environment in those NSAs, documents the noise abatement designed and evaluated to alleviate anticipated noise impacts feasibly and reasonably, and presents the final noise abatement measures that are recommended for construction as part of the project.

3.0 NOISE ANALYSIS METHODOLOGY

The methodologies applied to this noise analysis are in accordance with PennDOT's *Project Level Highway Traffic Noise Handbook,* Publication No. 24, May 2019 (Publication 24). PennDOT guidelines are based on the U.S. Department of Transportation, Federal Highway Administration (FHWA), Federal Aid Policy Guide 23, Code of Federal Regulations (CFR), Part 772 – *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Additional guidance and policy interpretation applied to this analysis is based on the U.S. Department of Transportation, Federal Highway Administration, *Highway Traffic Noise Analysis and Abatement Guidance* (FHWA-HEP-10-025, December 2011).

The proposed project is considered a Type 1 transportation improvement project. Given the magnitude of the proposed improvements, detailed noise analyses were conducted during both the preliminary and final engineering design phases of the project, in accordance with PennDOT/FHWA procedures. Analyses included noise monitoring of ambient (2006) conditions to allow for computer modeling of worst-case existing (2023) and design year (2050) conditions using the FHWA TNM 2.5 computer model.

Table 1 provides the PennDOT/FHWA Land Use Activity Categories, along with descriptions of specific land uses associated with each Activity Category. Also included in **Table 1** are the Noise Abatement Criteria (NAC) for each of the identified Activity Categories. Noise impacts are described as impacts that occur when predicted (design year) noise levels approach or exceed the NAC shown in **Table 1**. The term "approach" has been defined by PennDOT as 1-dBA below the criteria identified in **Table 1** for Activity Categories A, B, C, D and E.

In addition to the absolute criteria defined in **Table 1**, noise impacts can also occur when design year noise levels substantially exceed existing noise levels. PennDOT defines the "Substantial Noise Increase" Criteria for Activity Categories A, B, C, D and E Land Uses as increases of 10-dBA or greater when comparing worst-case existing noise levels to worst-case design year conditions. A 10-dBA (or more) increase in noise levels reflects the generally accepted range of increase which is likely to cause sporadic to widespread complaints, and is perceived by the human ear as a doubling of traffic noise emissions.

Noise levels at receptors that satisfy either of the criteria described above "warrant" further consideration for noise abatement to mitigate the predicted impacts.

The evaluation of noise abatement (where "warranted") is performed in two phases. Noise abatement must be evaluated for "feasibility" and for "reasonableness" to determine if it is appropriate to incorporate noise abatement measures into the final roadway design plans. Noise abatement feasibility addresses acoustical and engineering parameters to determine if a specific abatement measure is effective at reducing noise levels, as well as if that abatement measure can be constructed without introducing significant engineering or safety challenges that would preclude construction.

There are seven (7) parameters that must be addressed in order for noise abatement at a specific location to be determined feasible. For noise abatement (e.g., a noise barrier) to be found feasible, the answers to all seven (7) parameters must be "yes". The parameters to be considered when determining noise barrier feasibility are:

1. Can a 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. Can the noise barrier be constructed without causing a safety problem?
4. Can the noise barrier be constructed without restricting access to vehicular or pedestrian travel?
5. Can the noise barrier be constructed in a manner that allows for access for required maintenance and inspection operations?
6. Can the noise barrier be constructed in a manner that allows utilities to adequately function?
7. Can the noise barrier be constructed in a manner that allows drainage features to adequately function?

Noise barriers that successfully pass the feasibility test, considering the parameters above, are then evaluated for reasonableness to ensure noise abatement is appropriate for a given area or project. As per Publication 24, noise barrier reasonableness is determined by assessing multiple issues including (1) Noise Barrier Cost Reasonableness Values; (2) Noise Reduction Design Criteria and Goals; and (3) Consideration of Viewpoints (of benefitted receptors). Following is a summary of each of the items that are evaluated to determine if a specific noise abatement measure (i.e., typically a noise barrier) is reasonable.

PennDOT's "Noise Barrier Cost Reasonableness Value" is based upon a Maximum Square Footage of Abatement per Benefitted Receptor (MaxSF/BR) value of 2,000 or less. This MaxSF/BR criterion is applied statewide as part of the reasonableness determination process for all projects. In determining the "Square Footage per Benefitted Receptor (SF/BR)" value, the total square footage (SF) of a noise barrier is divided by the total number of "Benefitted Receptors" (BR) to determine if the abatement measure would be considered "reasonable". Any receptor that receives a 5-dBA or greater noise reduction (or insertion loss (IL)) is considered a "Benefitted Receptor" and included in the MaxSF/BR calculation and index comparison. Noise abatement measures that are calculated with a MaxSF/BR value of 2,000 or less are further considered for incorporation into the project.

PennDOT's "Noise Reduction Design Criteria and Goals" are intended to ensure that an optimized noise barrier design is established to achieve the most effective noise barrier in terms of both noise reduction and cost. While a 5-dBA noise reduction at the majority of the impacted receptors is required as part of the feasibility criteria, the following (tiered)

noise barrier abatement goals should be addressed when evaluating the reasonableness of any abatement measure for Activity Category A, B, C, and E land use facilities:

1. It is required that exterior noise levels be reduced by at least 7-dBA for at least one (1) benefitted receptor.
2. While conforming to the MaxSF/BR Criteria, it is desirable to obtain the 7-dBA minimum exterior insertion loss for additional impacted receptor sites if justified by a "point of diminishing returns" evaluation.
3. While conforming to the MaxSF/BR Criteria, it is desirable to provide additional exterior insertion loss above the 7-dBA minimum if justified by a "point of diminishing returns" evaluation.
4. If possible, it is desirable to reduce exterior noise levels to the low-60-decibel range (60-63) for Category B and C receptors and the upper-60-decible range (65-68) for Category E receptors.
5. If possible, it is desirable to reduce future exterior noise levels back to existing exterior noise levels.

When optimizing a potential noise barrier, the tiered sets of required and desirable abatement goals listed above are evaluated in terms of establishing noise reductions for impacted receptors only, and not for non-impacted receptors.

The final test associated with noise abatement reasonableness is the "Consideration of Viewpoints" (of property owners and residences benefitted by the proposed abatement). During this step, the viewpoints of all benefitted receptors are solicited in order to document their preferences related to a specific noise abatement option that is being considered for construction. Although the public may express opinions regarding the desire for (or against) particular noise abatement measures at any point in the development of a project, the solicitation of viewpoints does not formally occur until information contained within the draft version of the Final Design Noise Analysis Report has been approved for circulation to the public by the PTC and FHWA.

This final step in the noise abatement reasonableness determination allows the affected community the opportunity to provide input based on the proposed location, type, height, and length of the noise abatement feature. Community input includes support or opposition to the construction of the specific abatement measure, as well as preferences on the color and texture of the community-facing side of a noise barrier (assuming it is accepted by the community). When considering a specific noise abatement option, 50% or greater of the "benefitted receptors" must be in favor of the option in order for that option to be considered reasonable. Noise abatement options that are not supported by 50% or greater of the benefitted receptors are determined to be not reasonable. Generally, this phase of the reasonableness analysis cannot be determined until the end of the final design phase of the project.

Absorptive-faced barriers are required to be evaluated for parallel barrier configurations (a barrier located on both sides of the highway) where the ratio of the distance between the barriers to barrier-height is less than 10:1 (e.g., a configuration such that a 100-foot cross

section is flanked on both side by sound barriers at least 10 feet high). Parallel barriers in this configuration have the potential to degrade barrier performance due to multiple reflections creating an effect similar to a resonating chamber. Consideration of absorptive barriers is typically deferred to the final design phase as it requires detailed project engineering in order to be accurately assessed. The analysis uses TNM's "Parallel Barrier Analysis Module" and requires evaluation at a minimum of three (3) cross-sections, including one within 500-feet of the barrier terminus. Cross-sections chosen for analysis should include known variations of varying geometric relationships between roadway and receivers within the affected NSA(s), such as roadway in cut, at-grade, or on fill. Both a reflective and absorptive scenario are run for each cross-section to provide data for comparative analysis.

It's PennDOT's policy to permit the use of absorptive walls in parallel barrier configurations when:

- The degradation results in noise levels and/or insertion loss values that cause the barrier not to be feasible and/or reasonable.
- One or all of the noise abatement goals are not met because of the parallel barrier degradation.
- A reasonable increase of the barrier height does not counter the negative effect of parallel barrier reflective noise.

The final design noise analysis for Section I-95-C has been performed in accordance with the methodology outlined above. This methodology is in accordance with current PennDOT and FHWA procedures, as detailed in PennDOT's Publication 24. The results of this analysis are fully documented within this report.

4.0 EXISTING HIGHWAY TRAFFIC NOISE ENVIRONMENT

The noise analysis was initiated during the preliminary design phase by reviewing the project area to identify the locations of noise-sensitive land uses within meaningful proximity to the proposed improvements. The selection of noise monitoring locations was guided by the location of noise-sensitive land uses, the relative influence of non-highway noise sources on ambient sound levels, the location of existing (local) roadways in the project area, and the limits and design specifications associated with the proposed improvements. **Figure 2** provides an aerial view of the Section I-95-C project area.

Noise-sensitive land uses listed in **Table 1** are present and adjacent to the proposed transportation facility. Residential structures, classified as Land Use Activity Category B receptors, represent the majority of land uses in this section. Additionally, there is an outdoor use associated with a dog park in NSA 13 and a bocce court in NSA 14, as well as sporting fields and a walking trail associated with the Bensalem Township Community Park in NSA 29, all of which are Activity Category C receptors.

For organizational purposes, the project was split into multiple NSAs based on common areas of highway traffic noise influence. NSAs are groupings of noise-sensitive land uses that have similar noise levels and common noise influences. NSAs are also useful for considering the benefits of noise abatement and evaluating noise abatement measures for feasibility and reasonableness. For consistency, the PENA's NSA naming convention and boundaries have been retained in this final design analysis. **Figure 2** identifies the locations of the NSAs that have been evaluated for this assessment. The PENA concluded that noise abatement assessment was warranted, feasible, and reasonable for all five (5) NSAs in the project area.

4.1 Noise Monitoring

The noise monitoring data used in the final design analysis was initially conducted as part of the 2006 PENA. The monitoring data was evaluated and determined to be valid for use in the project's final design noise analysis, given no intervening changes to the roadway/receiver geometries and the presence of free-flow mainline traffic during all monitoring sessions.

In order to provide data to assist with noise model validation, noise monitoring was conducted at 22 locations within the project area for short-term durations. The locations of the noise monitoring sites are displayed in **Figures 3 - 6**. Noise monitoring receptor site data is shown in **Table 2**.

Noise Monitoring was performed at each of the selected noise monitoring locations using Bruel & Kjaer 2236 and RION NL-22 sound level meters. Readings were taken on the A-weighted scale and reported in decibels (dBA). The noise monitoring equipment meets all requirements of the American National Standard Specifications for Sound Level Meters,

ANSI S1.4-1983 (R2006), and meets all requirements as defined by FHWA. Noise monitoring was conducted in accordance with the methodologies contained in FHWA-PD-96-046, *Measurement of Highway-Related Noise* (FHWA, May 1996).

Noise levels were monitored for 20-minute durations at each monitoring location. Details collected by the sound level meters include date, time, and noise level data for each 10-second interval. Additional data collected at each monitoring location included atmospheric conditions, wind speed, background noise sources, and atypical or non-traffic-related noise influences. Traffic data (vehicle volume and speed) were also observed and recorded on all roadways which contribute to the ambient noise levels. Traffic was grouped into one (1) of five (5) categories: automobiles, medium trucks, heavy trucks, buses, and motorcycles, as per PennDOT/FHWA procedures. Copies of the noise monitoring data sheets and noise monitoring data are included in **Appendix B**.

Short-term noise monitoring was conducted on November 1-3 and November 8, 2005. During the monitoring sessions, traffic on contributing roadways was generally free flow, allowing for TNM model validation.

The following is a summary of monitored noise levels in the NSA being carried forward into final design phase analysis:

NSA 13
NSA 13 is located north of I-276 in the center of the project area, and consists of residences along Columbia Drive, Woodsview Drive, and within The Crossings at Neshaminy apartment complex. Units within the apartment complex consist of both first- and second-floor exterior patios and balconies, and there is a dog park in the southwest corner of the common exterior use area. Parcels at the western end of NSA 13 are generally at-grade relative to I-276, with the roadway partially shielded by intervening terrain. Moving east, the roadway gradually transitions into a deepening cut condition (below-grade relative to the community) heading east as it approaches the Hulmeville Road overpass.

NSA 13 is comprised of Category B (residential) and Category C (dog park) land uses. NSA 13 includes five (5) monitored sites (M2, M2A, M2B, M2C, and M2D) and 79 modeled sites (13.1-A through 13.3-V), representing 84 residences and the dog park.

All monitoring sites within this NSA are acoustically dominated by the I-276 mainline traffic. Site M2A represents the front corner of The Crossings at Neshaminy apartment complex at the western end of the NSA. Sites M2C and M2D represent front- and second-row receptors along Woodsview Drive, generally in the center of the NSA. Sites M2 and M2B represent front- and second-row receptors along Woodsview Drive, at the eastern end of the NSA. Noise levels at these sites were monitored between 58 and 70 dBA, with the front-row sites experiencing the higher levels.

NSA 14
NSA 14 is located south of I-276 in the center of the project area, and primarily consists of multi-unit residences in The Villas at Chancellor's Glen community which also includes a bocce court. There are two additional detached single-family homes at the western end of the NSA along Hulmeville Road. Parcels at the eastern end of NSA 14 are generally at-grade relative to I-276, but the roadway transitions to a deepening cut condition heading east as it approaches the Hulmeville Road overpass.

NSA 14 is comprised of Category B (residential) and Category C (bocce court) land uses. NSA 13 includes two (2) monitored sites (M3 and M3A) and 40 modeled sites (14-A through 14-NN), representing 87 residences and the bocce court.

Both monitoring sites within this NSA are acoustically dominated by the I-276 mainline traffic. Site M3 represents a front-row receptor along Liberty Drive in the middle of the NSA. Site M3A represents a second-row receptor along Liberty Drive in the middle of the NSA, generally aligned with Site M3. Noise levels at these sites were monitored at 68 and 61 dBA respectively, with the front-row site experiencing the higher level.

NSA 15
NSA 15 is located north of I-276 at the eastern end of the project area, and consists of residences along (generally from west to east) Michael Drive, Point Drive, Carolyn Court, Maryanne Court, Bedci Court, Mark Circle, Snapdragon Court, Clearview Avenue, and Lewisville Avenue. All of the residences are single-family homes. Parcels at the western end of NSA 15 are generally at-grade relative to I-276, with the roadway transitioning to a fill condition (above grade relative to the community) through the section adjacent to Carolyn Court, Maryanne Court, and Bedci Court. Moving east, the roadway quickly transitions into a cut condition approaching the Bensalem Boulevard overpass.

NSA 15 is comprised of Category B (residential) land uses. NSA 15 includes six (6) monitored sites (M4, M4A, M4B, M4C, M4D, and M4E) and 105 modeled sites (15-A through 15-AAAAA), representing 148 residences.

All monitoring sites within this NSA are acoustically dominated by the I-276 mainline traffic. Sites M4D and M4E represent front- and second-row receptors along Carolyn Court in the western portion of the NSA. Sites M4 and M4A represent front- and second-row receptors at the Point Drive cul-de-sac, generally in the center of the NSA. Sites M4B and M4C represent front- and second-row receptors along Clearview Avenue, in the eastern portion of the NSA. Noise levels at these sites were monitored between 62 and 73 dBA, with the front-row sites experiencing the higher levels.

NSA 16
NSA 16 is located south of I-276 at the eastern end of the project area, and consists of residences along (generally from west to east) Adler Lane, Badger Road, Cricket Lane, Eagen Court, Captain Milton E Major Avenue, Texas Avenue, Grant Avenue, Florida Avenue, Tennessee Avenue, and Spring Avenue. All of the residences are single-family

homes. Parcels at the western end of NSA 16 are slightly above-grade relative to I-276, with the roadway transitioning to a fill condition through the section adjacent to Cricket Lane and Eagen Court. Moving east, the roadway transitions into a cut condition adjacent to Texas Avenue, which deepens approaching the Bensalem Boulevard overpass.

NSA 16 is comprised of Category B (residential) land uses. NSA 16 includes eight (8) monitored sites (M5, M5A, M5B, M5C, M5D, M5E, M5F, and M5G) and 91 modeled sites (16-A through 16-MMMM) representing 122 residences.

All monitoring sites within this NSA are acoustically dominated by the I-276 mainline traffic, with contributing influence at Sites M5B and M5C from Bensalem Boulevard. Sites M5D and M5E represent front- and second-row parcels along Adler Lane at the western end of the NSA. Sites M5 and M5A represent front- and second-row receptors along Cricket Lane, generally in the center-west of the NSA. Sites M5F and M5G represent front- and second-row receptors along Grant Avenue, in the center-east portion of the NSA. Sites M5B and M5C represent front- and second-row receptors along Spring Avenue and Tennessee Avenue at the eastern end of the NSA. Noise levels at these sites were monitored between 57 and 68 dBA, with the front-row sites experiencing the higher levels.

NSA 29

NSA 29 is located north of I-276 at the western end of the project area, and consists of multi-use athletic fields and a walking trail associated with the Bensalem Township Community Park. Athletic fields at the western end of NSA 29 are generally at-grade relative to I-276, but are partially shielded by an elevated I-276 maintenance access roadway coming down from Galloway Road to the mainline. Moving east, the roadway transitions to a cut condition which extends to the end of the eastern limit of the walking trail.

NSA 29 is comprised of Category C (active sport areas) land use. NSA 29 includes one (1) monitored site (M1) and 25 modeled sites (29-A through 29-Y), representing 25 equivalent residential units (ERUs). The purpose of ERUs and their delineation are described in detail in **Section 4.2** below.

The monitoring site within this NSA is acoustically dominated by the I-276 mainline traffic. Site M1 represents a portion of two athletic fields that are in close proximity to the I-276 right-of-way boundary in the center-west portion of the NSA. Noise levels at this site were monitored at 61 dBA.

4.2 Noise Modeling of Existing Conditions

Computer modeling is the accepted technique for predicting and evaluating existing and future noise levels associated with traffic-induced noise. Currently, the FHWA Traffic Noise Model (TNM) version 2.5 is the FHWA-approved highway noise prediction computer model used in Pennsylvania. The TNM software package has been established as a reliable tool for predicting noise generated by highway traffic. TNM incorporates

specific engineering design information and project mapping elements to evaluate traffic-induced noise levels. The information applied to the modeling effort includes geo-referenced base-mapping, existing and proposed contour files, existing and proposed roadway design files (including profiles and cross-sections), and existing and future traffic data (including vehicle volume, composition, and speed).

Additional features identified in the field and accounted for in the TNM noise modeling effort include existing terrain features, tree zones, buildings and building rows, as well as existing local roadways that provide measurable noise influences at adjacent noise receptors. Base mapping and field views were used to identify noise-sensitive land uses within the project corridor, as well as areas of frequent outdoor human activity for Category C land uses.

The noise modeling process is initiated with computer model validation. This is accomplished by comparing monitored noise levels with noise levels generated by TNM, using traffic characteristics that were present during the noise monitoring effort. This comparison ensures that reported changes in noise levels between existing and future conditions are due to changes in roadway/traffic conditions and not to discrepancies between monitoring and modeling techniques. Differences of three (3) decibels or less between monitored and modeled levels are considered acceptable for TNM validation, as this is the limit of change detectable by the typical human ear in typical noisy settings and is used by PennDOT as the calibration benchmark.

Model validation had previously occurred in the development of the 2006 PENA. The project team determined that although the initial monitoring data remains valid for use as the foundation of project noise modeling, the 2006 PENA validation models were not compatible with project goals given the level of detail required for final design noise abatement analyses.

Table 2 provides a summary of the updated model validation for the project. Column 6 of **Table 2** provides the monitored noise level at the identified locations. Column 7 provides the TNM modeled noise levels (including the traffic characteristics recorded in the field). Column 8 displays the difference between monitored and modeled values.

The majority of the monitoring sites show a difference of 3 dBA or less between monitored and modeled values, indicating the model accurately represents the existing conditions at those locations. However, three (3) receptors were not able to be validated by the model. The model over-predicted noise levels at Sites M3, M4B, and M5D between 4 to 6 dBA. Given the over-prediction at all three (3) receptors, the project team reviewed the available monitoring data in an attempt to identify atypical conditions during the monitoring sessions at these locations; none were identified. Next, the TNM models for those receptors were re-evaluated to verify accurate depiction of the local topography, paying close attention to potential shielding elements that may lower the predicted levels to within acceptable tolerances; none were identified. A field investigation was conducted to further assess the local environment to determine the potential existence of other local features or conditions

in those areas that may have affected the noise monitoring activities and TNM representation of the topography; none were identified. Given the accurate prediction of noise levels at the majority of the monitored sites (including those in close proximity to Sites M3, M4B and M5D), the models have been determined to be suitable for use in predicting worst case noise levels in the existing, no-build, and build conditions through the project corridor. While the model is overpredicting noise levels at these individual locations, it has the effect of expanding the potential impact zone to be considered for abatement and yields a worst-case scenario that favors the community, further supporting its use.

Following the noise model validation phase, additional noise modeling was performed to evaluate existing (2023) noise levels more comprehensively under worst-case traffic conditions. As part of the worst-case existing condition modeling effort, additional "modeled-only" sites were added to thoroughly predict existing traffic noise levels and propagation characteristics throughout the project corridor.

The locations of all noise modeling sites are displayed on **Figures 3 - 6**. The modeling sites used in the final design phase differ from those utilized and reported in the PENA as models were refined to predict noise levels more accurately at individual properties.

Noise modeling sites were selected to be representative of one or more noise-sensitive receptors present within the NSAs. The majority of the receptors in the project area represent Category B (residential) land use. However, given the presence of Category C land uses within the project area, noise receptor attributes were developed using the ERU guidelines set forth in Appendix E of PennDOT's Publication 24. The ERU value is developed to represent the degree of use which occurs at a given site. Therefore, while the ERU for a single-family dwelling is always one, ERU values for other sites will vary based on a variety of factors. The guidelines outlined in Appendix E of Publication 24 allow for development of ERUs utilizing "any reasonably supported approach" at the discretion of the noise analyst.

No ERU calculations were developed in the PENA for the dog park in NSA 13 (Site 13.1-A). Given that it's a non-impacted site that is irrelevant to the abatement recommendations, a base value of one (1) has been assigned. Similarly, no ERU calculations were developed in the PENA for the bocce court in NSA 14 (Site 14-FF), given that it's a non-impacted site that is irrelevant to the abatement recommendations. A base value of one (1) has been assigned for that site.

The ERUs reflected in the PENA for the athletic fields and walking trail in NSA 29 were not in accordance with PennDOT's current ERU guidelines, and have been modified for the final design analysis. In accordance with Appendix E's "Methodology for Evaluating Activities Occurring Over an Area of Land", a receptor grid was developed using lateral and perpendicular 130' spacing between points. This yielded 25 grid points within the NSA boundary. A base value of one (1) per grid point was employed in this analysis to provide consistency with the recommendations of the PENA.

The worst-case existing condition modeling effort relies on worst-case existing traffic data (supplied by the project's traffic engineering team) to predict peak noise levels. Traffic data employed for the noise analysis can be found in **Appendix C**.

Column 6 of **Tables 3 - 7** provides a summary of worst-case existing (2023) noise levels throughout the project area under peak travel periods.

Based on a review of the modeling data, existing peak-hour noise levels currently approach or exceed the PennDOT/FHWA NAC in portions of NSA 13, NSA 14, NSA 15, NSA 16, and NSA 29. Existing noise impacts are generally limited to front-row receptors, but extend deeper into the communities represented by NSA 13, NSA 15, and NSA 16 due to local topography.

5.0 FUTURE HIGHWAY TRAFFIC NOISE ENVIRONMENT

There is currently one (1) design alternative being evaluated as part of the final design phase of Section I-95-C. **Figure 2** displays the section limits and general engineering details associated with the project. See **Section 2.0 Introduction** for a complete description of the proposed improvements. There are no known qualifying property displacements associated with the proposed improvements.

PennDOT's Publication 24 and associated FHWA guidance requires the prediction and reporting of both Future No-Build (the existing roadway network with design year traffic) and Build (incorporating all design elements and design year traffic that reflects the altered system) condition worst-case traffic noise levels.

The design year No-Build models were developed by incorporating design year (2050) No-Build peak hour traffic into the existing-condition baseline TNM models. Design year traffic volumes, vehicle composition, and speeds were assigned to existing roadways represented in the models.

The design-year Build-condition noise models were created by incorporating the proposed future roadway improvements (including changes to the existing highway's vertical and horizontal alignment as well as necessary re-grading of terrain along traffic-noise propagation pathways) to the validated existing condition noise model. Design year (2050) traffic volumes, vehicle composition, and speeds were then assigned to all modeled roadways in the project study area.

5.1 Design Year (2050) No-Build Conditions

As shown in Column 7 of **Tables 3 - 7,** the design-year No-Build traffic noise levels are anticipated to increase by 1-2 dBA at receptors within the project area (as compared to the existing condition). This is in accordance with expectations given the relative increases in traffic volumes over time identified by the traffic study.

5.2 Design Year (2050) Build Conditions

Design year (2050) Build Alternative traffic noise levels were modeled to determine if future noise levels are projected to approach or exceed the PennDOT/FHWA NAC under the current project design. If the PennDOT/FHWA NAC are approached or exceeded at any receptor under the Build Alternative, noise abatement consideration is warranted for those locations.

Column 8 in **Tables 3 – 7** provides a summary of design year worst-case noise levels at each receptor site under the Build Alternative. The following discussion provides a summary of the Build Alternative noise levels for each NSA. Digital copies of all FHWA TNM noise modeling files for the project are available upon request.

NSA 13
As shown in column 8 of **Table 3**, future design year worst-case traffic noise levels associated with the Build Alternative are projected to range from 55 to 77 dBA. Based on the noise modeling results, design year noise levels are predicted to increase 0-2 dBA, as compared to existing conditions.

Seventeen (17) modeled receptor sites representing 17 residences are predicted to approach or exceed the PennDOT/FHWA NAC for Activity Category B under the Build Alternative. Therefore, noise abatement consideration is warranted for NSA 13.

NSA 14
As shown in column 8 of **Table 4**, future design year worst-case traffic noise levels associated with the Build Alternative are projected to range from 52 to 74 dBA. Based on the noise modeling results, design year noise levels are predicted to increase 0-2 dBA, as compared to existing conditions.

Fourteen (14) modeled receptor sites representing 24 residences are predicted to approach or exceed the PennDOT/FHWA NAC for Activity Category B under the Build Alternative. Therefore, noise abatement consideration is warranted for NSA 14.

NSA 15
As shown in column 8 of **Table 5**, future design year worst-case traffic noise levels associated with the Build Alternative are projected to range from 53 to 78 dBA. Based on the noise modeling results, design year noise levels are predicted to increase 0-3 dBA, as compared to existing conditions.

Fifty-two (52) modeled receptor sites representing 63 residences are predicted to approach or exceed the PennDOT/FHWA NAC for Activity Category B under the Build Alternative. Therefore, noise abatement consideration is warranted for NSA 15.

NSA 16
As shown in column 8 of **Table 6**, future design year worst-case traffic noise levels associated with the Build Alternative are projected to range from 54 to 77 dBA. Based on the noise modeling results, design year noise levels are predicted to increase 0-3 dBA, as compared to existing conditions.

Forty-seven (47) modeled receptor sites representing 47 residences are predicted to approach or exceed the PennDOT/FHWA NAC for Activity Category B under the Build Alternative. Therefore, noise abatement consideration is warranted for NSA 16.

NSA 29
As shown in column 8 of **Table 7**, future design year worst-case traffic noise levels associated with the Build Alternative are projected to range from 57 to 66 dBA. Based on the noise modeling results, design year noise levels are predicted to increase 1-2 dBA, as compared to existing conditions.

Four (4) modeled receptor sites representing four (4) ERUs are predicted to approach or exceed the PennDOT/FHWA NAC for Activity Category C under the Build Alternative. Therefore, noise abatement consideration is warranted for NSA 29.

6.0 HIGHWAY TRAFFIC NOISE CONSIDERATION AND ABATEMENT OPTIONS

Design year noise levels associated with the Build Alternative are projected to approach or exceed the PennDOT/FHWA NAC in NSAs 13, 14, 15, 16, and 29. Therefore, noise abatement consideration is warranted for the impacted receptors within each of those NSAs. This section of the report documents the noise abatement alternatives that were considered to reduce noise levels within each NSA and an evaluation of their feasibility and reasonableness.

PennDOT and FHWA guidelines recommend a variety of noise abatement measures which should be considered in response to transportation-related noise impacts. While noise barriers and/or earth berms are generally the most effective form of noise abatement, additional abatement measures exist that have the potential to provide considerable noise reductions under certain circumstances. Noise Abatement measures to be considered for a given project include:

- Construction of noise barriers (or earth berms), including acquisition of property rights, either within or outside the highway right-of-way. Landscaping is not a viable noise abatement feature.
- Traffic management measures including, but not limited to, traffic-control devices and signing for the prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations.
- Alteration of horizontal and vertical alignments.
- Acquisition of real property or interests therein (predominately unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type 1 projects only.
- Noise Insulation of Activity Category D land use facilities listed in **Table 1**. Post installation maintenance and operational costs for noise insulation are not eligible for State or Federal-aid funding.

Based on the nature of the facility, traffic management and control measures were not considered an appropriate solution. Opportunities for alignment modifications are limited given right-of-way constraints and existing development adjacent to the corridor. Property acquisition (to provide buffer zones or to construct/provide noise abatement) is not necessary or supported by the analysis. Noise insulation of Activity Category D land uses is also not necessary or supported by the noise analysis. Therefore, noise barriers and/or earth berms were considered the only form of noise abatement having the potential to reduce future noise levels at impacted receptor sites.

Noise barriers and earth berms are often implemented into the highway design in response to identified noise impacts. The effectiveness of a free-standing (post and panel) noise barrier and an earth berm of equivalent height are relatively consistent; however, an earth

berm is often perceived as a more aesthetically pleasing option. Therefore, where possible, earth berms are typically preferred over noise barriers. Unfortunately, the use of earth berms is not always an option due to the excessive space they require within the roadway corridor. At a standard slope of 2:1, every one (1) foot of increased berm height requires approximately four (4) feet of horizontal width to accommodate the required slopes. This requirement becomes more complex in roadway corridors where previously developed parcels are adjacent to the proposed right-of-way. In these situations, the implementation of earth berms can require significant property acquisition to accommodate noise abatement. Due to the desire to minimize right-of-way acquisition and the lack of horizontal clearance, berms were not considered an option for this project. Therefore, noise barriers appear to be the most appropriate form of noise abatement available to reduce noise impacts. Accordingly, noise barriers were evaluated for all five (5) NSAs where noise impacts were identified.

When designing abatement, barrier footprints are typically located at the top of a cut-slope no less than ten (10) feet inside the existing ROW (in cut conditions) and/or along the top of the fill-slope, typically adjacent to the roadway shoulder (in fill conditions). In areas where a break in the barrier is required to accommodate utilities, drainage, or other design considerations, an overlap section is developed wherein the length of the overlapped panels are typically a minimum of three times the distance between the two barrier sections. For example, a gap of fifteen (15) feet between overlapping barriers would typically require an overlap section forty-five (45) feet or greater in length.

As discussed in **Section 3.0 Noise Analysis Methodology**, noise abatement measures must be evaluated for feasibility and reasonableness, and must satisfy the applicable parameters associated with each criterion in order to be recommended as part of the final design of the project. These parameters are identified and listed in PennDOT's Noise Barrier Warranted, Feasibility and Reasonableness Worksheets. Copies of the Noise Barrier Warranted, Feasible, and Reasonable Worksheets for each abatement option evaluated in the project area are provided in **Appendix D.**

Noise abatement was developed in an attempt to pass PennDOT's feasibility and reasonableness criteria. These parameters include (among other criteria) the feasibility requirement to provide noise reductions of at least 5 dBA for the majority of the impacted receptors in a given NSA. Additionally, as per PennDOT's reasonableness criteria, it is required that exterior noise levels be reduced by at least 7 dBA for at least one (1) benefitted receptor. PennDOT's Noise Barrier Cost Reasonableness Value is based on a Maximum Square Footage of Abatement per Benefitted Receptor (MaxSF/BR). Noise abatement measures that are calculated with a MaxSF/BR value of 2,000 or less are considered "reasonable".

Once a barrier has been developed that addresses minimum performance goals for feasibility and reasonableness, it is further optimized to a "point of diminishing returns". The relationship between noise barrier square footage and noise barrier performance is non-linear. This means that noise benefits typically increase with increased barrier height

and/or length; however, at some point, further increases in barrier height and/or length result in reduced increases in benefit until a point of diminishing returns is reached. A point can be identified where a potential noise barrier provides the best balance between square footage and acoustical benefit. All barriers presented in this analysis were developed in an attempt to achieve feasibility and reasonableness design goals for impacted receptors first, then optimized to the point of diminishing returns while still maintaining feasibility and reasonableness objectives. Additionally, logical termini for barrier panels were also considered to resolve aesthetic, engineering design, and public acceptance considerations during the final design phase.

Subsequent to PTC/FHWA review and approval of the Draft Final Design Noise Analysis Report, including the barrier options proposed for construction, abatement options will be presented to the public to solicit input on the desire for noise mitigation. The following is a summary of the options that were developed and optimized to provide feasible and reasonable noise abatement.

6.1 NSA 13 Barrier

Noise impacts are found across this NSA, in areas closest to the PTC right-of-way. Second floor units at the southern end of The Crossings at Neshaminy, represented by Sites 13.1-B2 and 13.1-G2, are impacted in the western portion of the NSA, along with several homes along Columbia Drive (Sites 13.2-A and 13.2-B). Impacts in the eastern portion of the project area are located at front- and second-row homes along Woodsview Drive represented by Sites 13.3-A through 13.3-M.

A continuous post-and-panel noise barrier was modeled in an attempt to identify feasible and reasonable noise abatement for these receptors. A noise barrier was evaluated throughout the limits of NSA 13, then refined in both height and length based on PennDOT feasibility and reasonableness considerations.

As shown in **Figure 7** (moving from west to east), the evaluated noise barrier for NSA 13 was modeled between approximate mainline stations 205 +50 and 227 +50, along the mainline edge-of-shoulder until it diverges to follow the cut slope beginning at approximate station 221 +50. The noise barrier was modeled at multiple heights ranging from six (6) feet above ground level to 20 feet above ground level, at one (1) foot increments. The noise barrier was then optimized for the purposes of evaluating noise barrier feasibility and reasonableness, as well as establishing logical termini for barrier end points.

Table 8 provides a noise barrier summary for the optimized noise barrier evaluated for impacted sites in NSA 13. As shown, the evaluated noise barrier provides noise reductions of 5 to 14 dBA for the impacted sites, indicating the optimized barrier option is feasible relative to performance goals. As summarized in **Table 8**, the optimized barrier has a total length of 2,208 feet, ranges from 12 to 20 feet in height, and has a total area of 42,231 square feet. Providing benefits to 46 residential units, the barrier has a MaxSF/BR Value

of 918, indicating that the optimized barrier option is reasonable.

Absorptive treatment of barrier panels has been evaluated due to the parallel barrier configuration that occurs in this NSA. However, absorptive treatments are not recommended in this application. Additional information on the parallel barrier analysis can be found in **Appendix E**.

Therefore, the optimized barrier design is recommended for further consideration and public input through the final design phase of the project.

6.2 NSA 14 Barrier System

Noise impacts are found across this NSA, in areas closest to the PTC right-of-way. Front-row and end-units within the Villas at Chancellor's Glen, represented by Sites 14-A through 14-K, 14-P, and 14-DD, are impacted in this NSA, along with a residence fronting on Hulmeville Road at the eastern end of the NSA (Site 14-N).

A post-and-panel overlapping two-barrier system was modeled in an attempt to identify feasible and reasonable noise abatement for these receptors. The overlap configuration is necessary to accommodate drainage and/or utility requirements. A noise barrier system was evaluated throughout the limits of NSA 14, then refined in both height and length based on PennDOT feasibility and reasonableness considerations.

As shown in **Figure 8** (moving from west to east), the evaluated noise barriers for NSA 14 were modeled between approximate mainline stations 211 +50 and 235 +00. The western barrier follows off-alignment contours until it angles parallel to the mainline at approximate station 218 +50. The overlap section occurs between approximate Station 219 +00 to 219 +75. The eastern barrier continues along the edge of shoulder to its terminus at the Hulmeville Road overpass (approximate Station 235 +00). The noise barriers were modeled at multiple heights ranging from six (6) feet above ground level to 20 feet above ground level, at one (1) foot increments. The noise barriers were then optimized for the purposes of evaluating noise barrier feasibility and reasonableness, as well as establishing logical termini for barrier end points.

Table 9, columns 5 and 6, provides a noise barrier summary for the optimized noise barriers evaluated for impacted sites in NSA 14. As shown, the evaluated noise barriers provide a noise reduction of 3 to 13 dBA for the impacted sites, indicating the optimized barrier option is feasible relative to performance goals. As summarized in **Table 8**, the optimized barriers have a total length of 2,432 feet, range from 15 to 20 feet in height, and have a total area of 44,995 square feet. Providing benefits to 61 residential units, the barriers have a MaxSF/BR Value of 738, indicating that the optimized barrier option is reasonable.

Note that although benefited, noise levels at impacted Site 14-P were not able to be reduced to the low 60 DBA range (a noise reduction design goal). Similarly, no abatement design

could be developed to provide benefit to impacted Site 14-DD. This was due to the complex localized terrain features that limit the ability to raise or extend the barrier any further than already proposed (feasibility).

Absorptive treatment of barrier panels has been evaluated due to the parallel barrier configuration that occurs in this NSA. However, absorptive treatments are not recommended in this application. Additional information on the parallel barrier analysis can be found in **Appendix E**.

Therefore, the optimized barrier design is recommended for further consideration and public input through the final design phase of the project.

6.3 NSA 15 Barrier System

Noise impacts are found across this NSA, in areas closest to the PTC right-of-way. Homes along Michael Drive, Carolyn Court, Maryanne Court, Bedci Court, Point Drive, Mark Circle, Clearview Avenue, Lewisville Avenue, and Leonard Avenue, represented by Sites 15-A through 15-D, 15-F through 15-I, 15-K through 15-P, 15-S through 15-FF, 15-HH through 15-JJ, and 15-AAA through 15-UUU, are impacted in this NSA.

A post-and-panel overlapping two-barrier system was modeled in an attempt to identify feasible and reasonable noise abatement for these receptors. The overlap configuration is necessary to accommodate drainage and/or utility requirements. A noise barrier system was evaluated throughout the limits of NSA 15, then refined in both height and length based on PennDOT feasibility and reasonableness considerations.

As shown in **Figure 9** (moving from west to east), the evaluated noise barriers for NSA 15 were modeled between approximate mainline stations 250 +00 and 294 +00. The overlap section occurs between approximate Station 270 +00 to 271 +00. The barrier system follows the edge of shoulder to approximate station 273 +00, through the overlap section, diverging to follow the top of the cut slope to its terminus at the Bensalem Boulevard overpass. The noise barriers were modeled at multiple heights ranging from six (6) feet above ground level to 20 feet above ground level, at one (1) foot increments. The noise barriers were then optimized for the purposes of evaluating noise barrier feasibility and reasonableness, as well as establishing logical termini for barrier end points.

Table 10 provides a noise barrier summary for the optimized noise barriers evaluated for impacted sites in NSA 15. As shown, the evaluated noise barriers provide noise reductions of 5 to 14 dBA for the impacted sites, indicating the optimized barrier option is feasible relative to performance goals. The optimized barriers have a total length of 4,448 feet, range from 13 to 19 feet in height, and have a total area of 79,005 square feet. Providing benefits to 135 residential units, the barriers have a MaxSF/BR Value of 585, indicating that the optimized barrier option is reasonable.

Absorptive treatment of barrier panels has been evaluated due to the parallel barrier

configuration that occurs in this NSA. However, absorptive treatments are not recommended in this application. Additional information on the parallel barrier analysis can be found in **Appendix E**.

Therefore, the optimized barrier design is recommended for further consideration and public input through the final design phase of the project.

6.4 NSA 16 Barrier System

Noise impacts are found across this NSA, in areas closest to the PTC right-of-way. Homes along Adler Lane, Cricket Lane, Eagen Court, Captain Milton E. Major Avenue, Texas Avenue, Tennessee Avenue, and Spring Ave, represented by Sites 16-A through 16-GG, 16-JJ through 16-NN, 16-PP, 16-QQ, 16-TT, 16-BBB, and 16-HHH through 16-MMM, are impacted in this NSA.

A post-and-panel overlapping two-barrier system was modeled in an attempt to identify feasible and reasonable noise abatement for these receptors. The overlap configuration is necessary to accommodate drainage and/or utility requirements. A noise barrier system was evaluated throughout the limits of NSA 16, then refined in both height and length based on PennDOT feasibility and reasonableness considerations.

As shown in **Figure 9** (moving from west to east), the evaluated noise barriers for NSA 16 were modeled between approximate mainline stations 243 +50 and 294 +00. The overlap section occurs between approximate Station 272 +00 to 273 +00. The barrier system initially follows the top of cut to approximate station 255 +00, transitioning to follow the edge of shoulder through the overlap section, diverging back to the top of the cut slope to its terminus at the Bensalem Boulevard overpass. The noise barriers were modeled at multiple heights ranging from six (6) feet above ground level to 20 feet above ground level, at one (1) foot increments. The noise barriers were then optimized for the purposes of evaluating noise barrier feasibility and reasonableness, as well as establishing logical termini for barrier end points.

Table 11 provides a noise barrier summary for the optimized noise barriers evaluated for impacted sites in NSA 16. As shown, the evaluated noise barriers provide noise reductions of 4 to 16 dBA for the impacted sites, indicating the optimized barrier option is feasible relative to performance goals. The optimized barriers have a total length of 5,184 feet, range from 11 to 19 feet in height, and have a total area of 90,080 square feet. Providing benefits to 112 residential units, the barriers have a MaxSF/BR Value of 804, indicating that the optimized barrier option is reasonable.
Note that no abatement design could be developed to provide benefit to impacted Site 16-TT. This was due to the complex localized terrain features and potential structural interference with the Bensalem Boulevard overpass limiting the ability to extend the barrier any further than already proposed (feasibility).

Absorptive treatment of barrier panels has been evaluated due to the parallel barrier

configuration that occurs in this NSA. However, absorptive treatments are not recommended in this application. Additional information on the parallel barrier analysis can be found in **Appendix E**.

Therefore, the optimized barrier design is recommended for further consideration and public input through the final design phase of the project.

6.5 NSA 29 Barrier

Noise impacts are found in the center-west portion of this NSA, in areas closest to the PTC right-of-way. ERU grid points within the athletic fields associated with the Bensalem Township Community Park, represented by Sites 29D through 29G, are impacted.

A continuous post-and-panel noise barrier was modeled in an attempt to identify feasible and reasonable noise abatement for these receptors. A noise barrier was evaluated throughout the limits of NSA 29, then refined in both height and length based on PennDOT feasibility and reasonableness considerations.

As shown in **Figure 10** (moving from west to east), the evaluated noise barrier for NSA 29 was modeled between approximate mainline stations 186 +50 and 196 +75, generally along the top of the cut slope. The noise barrier was modeled at multiple heights ranging from six (6) feet above ground level to 20 feet above ground level, at one (1) foot increments. The noise barrier was then optimized for the purposes of evaluating noise barrier feasibility and reasonableness, as well as establishing logical termini for barrier end points.

Table 12 provides a noise barrier summary for the optimized noise barrier evaluated for impacted sites in NSA 29. As shown, the evaluated noise barrier provides noise reductions of 6 to 7 dBA for the impacted sites, indicating the optimized barrier option is feasible relative to performance goals. The optimized barrier has a total length of 1,040 feet, ranges from 10 to 20 feet in height, and has a total area of 17,952 square feet. Providing benefits to 13 ERUs, the barrier has a MaxSF/BR Value of 1,381, indicating that the optimized barrier option is reasonable.

Therefore, the optimized barrier design is recommended for further consideration and public input through the final design phase of the project.

7.0 CONSTRUCTION NOISE CONSIDERATION AND ABATEMENT OPPORTUNITIES

Throughout the construction phase of the project, noise sensitive land uses in close proximity to the proposed improvements are susceptible to construction noise impacts. Activities and equipment associated with construction are likely to temporarily elevate noise within the project area. Sensitive receptors within close proximity to proposed improvements may experience varying noise levels and durations, depending on the nature of the activity, the type of equipment being used, and the relative distance from the temporary noise source.

Reductions in noise emissions at the source are an effective means of reducing construction noise impacts. Contractors should perform regular maintenance and upkeep of vehicles and equipment. Common areas of focus include engine and exhaust maintenance (including muffler systems), and regular lubrication of moving parts.

Additional methods should be considered to further reduce or respond to construction noise concerns. Implementation of workplace protocols should be considered, including elimination of "tailgate banging", consideration of the location of staging areas away from noise sensitive land uses, and potential incorporation of smart back-up alarms. Restrictions on work hours should also be considered, where appropriate. Where construction noise impacts are unavoidable, the use of temporary noise barriers are an alternative that may be considered. Community input on sequencing of operations as well as a complaint-response mechanism may also serve to reduce construction noise impacts on the community.

The PTC should attempt to coordinate with the local municipality to determine potential issues with construction noise, including any constraints on active work periods. Municipal officials have not formally expressed construction noise concerns, and time of day restrictions for construction activities have not been discussed. Any municipal concerns will be addressed through the PTC's ongoing public involvement processes. If construction noise specifications are required for inclusion in the Plans, Specifications, and Estimates package, detailed coordination is suggested between the PTC and the local municipality.

8.0 PUBLIC INVOLVEMENT PROCESS

The Section I-95-C project has been active for a number of years. Public and municipal involvement has been ongoing throughout the life of the project. In 2007, public plans display meetings were held during the preliminary design phase to present the engineering specifics and environmental concerns associated with the project. The public involvement phase is also necessary during final design to conclude the reasonableness evaluation for the proposed noise barrier concepts presented in the draft noise report. Final design noise abatement concepts have been developed in order to provide the benefitted receptors with the details necessary to make an informed decision.

Noise-specific public involvement will be conducted for project area NSAs following conditional agency approval of the Draft Final Design Noise Report (including the PTC and FHWA). Community-specific public outreach will be conducted with benefitted property owners and residents for each NSA. The goal of the community-specific public outreach will be to formally solicit input from the affected community related to the desire for noise abatement, as well as preferred aesthetic options on the community side of the proposed barrier options.

The benefited property owners and renters will be provided detailed information about the noise analysis process employed and the specific abatement measures proposed for construction as part of this project. Copies of the public outreach participation list, as well as all public outreach informational sheets, graphics, and survey forms, will be provided in the final version of the Final Design Noise Report.

TABLES

Table 1
PennDOT and FHWA
Hourly Weighted Sound Levels dB(A) For Various Land Use Activity Categories*

Land Use Activity Category	Leq(h)[1]	Description of Land Use Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67 (exterior)	Residential
C[2]	67 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A, B or C.
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	Undeveloped lands that are not permitted.

1 Impact thresholds should not be used as design standards for noise abatement purposes.
2 Includes undeveloped lands permitted for this activity category

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

Table 2

I-95/I-276 Interchange - Section I-95-C

Existing (2006) Monitored Noise Levels (Leq(h) in dBA)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site ID	Site Description	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)* in dBA	Existing (2006) Monitored Noise Level**	Validation Modeled Noise Level	Difference***
13	M2	2709 Woods View Dr, Bensalem, PA	C	66	68.0	70.9	2.9
	M2A	2711 Woods View Dr, Bensalem, PA	B	66	58.0	59.9	1.9
	M2B	2649 Woods View Dr, Bensalem, PA	B	66	62.0	62.8	0.8
	M2C	2651 Woods View Dr, Bensalem, PA	B	66	62.0	60.1	-1.9
	M2D	3060 Bristol Rd, Bensalem, PA	B	66	70.0	71.2	1.2
14	M3	99 Liberty Drive, Bensalem, PA	B	66	68.0	72.1	4.1
	M3A	91 Liberty Drive, Bensalem, PA	B	66	61.0	60.8	-0.2
15	M4	1507 Point Dr, Bensalem, Pa	B	66	73.0	72.1	-0.9
	M4A	1514 Point Dr, Bensalem, Pa	B	66	63.0	62.2	-0.8
	M4B	6116-6128 Clearview Ave, Bensalem, PA	B	66	68.0	72.2	4.2
	M4C	6116-6128 Clearview Ave, Bensalem, PA	B	66	63.0	65.5	2.5
	M4D	1623 Carolyn Ct, Bensalem, PA	B	66	67.0	69.7	2.7
	M4E	5815 Michael Dr, Bensalem, PA	B	66	62.0	61.6	-0.4
16	M5	5688 Cricket Ln, Bensalem, PA	B	66	67.0	68.5	1.5
	M5A	5689 Cricket Ln, Bensalem, PA	B	66	64.0	64.5	0.5
	M5B	1119 Tennessee Ave, Bensalem, PA	B	66	67.0	68.3	1.3
	M5C	1057 Tennessee Ave, Bensalem, PA	B	66	59.0	56.0	-3.0
	M5D	1883 Adler Rd, Bensalem, PA	B	66	67.0	73.1	6.1
	M5E	1874 Adler Rd, Bensalem, PA	B	66	57.0	58.8	1.8
	M5F	6040 Grant Ave, Bensalem, PA	B	66	68.0	70.4	2.4
	M5G	6022 Grant Ave, Bensalem, PA	B	66	61.0	62.9	1.9
29	M1	3000 Donallen Dr, Bensalem, PA	B	66	61.0	63.7	2.7

*Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1)

** Data sourced from the 2006 Preliminary Engineering Noise Analysis

*** Values in **red** exceed PennDOT validation tolerances (+/- 3 dBA)

Table 3
I-95/I-276 Interchange - Section I-95-C
NSA 13 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
13	13.1-A	1	C	66	61	63	62
	13.1-B1	1	B	66	62	64	63
	13.1-B2	1	B	66	66	67	67
	13.1-C1	1	B	66	61	63	62
	13.1-C2	1	B	66	65	66	65
	13.1-D1	1	B	66	61	62	61
	13.1-D2	1	B	66	64	65	64
	13.1-E1	1	B	66	60	61	61
	13.1-E2	1	B	66	63	64	63
	13.1-F1	1	B	66	59	60	60
	13.1-F2	1	B	66	62	63	62
	13.1-G1	1	B	66	62	63	63
	13.1-G2	1	B	66	65	67	66
	13.1-H1	1	B	66	60	62	61
	13.1-H2	1	B	66	63	65	64
	13.1-I1	1	B	66	59	60	60
	13.1-I2	1	B	66	62	64	63
	13.1-J1	1	B	66	58	60	59
	13.1-J2	1	B	66	61	63	62
	13.1-K1	1	B	66	57	59	58
	13.1-K2	1	B	66	60	62	61
	13.1-L1	1	B	66	56	58	57
	13.1-L2	1	B	66	59	61	60
	13.1-M1	1	B	66	56	57	57
	13.1-M2	1	B	66	59	60	59
	13.1-N1	1	B	66	53	55	55
	13.1-N2	1	B	66	58	59	59
	13.1-O1	1	B	66	54	55	56
	13.1-O2	1	B	66	58	59	59
	13.1-P1	1	B	66	57	58	58
	13.1-P2	1	B	66	57	59	58
	13.1-Q1	1	B	66	55	57	56
	13.1-Q2	1	B	66	58	60	59
	13.1-R1	1	B	66	58	59	59
	13.1-R2	1	B	66	58	60	59
	13.1-S1	1	B	66	56	58	57
	13.1-S2	1	B	66	59	60	60
	13.1-T1	1	B	66	58	59	59
	13.1-T2	1	B	66	60	62	61
	13.1-U1	1	B	66	57	58	58
	13.1-U2	1	B	66	59	61	60
	13.1-V1	1	B	66	56	57	57
	13.1-V2	1	B	66	58	60	59
	13.1-W1	1	B	66	53	55	55
	13.1-W2	1	B	66	56	57	57
	13.1-X1	1	B	66	55	57	57
	13.1-X2	1	B	66	58	60	59
	13.1-Y1	1	B	66	57	58	58

Table 3
I-95/I-276 Interchange - Section I-95-C
NSA 13 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
13	13.1-Y2	1	B	66	60	61	60
	13.2-A	1	B	66	66	67	66
	13.2-B	1	B	66	66	68	67
	13.2-C	1	B	66	63	64	64
	13.2-D	1	B	66	64	66	65
	13.2-E	1	B	66	60	61	61
	13.2-F	1	B	66	62	63	63
	13.2-G	1	B	66	62	63	63
	13.2-H	1	B	66	62	63	63
	13.3-A	1	B	66	75	76	76
	13.3-B	1	B	66	76	77	77
	13.3-C	1	B	66	76	77	77
	13.3-D	1	B	66	75	77	76
	13.3-E	1	B	66	75	76	75
	13.3-F	1	B	66	73	74	74
	13.3-G	1	B	66	70	71	71
	13.3-H	1	B	66	66	67	66
	13.3-I	1	B	66	69	70	69
	13.3-J	1	B	66	69	71	70
	13.3-K	1	B	66	68	70	69
	13.3-L	1	B	66	66	68	67
	13.3-M	1	B	66	65	67	66
	13.3-N	1	B	66	65	66	65
	13.3-O	1	B	66	63	64	63
	13.3-P	1	B	66	62	64	64
	13.3-Q	1	B	66	62	63	63
	13.3-R	1	B	66	60	62	62
	13.3-S	1	B	66	59	61	61
	13.3-T	3	B	66	58	60	60
	13.3-U	3	B	66	57	58	58
	13.3-V	3	B	66	54	56	56

* Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1) OR exceed existing noise levels by 10 dBA or greater WARRANT abatement consideration.

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds existing noise levels by 10 dBA or greater

Table 4
I-95/I-276 Interchange - Section I-95-C
NSA 14 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
14	14-A	1	B	66	72	73	73
	14-B	2	B	66	73	74	73
	14-C	2	B	66	73	74	74
	14-D	2	B	66	71	73	72
	14-E	1	B	66	69	70	69
	14-F	2	B	66	73	74	73
	14-G	2	B	66	73	74	73
	14-H	2	B	66	73	74	73
	14-I	2	B	66	73	74	73
	14-J	2	B	66	68	69	69
	14-K	2	B	66	65	66	66
	14-L	1	B	66	62	64	64
	14-M	2	B	66	59	61	61
	14-N	1	B	66	66	68	67
	14-O	1	B	66	59	60	60
	14-P	1	B	66	68	70	69
	14-Q	2	B	66	55	57	57
	14-R	2	B	66	56	57	57
	14-S	2	B	66	55	57	57
	14-T	2	B	66	57	58	58
	14-U	2	B	66	61	62	61
	14-V	2	B	66	60	62	61
	14-W	2	B	66	61	63	62
	14-X	2	B	66	63	65	64
	14-Y	2	B	66	62	63	63
	14-Z	2	B	66	60	62	62
	14-AA	2	B	66	58	59	59
	14-BB	2	B	66	54	56	56
	14-CC	1	B	66	53	54	54
	14-DD	2	B	66	66	67	66
	14-EE	2	B	66	56	58	58
	14-FF	1	C	66	57	59	59
	14-GG	2	B	66	55	57	57
	14-HH	3	B	66	52	53	53
	14-II	2	B	66	57	58	58
	14-JJ	1	B	66	57	58	58
	14-KK	12	B	66	50	52	52
	14-LL	8	B	66	52	54	54
	14-MM	2	B	66	63	65	64
	14-NN	2	B	66	55	56	56

* Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1) OR exceed existing noise levels by 10 dBA or greater WARRANT abatement consideration.

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds existing noise levels by 10 dBA or greater

Table 5
I-95/I-276 Interchange - Section I-95-C
NSA 15 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
15	15-A	1	B	66	72	73	74
	15-B	1	B	66	75	77	76
	15-C	1	B	66	73	75	74
	15-D	1	B	66	67	68	68
	15-E	1	B	66	64	65	65
	15-F	1	B	66	68	70	69
	15-G	1	B	66	69	71	71
	15-H	1	B	66	71	72	72
	15-I	1	B	66	71	72	73
	15-J	1	B	66	64	65	65
	15-K	1	B	66	66	67	67
	15-L	1	B	66	69	70	70
	15-M	1	B	66	67	69	70
	15-N	1	B	66	70	71	72
	15-O	1	B	66	68	70	70
	15-P	1	B	66	64	66	66
	15-Q	1	B	66	62	63	64
	15-R	1	B	66	64	65	65
	15-S	1	B	66	64	66	66
	15-T	1	B	66	70	72	72
	15-U	1	B	66	70	72	72
	15-V	1	B	66	67	69	68
	15-W	2	B	66	75	76	75
	15-X	2	B	66	72	73	73
	15-Y	3	B	66	66	67	68
	15-Z	2	B	66	64	65	66
	15-AA	1	B	66	76	77	76
	15-BB	1	B	66	74	76	75
	15-CC	1	B	66	74	76	74
	15-DD	1	B	66	73	74	73
	15-EE	1	B	66	68	70	70
	15-FF	1	B	66	65	67	67
	15-GG	1	B	66	64	65	65
	15-HH	1	B	66	71	72	72
	15-II	1	B	66	67	68	69
	15-JJ	1	B	66	64	65	66
	15-KK	1	B	66	61	62	63
	15-LL	1	B	66	59	61	61
	15-MM	1	B	66	59	60	61
	15-NN	1	B	66	58	59	60
	15-OO	1	B	66	56	57	58
	15-PP	1	B	66	61	63	64
	15-QQ	1	B	66	63	64	64
	15-RR	1	B	66	63	65	65
	15-SS	1	B	66	55	57	57
	15-TT	4	B	66	54	55	55
	15-UU	1	B	66	57	58	58
	15-VV	3	B	66	63	65	65
	15-WW	1	B	66	58	59	59
	15-XX	1	B	66	58	59	59

Table 5
I-95/I-276 Interchange - Section I-95-C
NSA 15 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
15	15-YY	3	B	66	61	63	62
	15-ZZ	1	B	66	63	65	64
	15-AAA	2	B	66	65	67	66
	15-BBB	1	B	66	69	71	70
	15-CCC	1	B	66	71	73	72
	15-DDD	1	B	66	73	75	74
	15-EEE	1	B	66	74	76	75
	15-FFF	1	B	66	72	74	73
	15-GGG	1	B	66	68	70	69
	15-HHH	1	B	66	67	69	68
	15-III	1	B	66	70	72	71
	15-JJJ	1	B	66	73	75	74
	15-KKK	1	B	66	74	75	74
	15-LLL	1	B	66	75	77	76
	15-MMM	1	B	66	76	78	78
	15-NNN	1	B	66	77	78	78
	15-OOO	1	B	66	74	75	75
	15-PPP	1	B	66	67	69	70
	15-QQQ	1	B	66	64	65	66
	15-RRR	1	B	66	72	74	73
	15-SSS	3	B	66	67	69	69
	15-TTT	3	B	66	67	68	69
	15-UUU	2	B	66	64	65	66
	15-VVV	2	B	66	61	62	63
	15-WWW	3	B	66	58	59	60
	15-XXX	3	B	66	57	58	59
	15-YYY	3	B	66	55	56	56
	15-ZZZ	2	B	66	54	55	55
	15-AAAA	3	B	66	55	56	56
	15-BBBB	3	B	66	57	59	58
	15-CCCC	3	B	66	54	56	56
	15-DDDD	3	B	66	59	60	60
	15-EEEE	3	B	66	60	61	61
	15-FFFF	4	B	66	60	62	62
	15-GGGG	1	B	66	59	60	60
	15-HHHH	1	B	66	57	59	58
	15-IIII	1	B	66	59	60	59
	15-JJJJ	1	B	66	61	63	62
	15-KKKK	1	B	66	60	61	61
	15-LLLL	1	B	66	59	60	61
	15-MMMM	1	B	66	61	62	62
	15-NNNN	1	B	66	61	62	62
	15-OOOO	1	B	66	58	59	60
	15-PPPP	1	B	66	61	62	63
	15-QQQQ	3	B	66	62	63	64
	15-RRRR	1	B	66	58	59	59
	15-SSSS	1	B	66	62	63	64
	15-TTTT	1	B	66	62	63	64
	15-UUUU	1	B	66	58	60	60
	15-VVVV	1	B	66	59	60	61
	15-WWWW	3	B	66	54	55	55
	15-XXXX	1	B	66	54	56	56
	15-YYYY	1	B	66	55	56	56
	15-ZZZZ	1	B	66	52	53	53
	15-AAAAA	1	B	66	54	55	56

* Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1) OR exceed existing noise levels by 10 dBA or greater WARRANT abatement consideration.

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds existing noise levels by 10 dBA or greater

Table 6
I-95/I-276 Interchange - Section I-95-C
NSA 16 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
16	16-A	1	B	66	67	69	68
	16-B	1	B	66	74	75	74
	16-C	1	B	66	76	77	76
	16-D	1	B	66	75	77	75
	16-E	1	B	66	76	77	76
	16-F	1	B	66	75	77	76
	16-G	1	B	66	75	76	76
	16-H	1	B	66	75	77	76
	16-I	1	B	66	75	77	76
	16-J	1	B	66	75	77	76
	16-K	1	B	66	72	74	73
	16-L	1	B	66	74	75	74
	16-M	1	B	66	73	75	74
	16-N	1	B	66	74	76	75
	16-O	1	B	66	75	76	76
	16-P	1	B	66	75	77	77
	16-Q	1	B	66	72	73	73
	16-R	1	B	66	71	72	72
	16-S	1	B	66	70	72	71
	16-T	1	B	66	69	71	69
	16-U	1	B	66	69	70	70
	16-V	1	B	66	70	72	71
	16-W	1	B	66	71	72	71
	16-X	1	B	66	71	72	72
	16-Y	1	B	66	71	73	72
	16-Z	1	B	66	71	73	72
	16-AA	1	B	66	71	73	72
	16-BB	1	B	66	74	76	75
	16-CC	1	B	66	73	74	74
	16-DD	1	B	66	64	65	65
	16-EE	1	B	66	70	71	71
	16-FF	1	B	66	66	68	68
	16-GG	1	B	66	64	65	66
	16-HH	3	B	66	59	61	61
	16-II	1	B	66	55	56	57
	16-JJ	1	B	66	76	78	77
	16-KK	1	B	66	65	66	66
	16-LL	1	B	66	75	77	76
	16-MM	1	B	66	73	75	74
	16-NN	1	B	66	70	71	72
	16-OO	1	B	66	60	62	62
	16-PP	1	B	66	76	78	77
	16-QQ	1	B	66	71	73	72
	16-RR	1	B	66	63	64	64
	16-SS	1	B	66	63	64	64
	16-TT	1	B	66	67	68	68
	16-UU	1	B	66	58	59	59
	16-VV	1	B	66	59	60	61

Table 6
I-95/I-276 Interchange - Section I-95-C
NSA 16 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
16	16-WW	3	B	66	58	60	60
	16-XX	3	B	66	60	62	62
	16-YY	1	B	66	54	56	56
	16-ZZ	1	B	66	61	63	63
	16-AAA	1	B	66	64	66	65
	16-BBB	1	B	66	65	67	66
	16-CCC	1	B	66	62	64	63
	16-DDD	2	B	66	60	62	62
	16-EEE	1	B	66	61	62	62
	16-FFF	1	B	66	62	64	63
	16-GGG	1	B	66	64	66	65
	16-HHH	1	B	66	66	68	68
	16-III	1	B	66	70	72	71
	16-JJJ	1	B	66	68	70	68
	16-KKK	1	B	66	72	73	72
	16-LLL	1	B	66	69	70	69
	16-MMM	1	B	66	65	67	66
	16-NNN	1	B	66	58	60	59
	16-OOO	3	B	66	55	57	57
	16-PPP	2	B	66	56	57	57
	16-QQQ	3	B	66	61	62	63
	16-RRR	3	B	66	59	61	61
	16-SSS	1	B	66	62	64	64
	16-TTT	2	B	66	55	56	56
	16-UUU	2	B	66	53	54	54
	16-VVV	4	B	66	55	56	56
	16-WWW	1	B	66	57	58	58
	16-XXX	3	B	66	55	56	56
	16-YYY	1	B	66	62	63	63
	16-ZZZ	1	B	66	61	62	62
	16-AAAA	1	B	66	60	62	61
	16-BBBB	1	B	66	60	61	61
	16-CCCC	1	B	66	60	62	61
	16-DDDD	4	B	66	55	56	56
	16-EEEE	1	B	66	63	64	64
	16-FFFF	1	B	66	63	65	64
	16-GGGG	1	B	66	61	62	62
	16-HHHH	1	B	66	56	57	57
	16-IIII	3	B	66	56	57	58
	16-JJJJ	3	B	66	57	59	59
	16-KKKK	2	B	66	57	58	58
	16-LLLL	2	B	66	60	61	61
	16-MMMM	2	B	66	58	59	59

* Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1) OR exceed existing noise levels by 10 dBA or greater WARRANT abatement consideration.

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds existing noise levels by 10 dBA or greater

Table 7
I-95/I-276 Interchange - Section I-95-C
NSA 29 Noise Level Summary (Leq(h))

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NSA	Site Descriptor	Residences/ERU's	PennDOT/FHWA Activity Category	Noise Abatement Criteria (NAC)*	Existing (2023) Peak Hour Noise Level	Design Year (2050) No Build Noise Level	Design Year (2050) Build Noise Level
29	29-A	1	C	66	58	60	59
	29-B	1	C	66	62	63	62
	29-C	1	C	66	64	65	64
	29-D	1	C	66	65	66	66
	29-E	1	C	66	65	67	66
	29-F	1	C	66	65	67	66
	29-G	1	C	66	65	66	66
	29-H	1	C	66	63	65	65
	29-I	1	C	66	56	58	57
	29-J	1	C	66	59	60	60
	29-K	1	C	66	60	62	61
	29-L	1	C	66	61	63	62
	29-M	1	C	66	61	62	62
	29-N	1	C	66	61	63	62
	29-O	1	C	66	61	62	62
	29-P	1	C	66	58	60	61
	29-Q	1	C	66	58	59	60
	29-R	1	C	66	56	58	58
	29-S	1	C	66	56	58	58
	29-T	1	C	66	57	58	58
	29-U	1	C	66	57	59	59
	29-V	1	C	66	57	58	59
	29-W	1	C	66	57	59	59
	29-X	1	C	66	57	58	59
	29-Y	1	C	66	55	57	58

* Noise levels that are within 1 dBA of the PennDOT/FHWA NAC (Table 1) OR exceed existing noise levels by 10 dBA or greater WARRANT abatement consideration.

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds existing noise levels by 10 dBA or greater

Table 8
I-95/I-276 Interchange - Section I-95-C
NSA 13 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	1. Optimized Barrier	
				Mitigated Noise Level*	Insertion Loss*
13	13.1-A	1	62	59	3
	13.1-B1	1	63	58	5
	13.1-B2	1	67	62	5
	13.1-C1	1	62	57	5
	13.1-C2	1	65	60	5
	13.1-D1	1	61	56	5
	13.1-D2	1	64	59	5
	13.1-E1	1	61	55	6
	13.1-E2	1	63	58	5
	13.1-F1	1	60	54	5
	13.1-F2	1	62	57	5
	13.1-G1	1	63	58	4
	13.1-G2	1	66	61	5
	13.1-H1	1	61	58	4
	13.1-H2	1	64	61	3
	13.1-I1	1	60	57	3
	13.1-I2	1	63	60	3
	13.1-J1	1	59	56	3
	13.1-J2	1	62	59	3
	13.1-K1	1	58	55	3
	13.1-K2	1	61	58	3
	13.1-L1	1	57	55	3
	13.1-L2	1	60	58	2
	13.1-M1	1	57	54	2
	13.1-M2	1	59	57	2
	13.1-N1	1	56	55	0
	13.1-N2	1	57	57	0
	13.1-O1	1	54	54	0
	13.1-O2	1	56	56	0
	13.1-P1	1	54	53	0
	13.1-P2	1	55	55	0
	13.1-Q1	1	53	53	1
	13.1-Q2	1	55	55	0
	13.1-R1	1	53	52	0
	13.1-R2	1	55	54	0
	13.1-S1	1	52	52	1
	13.1-S2	1	54	54	0
	13.1-T1	1	59	57	2
	13.1-T2	1	61	59	2
	13.1-U1	1	58	57	1
	13.1-U2	1	60	59	1
	13.1-V1	1	57	56	1
	13.1-V2	1	59	59	1
	13.1-W1	1	55	54	2
	13.1-W2	1	57	56	2
	13.1-X1	1	57	51	6
	13.1-X2	1	59	54	6

Table 8
I-95/I-276 Interchange - Section I-95-C
NSA 13 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	1. Optimized Barrier	
				Mitigated Noise Level*	Insertion Loss*
13	13.1-Y1	1	58	53	5
	13.1-Y2	1	60	56	5
	13.2-A	1	66	59	7
	13.2-B	1	67	57	10
	13.2-C	1	64	58	6
	13.2-D	1	65	55	10
	13.2-E	1	61	56	5
	13.2-F	1	63	55	9
	13.2-G	1	63	55	8
	13.2-H	1	63	52	11
	13.3-A	1	76	62	14
	13.3-B	1	77	63	14
	13.3-C	1	77	63	14
	13.3-D	1	76	63	13
	13.3-E	1	75	62	13
	13.3-F	1	74	62	12
	13.3-G	1	71	62	10
	13.3-H	1	66	57	9
	13.3-I	1	69	57	12
	13.3-J	1	70	58	12
	13.3-K	1	69	57	12
	13.3-L	1	67	57	10
	13.3-M	1	66	56	9
	13.3-N	1	65	56	9
	13.3-O	1	63	56	7
	13.3-P	1	64	57	7
	13.3-Q	1	63	58	5
	13.3-R	1	62	59	3
	13.3-S	1	61	58	3
	13.3-T	3	60	52	7
	13.3-U	3	58	52	6
	13.3-V	3	56	54	2

Barrier Analysis	NSA or Receiver(s)	Number of Benefits	Barrier Length	Minimum Height (ft.)	Maximum Height (ft.)	Total Area (Sq./Ft.)	MaxSF/BR Value	Barrier Feasible?	Barrier Reasonable?
1. Optimized	NSA 13	46	2,208	12	20	42,231	918	Yes	Yes

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds exisitng noise levels by 10 dBA or greater
Insertion Loss of 5 dBA or greater
Insertion loss of 7 dBA or greater
* Noise values, comparisons and Insertion Loss are calculated to the tenth of a dBA and then rounded for presentation purposes

Table 9
I-95/I-276 Interchange - Section I-95-C
NSA 14 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier System	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
14	14-A	1	73	61	12
	14-B	2	73	60	13
	14-C	2	74	61	12
	14-D	2	72	60	12
	14-E	1	69	57	11
	14-F	2	73	61	12
	14-G	2	73	60	13
	14-H	2	73	60	13
	14-I	2	73	60	12
	14-J	2	69	60	9
	14-K	2	66	58	8
	14-L	1	64	57	7
	14-M	2	61	56	5
	14-N	1	67	60	7
	14-O	1	60	58	2
	14-P	1	69	64	5
	14-Q	2	57	53	4
	14-R	2	57	51	6
	14-S	2	57	51	5
	14-T	2	58	51	7
	14-U	2	61	53	9
	14-V	2	61	53	8
	14-W	2	62	55	8
	14-X	2	64	56	8
	14-Y	2	63	56	7
	14-Z	2	62	55	6
	14-AA	2	59	53	6
	14-BB	2	56	51	4
	14-CC	1	54	50	5
	14-DD	2	66	64	3
	14-EE	2	58	52	6
	14-FF	1	59	54	4
	14-GG	2	57	51	6
	14-HH	3	53	50	3
	14-II	2	58	50	8
	14-JJ	1	58	51	8
	14-KK	12	52	50	2
	14-LL	8	54	49	5
	14-MM	2	64	62	2
	14-NN	2	56	54	2

Barrier System Analysis	NSA or Receiver(s)	Number of Benefits	Barrier Length	Minimum Height (ft.)	Maximum Height (ft.)	Total Area (Sq./Ft.)	MaxSF/BR Value	Barrier Feasible?	Barrier Reasonable?
1. Optimized	NSA 14	61	2,432	15	20	44,995	738	Yes	Yes

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds exisitng noise levels by 10 dBA or greater
Insertion Loss of 5 dBA or greater
Insertion loss of 7 dBA or greater
* Noise values, comparisons and Insertion Loss are calculated to the tenth of a dBA and then rounded for presentation purpose

Table 10
I-95/I-276 Interchange - Section I-95-C
NSA 15 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier System	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
15	15-A	1	74	63	11
	15-B	1	76	63	12
	15-C	1	74	62	12
	15-D	1	68	58	10
	15-E	1	65	56	10
	15-F	1	69	59	10
	15-G	1	71	61	10
	15-H	1	72	61	11
	15-I	1	73	61	12
	15-J	1	65	53	12
	15-K	1	67	55	12
	15-L	1	70	58	12
	15-M	1	70	59	10
	15-N	1	72	61	11
	15-O	1	70	59	11
	15-P	1	66	54	11
	15-Q	1	64	53	10
	15-R	1	65	54	11
	15-S	1	66	55	11
	15-T	1	72	61	11
	15-U	1	72	61	11
	15-V	1	68	57	11
	15-W	2	75	61	14
	15-X	2	73	61	12
	15-Y	3	68	59	9
	15-Z	2	66	58	8
	15-AA	1	76	63	13
	15-BB	1	75	63	13
	15-CC	1	74	62	12
	15-DD	1	73	62	11
	15-EE	1	70	63	7
	15-FF	1	67	63	5
	15-GG	1	65	63	3
	15-HH	1	72	63	9
	15-II	1	69	60	9
	15-JJ	1	66	56	10
	15-KK	1	63	54	9
	15-LL	1	61	53	9
	15-MM	1	61	52	9
	15-NN	1	60	52	8
	15-OO	1	58	50	8
	15-PP	1	64	54	10
	15-QQ	1	64	54	10
	15-RR	1	65	53	11
	15-SS	1	57	54	3
	15-TT	4	55	53	2
	15-UU	1	58	51	7
	15-VV	3	65	53	11
	15-WW	1	59	51	8
	15-XX	1	59	51	8
	15-YY	3	62	52	10
	15-ZZ	1	64	53	11
	15-AAA	2	66	55	11
	15-BBB	1	70	58	12
	15-CCC	1	72	59	13
	15-DDD	1	74	60	13
	15-EEE	1	75	62	14
	15-FFF	1	73	59	14
	15-GGG	1	69	57	12
	15-HHH	1	68	56	12
	15-III	1	71	59	12
	15-JJJ	1	74	61	13

Table 10
I-95/I-276 Interchange - Section I-95-C
NSA 15 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier System	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
15	15-KKK	1	74	62	13
	15-LLL	1	76	63	13
	15-MMM	1	78	64	14
	15-NNN	1	78	64	14
	15-OOO	1	75	62	13
	15-PPP	1	70	59	11
	15-QQQ	1	66	56	10
	15-RRR	1	73	61	12
	15-SSS	3	69	59	11
	15-TTT	3	69	58	11
	15-UUU	2	66	57	9
	15-VVV	2	63	56	7
	15-WWW	3	60	55	5
	15-XXX	3	59	54	5
	15-YYY	3	56	54	2
	15-ZZZ	2	55	49	5
	15-AAAA	3	56	52	4
	15-BBBB	3	58	50	8
	15-CCCC	3	56	49	7
	15-DDDD	3	60	52	8
	15-EEEE	3	61	52	10
	15-FFFF	4	62	52	10
	15-GGGG	1	60	51	9
	15-HHHH	1	58	50	8
	15-IIII	1	59	52	8
	15-JJJJ	1	62	52	10
	15-KKKK	1	61	53	8
	15-LLLL	1	61	54	7
	15-MMMM	1	62	54	8
	15-NNNN	1	62	54	9
	15-OOOO	1	60	51	8
	15-PPPP	1	63	55	8
	15-QQQQ	3	64	56	8
	15-RRRR	1	59	54	6
	15-SSSS	1	64	55	9
	15-TTTT	1	64	59	5
	15-UUUU	1	60	54	6
	15-VVVV	1	61	55	5
	15-WWWW	3	55	49	7
	15-XXXX	1	56	49	6
	15-YYYY	1	56	52	4
	15-ZZZZ	1	53	49	5
	15-AAAAA	1	56	49	7

Barrier System Analysis	NSA or Receiver(s)	Number of Benefits	Cumulative Barrier Length	Minimum Height (ft.)	Maximum Height (ft.)	Total Area (Sq./Ft.)	MaxSF/BR Value	Barrier Feasible?	Barrier Reasonable?
1. Optimized	NSA 15	135	4,448	13	19	79,005	585	Yes	Yes

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds exisitng noise levels by 10 dBA or greater
Insertion Loss of 5 dBA or greater
Insertion loss of 7 dBA or greater

* Noise values, comparisons and Insertion Loss are calculated to the tenth of a dBA and then rounded for presentation purposes

Table 11
I-95/I-276 Interchange - Section I-95-C
NSA 16 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier System	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
16	16-A	1	68	59	9
	16-B	1	74	62	12
	16-C	1	76	63	13
	16-D	1	76	63	13
	16-E	1	76	63	13
	16-F	1	75	64	12
	16-G	1	75	63	13
	16-H	1	75	63	13
	16-I	1	76	63	13
	16-J	1	76	63	13
	16-K	1	73	62	12
	16-L	1	74	62	12
	16-M	1	74	62	12
	16-N	1	75	62	13
	16-O	1	76	62	14
	16-P	1	77	62	14
	16-Q	1	73	62	11
	16-R	1	73	61	11
	16-S	1	72	61	11
	16-T	1	71	61	10
	16-U	1	71	60	11
	16-V	1	71	62	10
	16-W	1	72	62	10
	16-X	1	72	62	10
	16-Y	1	72	62	10
	16-Z	1	72	62	10
	16-AA	1	72	62	10
	16-BB	1	75	61	13
	16-CC	1	73	62	11
	16-DD	1	65	57	8
	16-EE	1	71	60	11
	16-FF	1	68	59	9
	16-GG	1	66	57	8
	16-HH	3	61	55	7
	16-II	1	57	52	5
	16-JJ	1	76	61	15
	16-KK	1	66	58	8
	16-LL	1	75	61	14
	16-MM	1	74	62	12
	16-NN	1	71	60	11
	16-OO	1	63	57	6
	16-PP	1	76	62	14
	16-QQ	1	73	60	12
	16-RR	1	65	62	2
	16-SS	1	64	63	2
	16-TT	1	69	64	5
	16-UU	1	59	53	6
	16-VV	1	61	55	5
	16-WW	3	60	53	7
	16-XX	3	61	53	8
	16-YY	1	56	49	7
	16-ZZ	1	63	53	9
	16-AAA	1	65	55	10
	16-BBB	1	66	55	11
	16-CCC	1	63	54	10

Table 11
I-95/I-276 Interchange - Section I-95-C
NSA 16 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier System	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
16	16-DDD	2	62	53	9
	16-EEE	1	62	53	9
	16-FFF	1	63	54	9
	16-GGG	1	65	55	10
	16-HHH	1	68	56	11
	16-III	1	71	59	12
	16-JJJ	1	68	57	12
	16-KKK	1	72	59	12
	16-LLL	1	69	58	11
	16-MMM	1	66	56	9
	16-NNN	1	59	52	7
	16-OOO	3	57	51	6
	16-PPP	2	57	53	4
	16-QQQ	3	63	57	6
	16-RRR	3	61	60	0
	16-SSS	1	64	63	1
	16-TTT	2	57	52	5
	16-UUU	2	54	51	3
	16-VVV	4	56	51	5
	16-WWW	1	58	51	8
	16-XXX	3	56	49	7
	16-YYY	1	63	54	9
	16-ZZZ	1	62	53	9
	16-AAAA	1	62	52	9
	16-BBBB	1	61	52	9
	16-CCCC	1	61	53	8
	16-DDDD	4	57	49	7
	16-EEEE	1	64	54	10
	16-FFFF	1	64	54	10
	16-GGGG	1	62	54	8
	16-HHHH	1	57	51	6
	16-IIII	3	58	50	8
	16-JJJJ	3	59	51	8
	16-KKKK	2	58	51	7
	16-LLLL	2	61	52	9
	16-MMMM	2	59	51	8

Barrier System Analysis	NSA or Receiver(s)	Number of Benefits	Cumulative Barrier Length	Minimum Height (ft.)	Maximum Height (ft.)	Total Area (Sq./Ft.)	MaxSF/BR Value	Barrier Feasible?	Barrier Reasonable?
1. Optimized	NSA 16	112	5,184	11	19	90,080	804	Yes	Yes

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds exisitng noise levels by 10 dBA or greater
Insertion Loss of 5 dBA or greater
Insertion loss of 7 dBA or greater

* Noise values, comparisons and Insertion Loss are calculated to the tenth of a dBA and then rounded for presentation purposes

Table 12
I-95/I-276 Interchange - Section I-95-C
NSA 29 - Noise Barrier Analysis

(1)	(2)	(3)	(4)	(5)	(6)
				1. Optimized Barrier	
NSA	Site Descriptor	Residences/ERUs	Design Year (2050) Build Noise Level*	Mitigated Noise Level*	Insertion Loss*
29	29-A	1	59	58	1
	29-B	1	62	60	3
	29-C	1	64	60	5
	29-D	1	66	59	6
	29-E	1	66	59	7
	29-F	1	66	59	7
	29-G	1	66	59	7
	29-H	1	65	60	5
	29-I	1	57	56	1
	29-J	1	60	57	2
	29-K	1	61	57	4
	29-L	1	62	57	5
	29-M	1	62	56	6
	29-N	1	62	56	6
	29-O	1	62	56	6
	29-P	1	61	56	5
	29-Q	1	60	59	0
	29-R	1	58	57	1
	29-S	1	58	56	2
	29-T	1	58	56	3
	29-U	1	59	55	4
	29-V	1	59	54	4
	29-W	1	59	54	5
	29-X	1	59	54	5
	29-Y	1	58	53	4

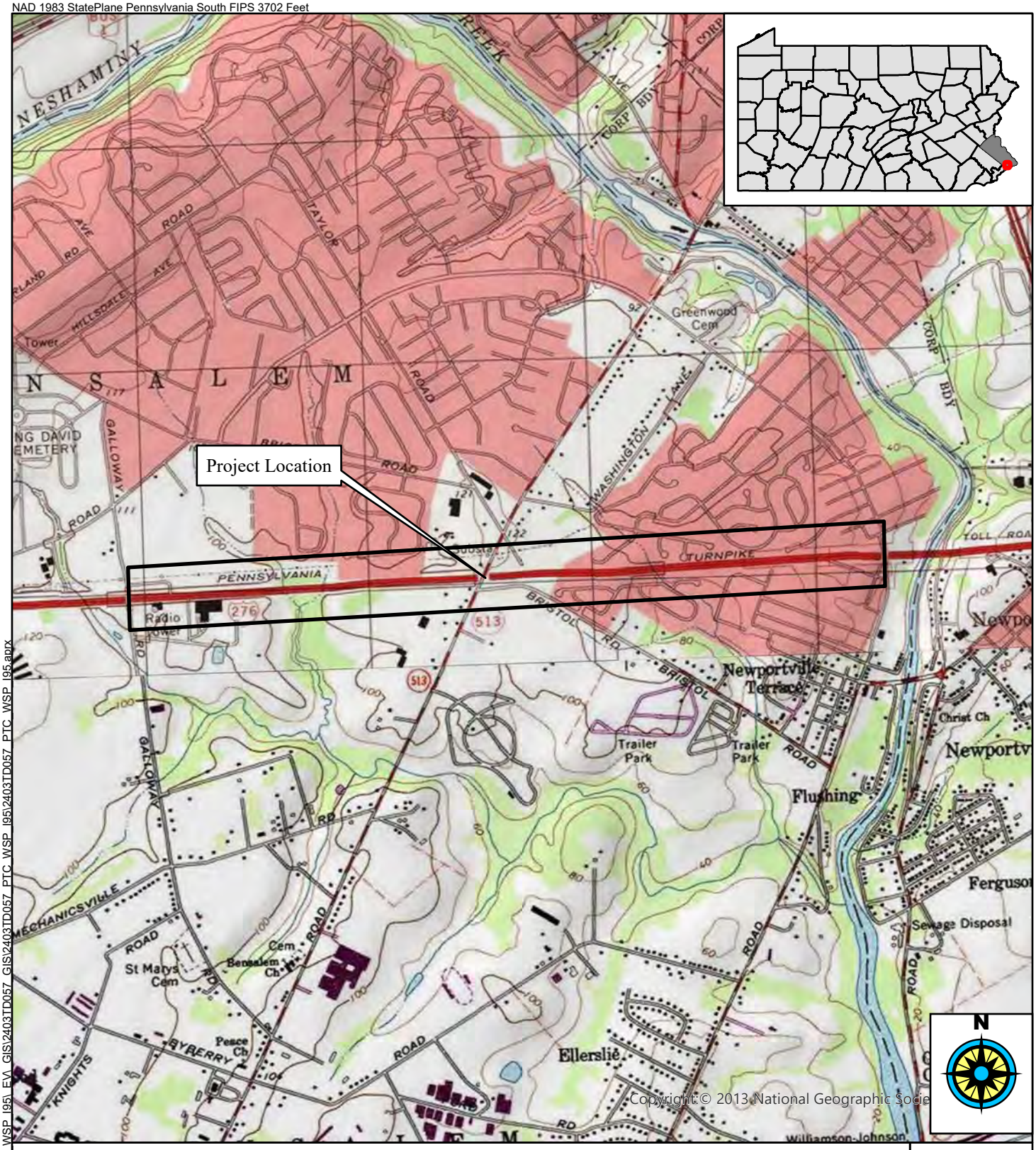
Barrier Analysis	NSA or Receiver(s)	Number of Benefits	Barrier Length	Minimum Height (ft.)	Maximum Height (ft.)	Total Area (Sq./Ft.)	MaxSF/BR Value	Barrier Feasible?	Barrier Reasonable?
1. Optimized	NSA 29	13	1,040	10	20	17,952	1,381	Yes	Yes

Noise level approaches or exceeds PennDOT/FHWA NAC or exceeds exisitng noise levels by 10 dBA or greater
Insertion Loss of 5 dBA or greater
Insertion loss of 7 dBA or greater

* Noise values, comparisons and Insertion Loss are calculated to the tenth of a dBA and then rounded for presentation purposes

FIGURES

NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet



Project Location Map

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Figure: 1

Scale: 1:24,000

Source: USA Topo Map, ESRI Basemap

NAVARRO & WRIGHT CONSULTING ENGINEERS, INC.

Navarro & Wright Consulting Engineers, Inc.
151 Reno Avenue, New Cumberland, PA 17070
(717) 441-2216 (Telephone) (717) 441-2218 (Fax)

Date: 2/21/2025

Drawn by: RDL

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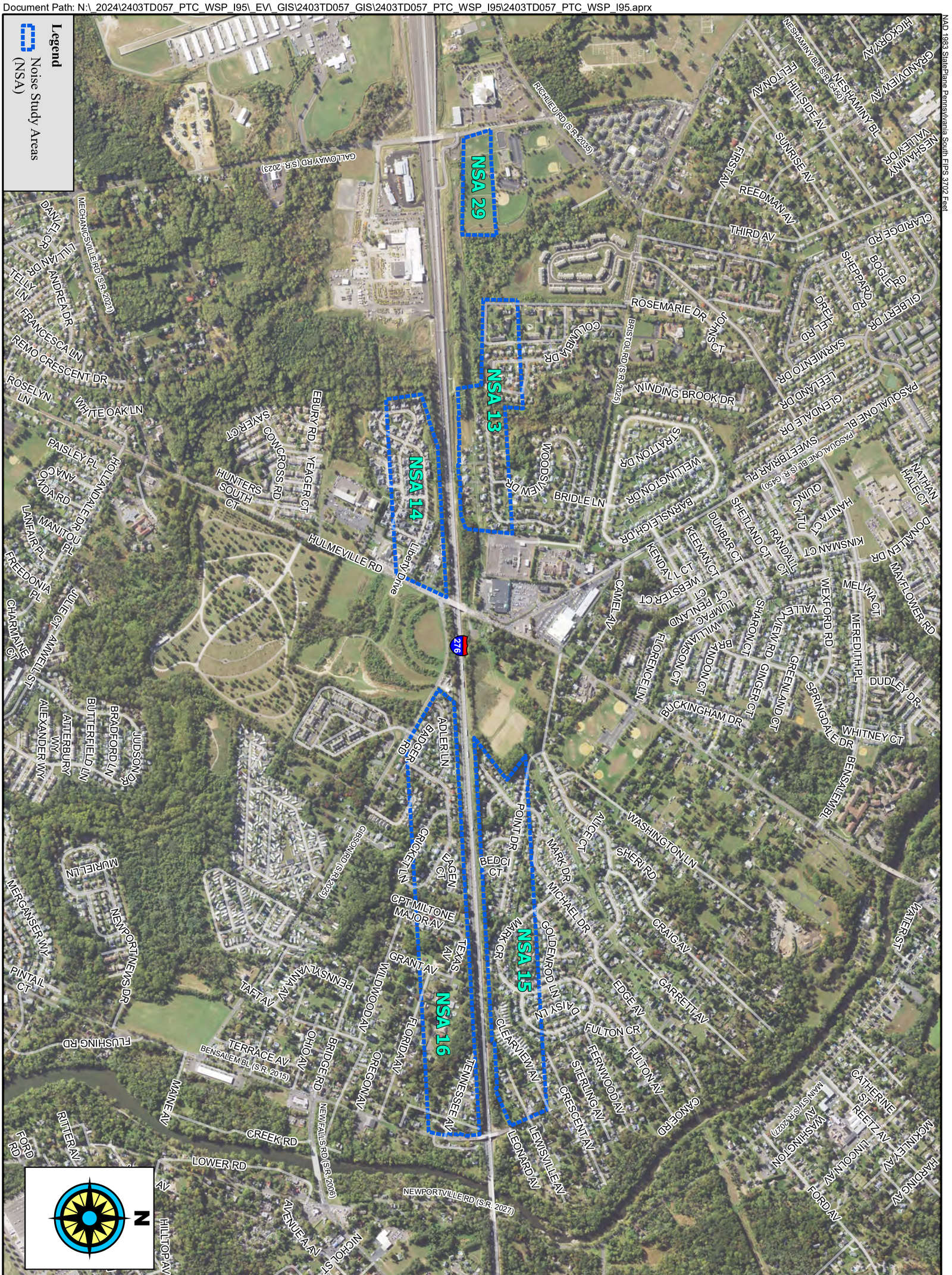

NSA Locations

I-95_C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Figure: 2

Job number: 2403TD057	
Drawn by: RDL	
Checked by: NW	
Scale: 1:12,000	
Date: 2/21/2025	

NAVARRO & WRIGHT CONSULTING ENGINEERS, INC.

151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Document Path: N:\ 2024\2403TD057_PTC_WSP_I95_EV_GIS\2403TD057_GIS\2403TD057_PTC_WSP_I95\2403TD057_PTC_WSP_I95.aprx

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151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 13 Monitoring Locations

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =200 feet
Date:	2/21/2025

Figure: 3

NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

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(717) 441-2218 (Telephone)
(717) 441- 2216 (Fax)

NSA 14 Monitoring Locations

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =200 feet
Date:	2/21/2025

Figure: 4

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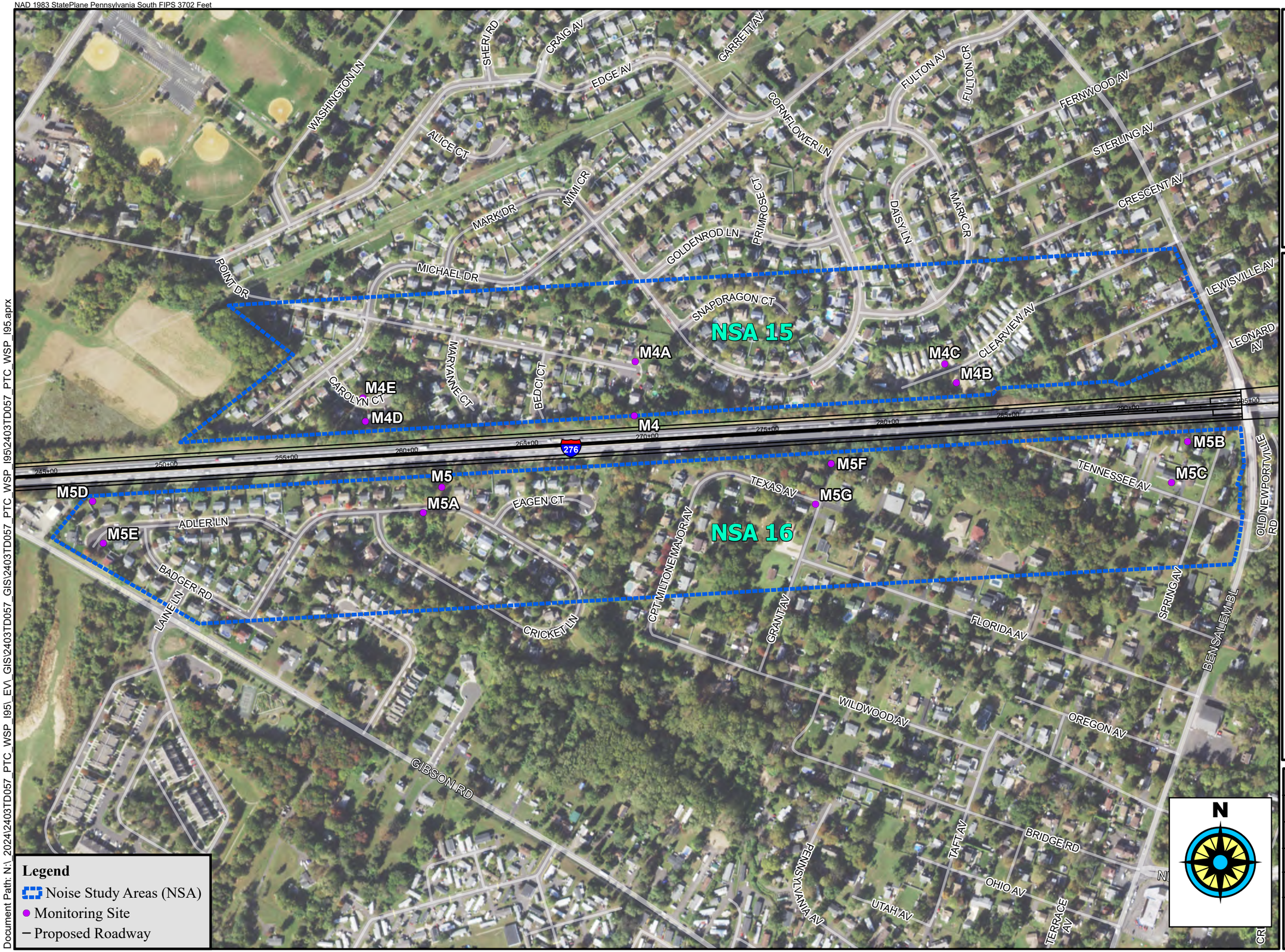
NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet



Legend

- Noise Study Areas (NSA)
- Monitoring Site
- Proposed Roadway

N

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New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 15 and 16 Monitoring Locations

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =375 feet
Date:	2/21/2025

Figure: 5

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NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Legend
- Noise Study Areas (NSA)
- Monitoring Site
- Proposed Roadway

NAVARRO & WRIGHT CONSULTING ENGINEERS, INC.
151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 29 Monitoring Locations

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =100 feet
Date:	2/21/2025

Figure: 6

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NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Legend

- Noise Study Areas (NSAs)
- Noise Barriers
- Proposed Roadway

Noise Receptors

- No Impact, No Benefit
- No Impact, Benefit
- Impact, No Benefit
- Impact, Benefit
- 1st Floor/2nd Floor

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151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 13 Barrier

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number: 2403TD057
Drawn by: RDL
Checked by: NW
Scale: 1 inch =200 feet
Date: 3/3/2025

Figure: 7

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NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Legend

- Noise Study Areas (NSAs)
- Noise Barriers
- Proposed Roadway

Noise Receptors

- No Impact, No Benefit
- No Impact, Benefit
- Impact, No Benefit
- Impact, Benefit

N

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151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 14 Barrier

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =200 feet
Date:	3/3/2025

Figure: 8

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NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Document Path: \\EgnyteDrive\Projects_2024\2403TD057_PTC_WSP_I95\2403TD057_PTC_WSP_I95_EVI_GIS\2403TD057_PTC_WSP_I95_aprx

NAVARRO & WRIGHT CONSULTING ENGINEERS, INC.

151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 15 and 16 Barriers

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =375 feet
Date:	3/3/2025

Figure: 9

NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Legend

- Noise Study Areas (NSAs)
- Noise Barriers
- Proposed Roadway

Noise Receptors

- No Impact, No Benefit
- No Impact, Benefit
- Impact, No Benefit
- Impact, Benefit

NAVARRO & WRIGHT CONSULTING ENGINEERS, INC.

151 Reno Avenue
New Cumberland, PA 17070
(717) 441-2216 (Telephone)
(717) 441- 2218 (Fax)

NSA 29 Barrier

I-95-C Central Turnpike Widening Project
Bensalem Township, Bucks County, Pennsylvania

Source: USDA NAIP 2019

Job number:	2403TD057
Drawn by:	RDL
Checked by:	NW
Scale:	1 inch =100 feet
Date:	1/9/2025

Figure: 10

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APPENDICES

Appendix A

List of Preparers

List of Preparers and Reviewers

Name:	Robert C. Kolmansberger
Organization:	Navarro & Wright Consulting Engineers, Inc.
Role:	Abatement Analysis, Report Development, QA/QC
Experience:	33 years
Education:	BA, Geography and Environmental Planning

Name:	Nathaniel Weinstock
Organization:	Navarro & Wright Consulting Engineers, Inc.
Role:	Noise Modeling, Abatement Analysis, Report Development, QA/QC
Experience:	25 years
Education:	BS, Public Service

Name:	Frederick E. Schiller
Organization:	Navarro & Wright Consulting Engineers, Inc.
Role:	Noise Modeling, Abatement Analysis, Report Development, QA/QC
Experience:	18 years
Education:	Associates Degree, General Studies

Name:	Rebecca Love
Organization:	Navarro & Wright Consulting Engineers, Inc.
Role:	Report Development
Experience:	1 year
Education:	BS, Environmental Biology

Appendix B

Noise Monitoring Data

SHORT-TERM AND LONG-TERM NOISE MONITORING RESULTS

NSA	Monitored Site ID	Site Address	Date	Leq (dBA)		
				AM Peak (7am-8am)	Midday Peak (8am-5pm)	PM Peak (5pm-6pm)
29	M1	3000 Donallen Drive, Bensalem, PA 19020	11/1/05-11/3/05	61	61	61
13	M2	2709 Woods View Drive Bensalem, PA 19020	11/1/05-11/2/05	68	67	67
	M2B	2711 Woods View Drive Bensalem, PA 19020	11/1/05-11/2/05	62	60	60
	M2C	2649 Woods View Drive Bensalem, PA 19020	11/8/05	62	58	60
	M2D	2651 Woods View Drive Bensalem, PA 19020	11/8/05	70	67	67
	M2A	3060 Bristol Road, Bensalem PA 19020	11/1/05	58	56	57
14	M3	99 Liberty Drive, Bensalem, PA 19020	11/1/05	68	67	67
	M3A	91 Liberty Drive, Bensalem, PA 19020	11/1/05	61	60	60
15	M4	1507 Point Drive, Bensalem, PA 19020	11/2/05-11/3/05	73	71	73
	M4A	1514 Point Drive, Bensalem, PA 19020	11/2/05-11/3/05	63	59	61
	M4B	6116-6128 Clearview Avenue, Bensalem, PA 19020	11/2/05	68	67	68
	M4C	6116-6128 Clearview Avenue, Bensalem, PA 19020	11/2/05	63	62	63
	M4D	1623 Carolyn Court	11/2/05	67	65	66
	M4E	5815 Michael Drive, Bensalem, PA 19020	11/2/05	62	61	61
16	M5	5688 Cricket Lane, Bensalem, PA 19020	11/8/05	67	65	65
	M5A	5689 Cricket Lane, Bensalem, PA 19020	11/8/05	64	62	64
	M5B	1119 Tennessee Avenue, Bensalem PA 19020	11/3/05	67	65	66
	M5C	1057 Tennessee Avenue, Bensalem PA 19020	11/3/05	59	60	59
	M5D	1883 Adler Road, Bensalem, PA 19020	11/8/05	67	67	68
	M5E	1874 Adler Road, Bensalem, PA 19020	11/8/05	57	58	59
	M5F	6040 Grant Avenue Bensalem, PA 19020	11/3/05	68	67	67
	M5G	6022 Grant Avenue, Bensalem, PA 19020	11/3/05	61	61	61
17	M6	6361 Leonard Avenue, Bensalem, PA 19020	11/8/05	68	66	67
	M6A	6354 Leonard Avenue, Bensalem, PA 19020	11/8/05	62	59	60

Source: **The Louis Berger Group, Inc., February 2006**

Notes: **1st Row Receptor**

2nd Row Receptor

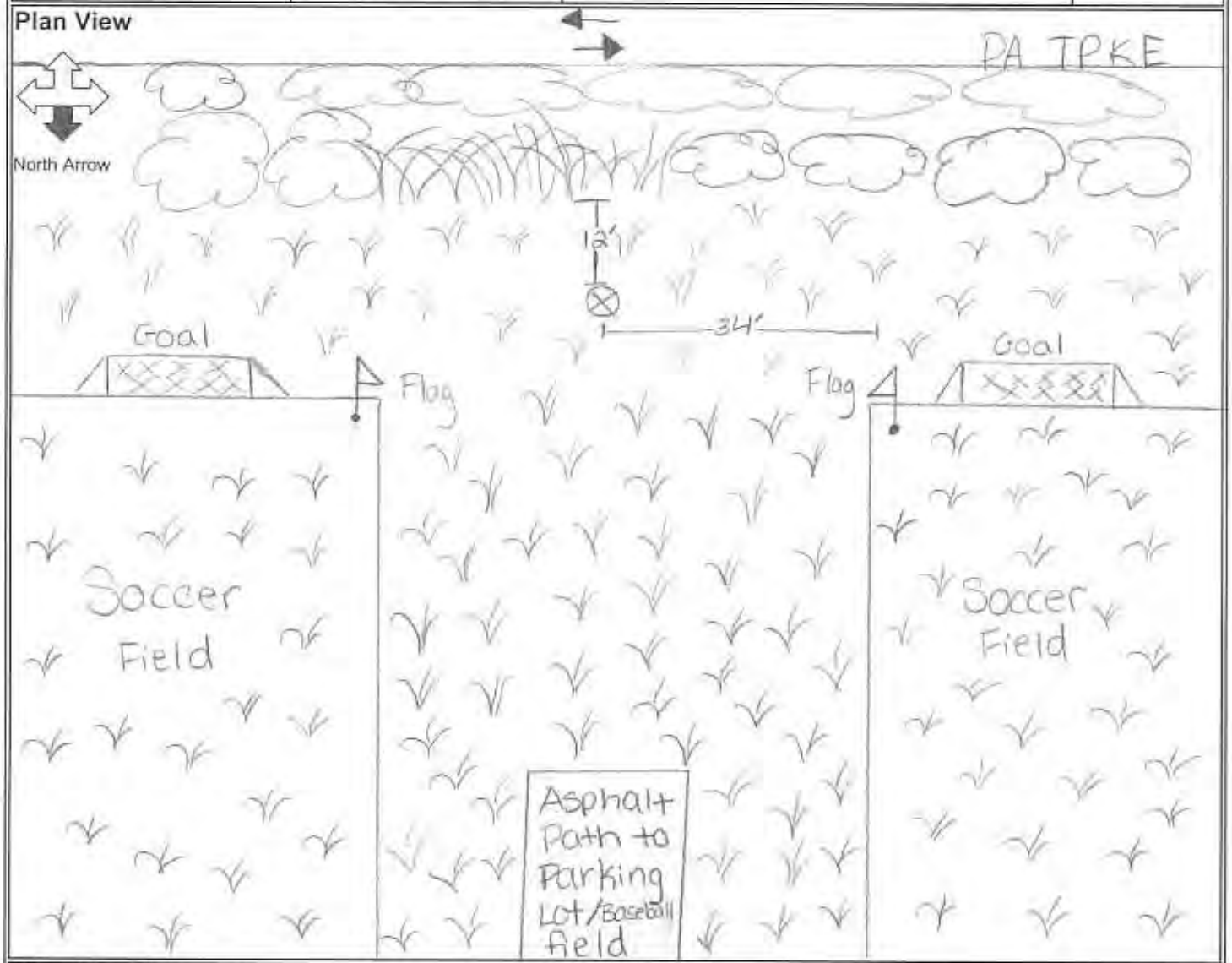
Note that NSA 17 was included in the original 2005 I-95-C fieldwork but was subsequently shifted to adjacent Section I-95-D, located east of Bensalem Boulevard. Monitoring data tables were reproduced in this report as documented in the 2006 PE Noise Analysis Report.

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
1	11/1/05	3000 Donallen Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Soccer Field	Treeline	
Grade	**Pavement Type**	**Distance to Landmark**	
	Grass	12 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
45°	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names. hydrants, telephone poles, manholes, etc.

Site 1

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 1 Address Park

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #	
AM Peak	7:00 AM - 8:00 AM	11/1/05	7:30	61.6	60.8	60.7	61.0	61.2	61.2	AU2_0001	
				59.5	63.7	60.6	59.9	60.5	59.6	(13 min)	60-64
				60.1	0.0						
Midday	8:00 AM - 5:00 PM	11/1/05	3:01	61.1	61.3	62.6	62.0	60.8	61.7	AU2_0005	
				61.2	60.4	61.8	60.7	61.5	60.2	(21 min.)	60-63
				60.3	59.5	59.8	59.9	61.0	63.2	60.7 62.1 60.2	59.7 0.0
PM Peak	5:00 PM - 6:00 PM	11/1/05	4:32	61.2	59.2	60.5	58.7	60.8	59.3	AU2_0006	
				60.5	60.0	61.1	60.3	62.2	60.1	(13 min)	59-62
				59.9	59.6						
Photo		55-58, 75-78					Diagram	✓			

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM Peak

- main noises are from PA turnpike
  - ↳ sounds of tires on pavement
- constant noise of birds chirping (can be easily heard over traffic from turnpike)
- plane overhead
  7:37:40 to 7:37:55 (64dBA)
- occasional loud trucks passing

Midday Peak

3:03:40 wind picks up a bit (can hear leaves rustle on trees)

- birds chirping → not as loudly as AM Peak hour
- main noises are from PA turnpike
- traffic not as frequent as during AM peak

3:04:58 - 3:05:18 62.7 plane flies overhead

*relatively quiet other than PA turnpike traffic

3:05:52 wind picks up

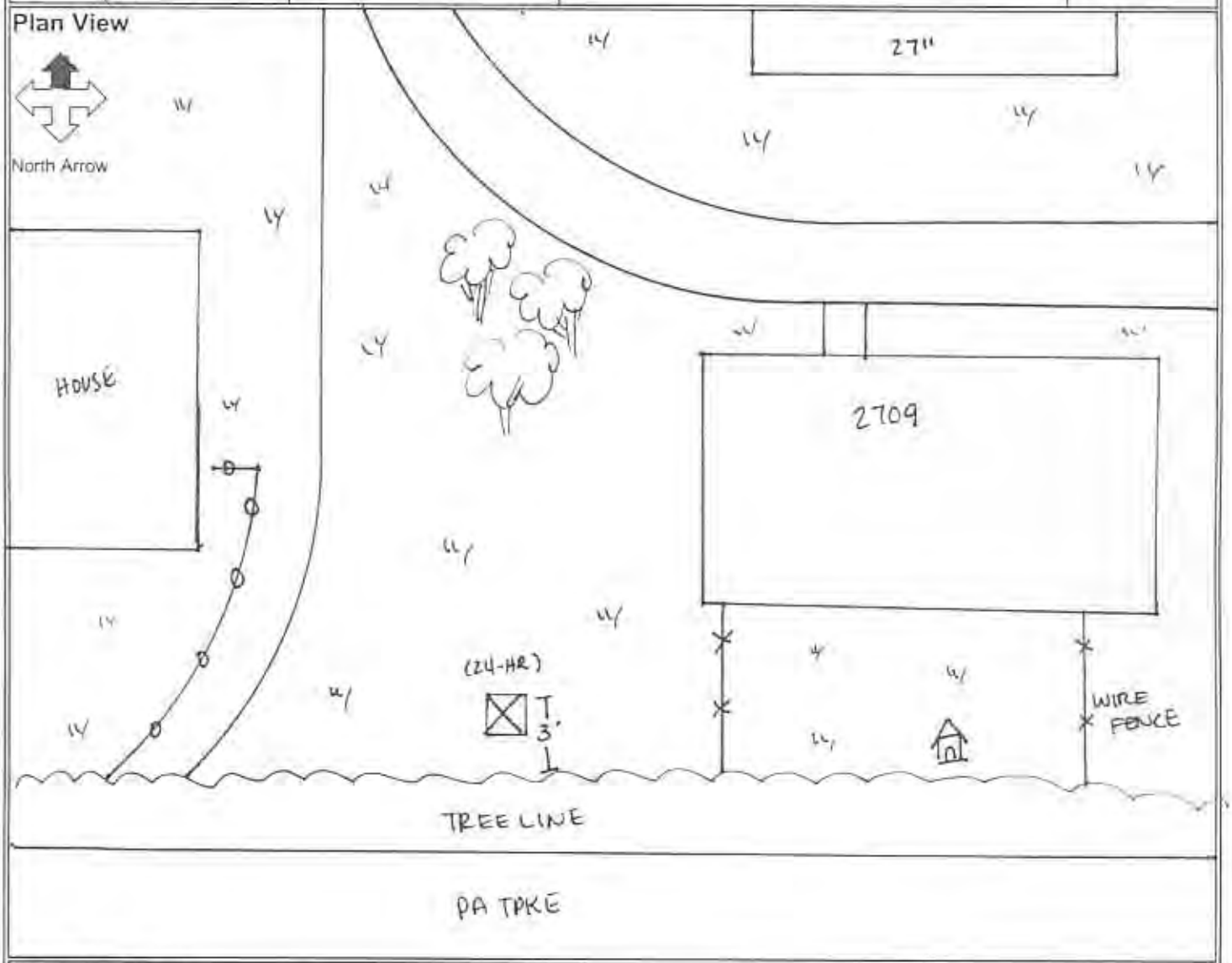
- 3:08:24 wind picks up
- 3:08:45 two loud trucks pass 64.7?
- 64.8 @ 3:09:42 loud truck
- 3:15:37 wind picks up
- not as many trucks pass as during AM peak

Field Noise Monitoring Site Diagram

The Louis Berger Group, Inc.

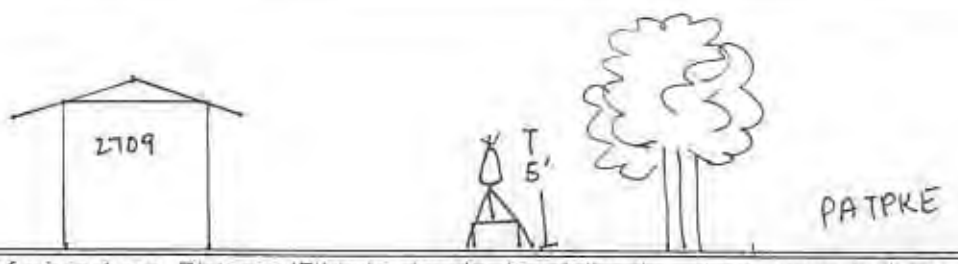
Location #	Date	Address	Observer
2	11/1/05	2709 WOODSVIEW DRIVE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	TREELINE	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	GRASS	3FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2260

Plan View



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 2

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 2 Address 2709 Woodsview Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2260 Rec #
AM Peak	7:00 AM - 8:00 AM	11-1-05	9:50 AM							
Midday	8:00 AM - 5:00 PM									
PM Peak	5:00 PM - 6:00 PM									
Photo		63-67			Kodak		Diagram		V	

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

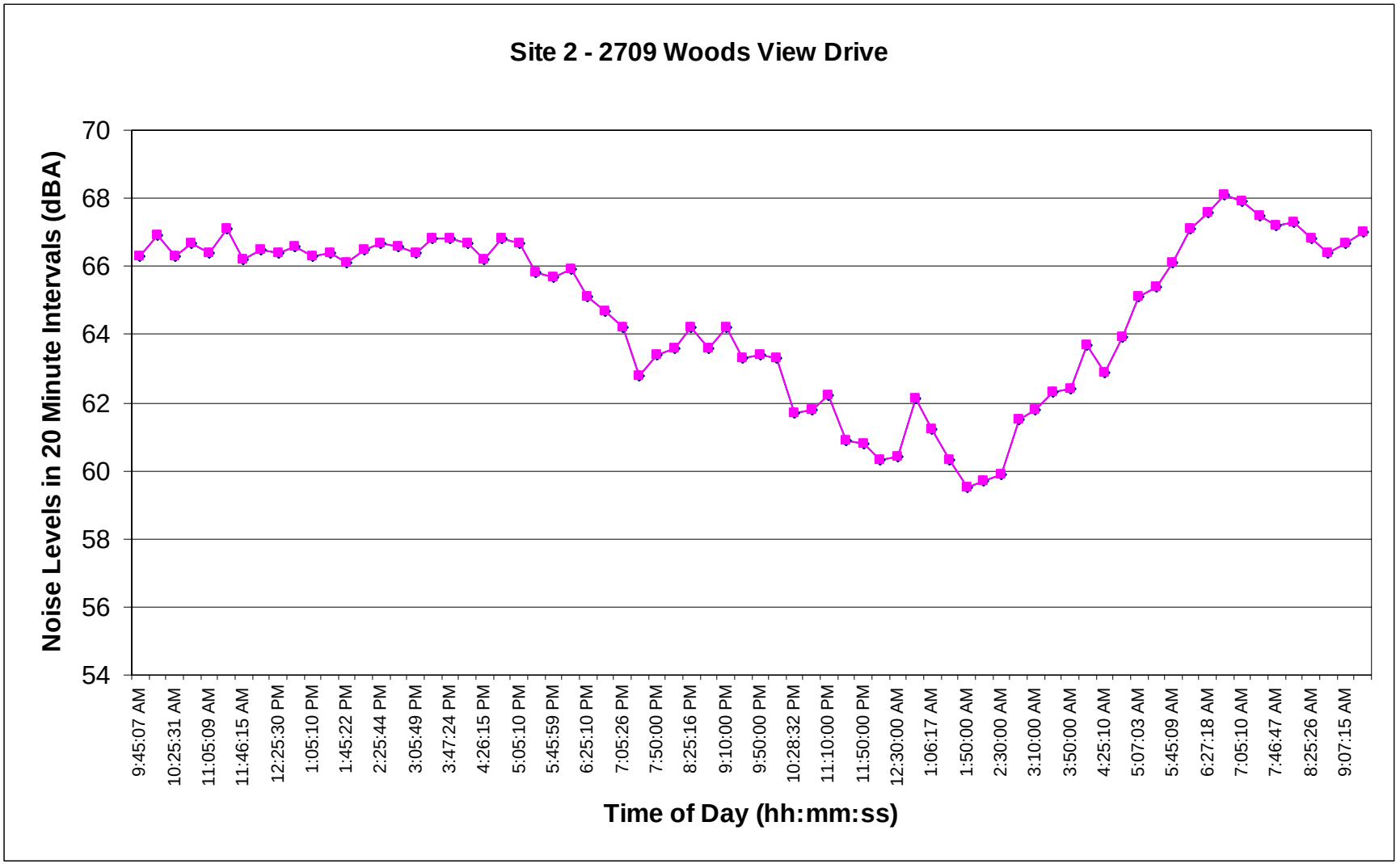
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

11/1/05 - 24 hour setup @ backyard property line of 2709 Woods View Drive.
PA TPKE - less than 100ft away
Meter setup at tree line.
Predominant noise is from PA TPKE
11/3/05 - PICKUP @ 1:00 PM

2709 WOODS VIEW DRIVE (24hr) 2

24-Hour Monitoring Results

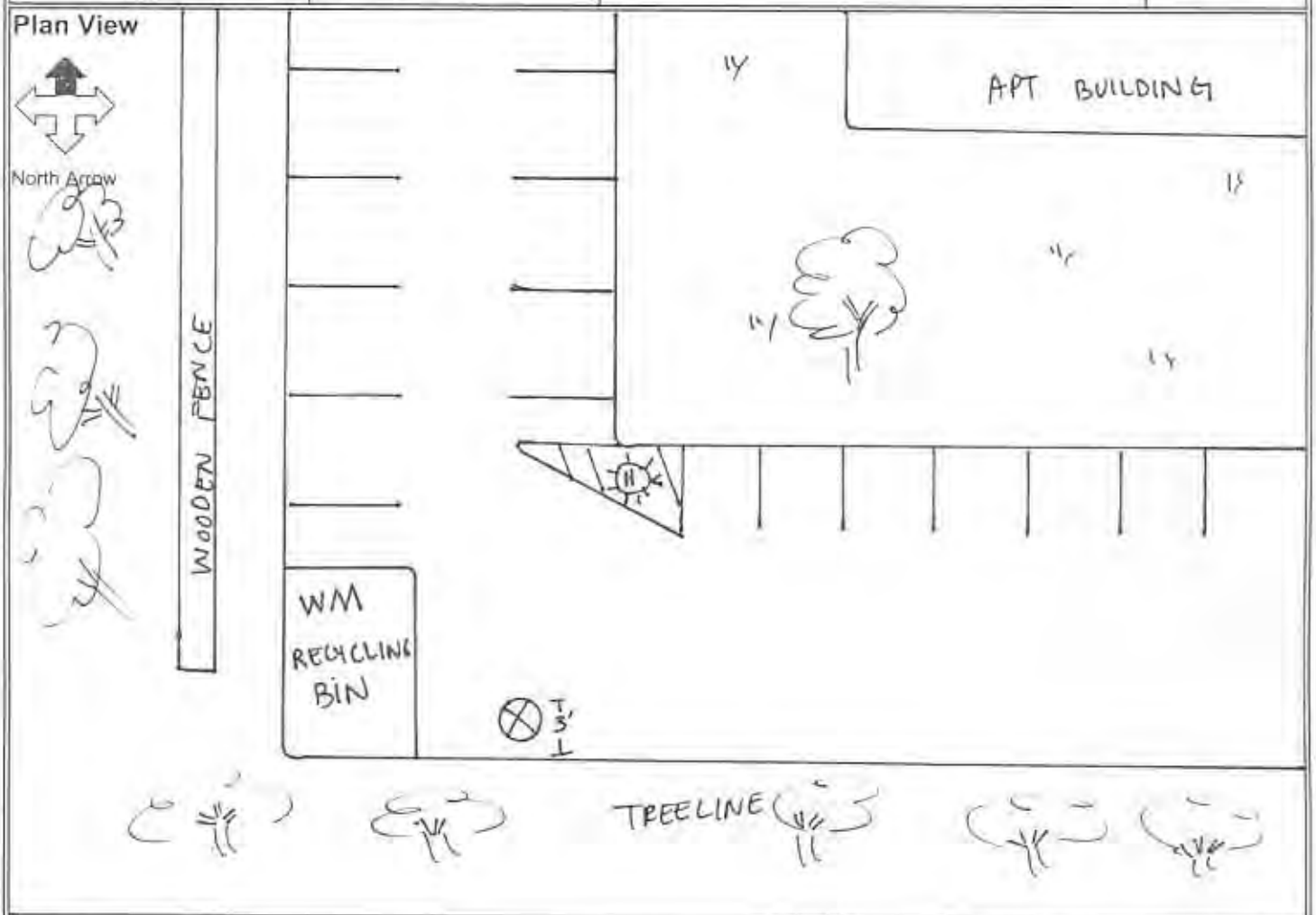


Field Noise Monitoring Site Diagram

The Louis Berger Group, Inc.

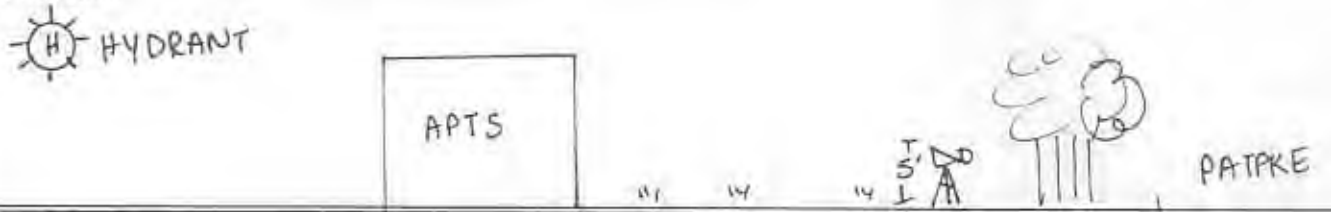
Location #	Date	Address	Observer
2A	11/1/05	3060 BRISTOL ROAD	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	ROAD	EDGE OF PARKING LOT	
Grade	**Pavement Type**	**Distance to Landmark**	
AT GRADE	ASPHALT	3FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
45°	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 2A

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 2A Address 3060 Bristol Road

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 Rec #
AM Peak	7:00 AM - 9:00 AM	11/1/05	7:30AM	58.5	59	58	57.5	68	57	1
			7:33	58.0	58.1	58	57	60.2	56.6	2
			7:37	57.7	58	57.5	56.5	60.2	55.5	3
Midday	9:00 AM - 5:00 PM (15 MIN)	11/1/05	3:00 P	57.1		56	54	65	53	10
			3:07	55.6	56.4	55	53	61.2	51.2	11
			3:19	56.5	56	55.5	54	64.5	52.6	12
PM Peak	5:00 PM - 7:00 PM	11/1/05	4:32	54.6		56	54	61.8	52.8	13
			4:36	54.6	54.9	3.16 diff 55		61.3	53.5	14
			4:39	55.5	55	58	55.5	64.1	53	15
Photo		168-176 - CANON					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

7:30AM - QUIET PARKING LOT AREA, TRAFFIC ON PATPKE, BIRD NOISES, PEOPLE STARTING CAR ENGINE, ONE CAR DROVE BY

3:00 PM - NOISES FROM VEHICULAR TRAFFIC ON PATPKE

3:04 PM - AIRPLANE OVERHEAD BIRD NOISES

3:05 PM - BREEZE

3:19 PM - CAR DROVE BY & ASKED QUESTIONS

4:32 PM - QUIET ONLY INSECT NOISES SOME TRAFFIC NOISE

4:39 PM - TRAFFIC NOISE PICKING UP INSECT NOISES CONTINUOUS

11/3/05

TIME	LEQ	REC
5:51 PM 3	56.9	30
5:55 PM 3	57.1	31
5:59 PM 4	56.6	32

5:51 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

- BACKGROUND NOISES INCLUDE CRICKETS & INSECT NOISES & TREE LEAVES RUSTLING & CARS DRIVING BY (11

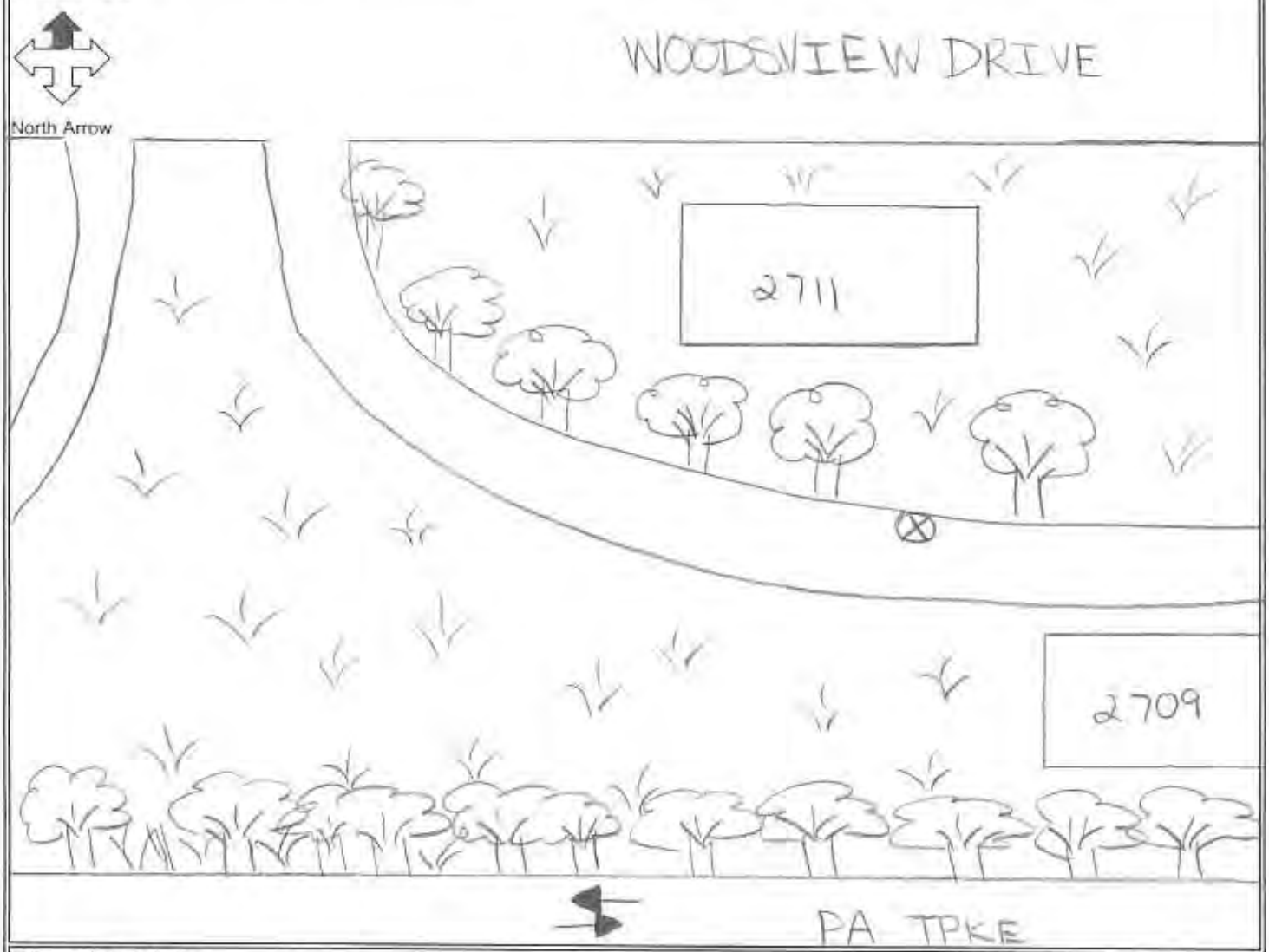
LONG MEADOW ADT ON 3060 BRISTOL RD 2A

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
2B	11/1/05	2711 Woodsview Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Driveway	Property Line / Driveway	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Asphalt	On Driveway	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
60	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 2B

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 2B Address 2911 Woodsview Dr.

	Time Periods	Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/1/05	2:26							AU2_0004 (15 min.)
Midday	8:00 AM - 5:00 PM	11/1/05	5:00							AU2_0007 (11 min.)
PM Peak	5:00 PM - 6:00 PM	11/2/05	7:15							AU2_0009 ( )
Photo		70 - 74					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

Midday
- main noise source is from PA Tpke.
- can hear birds chirping & insects buzzing (not too loudly but audible even w/ traffic passing on PA Tpke
- trucks passing occasionally on tpke
- 2:30 - 2:31 can hear plane in dist. but does not seem to affect LAeq
- 61.2 @ 2:33 from loud trucks passing on tpke.
- 2:35 60.7 when loud & many trucks pass by on tpk.
- 2:35:59 to 2:36 dog barks a few times → levels stay around 58-59 (coming from 2707? back yard)

* insects buzzing is pretty constant
- 61.9 @ 2:39 b/c many trucks passing on PA tpke
- 2:40 dog barks again but truck traffic * also higher @ this moment
- 2:41 62.8 loud trucks passing

- 5:01:05 60.5 from dog barking @ 2011 Woodsview
- insects & birds not as loud as during midday
- relatively quiet
- 5:02:30 dog barking again
- 5:03:44 dog barks again 60.0 dBA?

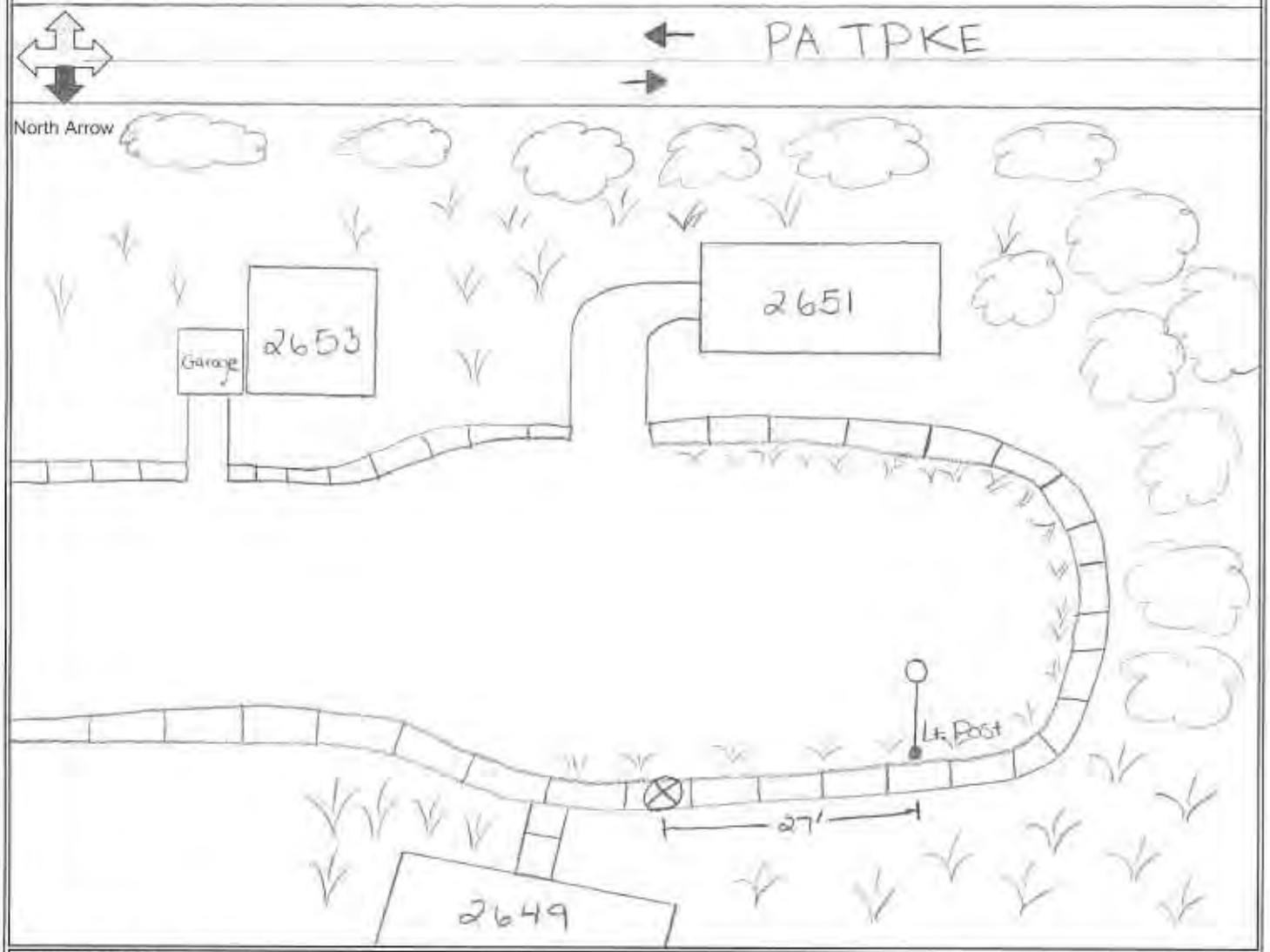
* Can't hear as many trucks
- 5:05:54 several trucks pass by on tpke → levels jump to 60.4

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
2C	11/8/05	2649 Woodsview Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPK East/West	Sidewalk	Light Post	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Concrete	27 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
40's	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 2C

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 2C Address 2649 Woodsview Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	7:05							AU2_0026
Midday	8:00 AM - 5:00 PM	11/8/05	12:17							AU2_0030
PM Peak	5:00 PM - 6:00 PM	11/8/05	5:47							AU2_0038
Photo		45-48					Diagram			

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!
BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM peak
- quiet neighborhood
- can occasionally hear birds chirping
- const. hum of tires on pavement especially off to my right (eastward)

7:11 - 7:12 loud bird chirp → level remains const. around 62.3 - 62.5

- trucks easily seen passing on tpke. but not many loud trucks heard during AM peak → trucks are not jake braking as they pass

Midday peak
- very quiet
- a few birds chirping
- traffic seems less const. than during AM peak (quieter but can still hear a const. hum of tires on pavement eastward to my right)

12:19 lt. wind rustles some leaves
12:22 plane overhead - no affect on levels
12:29 plane overhead - levels around 59.5
12:31 plane overhead
12:32 lt. wind some leaves rustle

Field Noise Monitoring Data Sheet

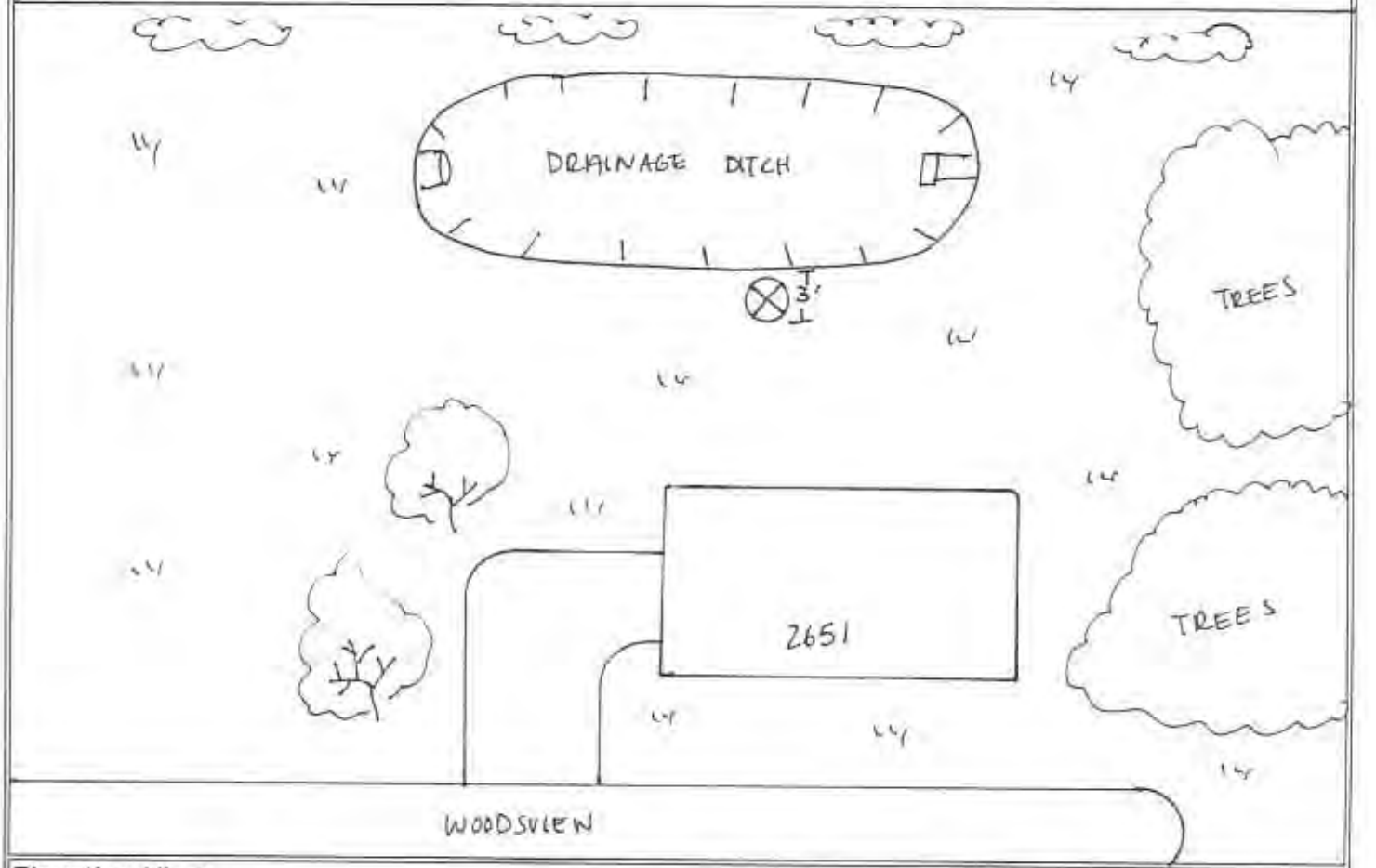
The Louis Berger Group, Inc.

Location #	Date	Address	Observer
2D	11-8-2005	2651 WOODSVIEW	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	DRAINAGE DITCH	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	GRASS	3 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
40s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View

North Arrow

PA TPKE



Elevation View

* Not to scale.

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 2D

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 2D Address 2651 Woodsview

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	7:05 AM	69.5 [3]						1
			7:09 AM	69.7 [3]						2
			7:12 AM	69.5 [4]						3
Midday	5:00 AM - 5:00 PM	11/8/05	12:17 PM	66.6 [5]						15
			12:22 PM	67.2 [5]						16
			12:27 PM	66.5 [2]						17
PM Peak	5:00 PM - 6:00 PM	11/8/05	5:47 PM	67.4 [3]						39
			5:51 PM	67.0 [3]						46
			5:54 PM	66	68.5	65	62.5	72.2	59.5	
Photo		CANON 330 - 342					Diagram		✓	

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

7:05 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE
- AT TOP OF PROPERTY LINE, CAN SEE PATPKE

11/2/05 - PREDOMINANT NOISE IS VEHICULAR TRAFAC ON PATPKE
* CONSTANT INSECT NOISES.

12:20 PM - CLOUDY - OVERCAST SKIES & BREEZY

12:29 PM - Helicopter overhead

TIME	LEQ	REC
12:30 PM	67 [3]	18

12:31 PM - SMALL PLANE FLYING OVERHEAD

5:47 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

2651 Woodsview 2D

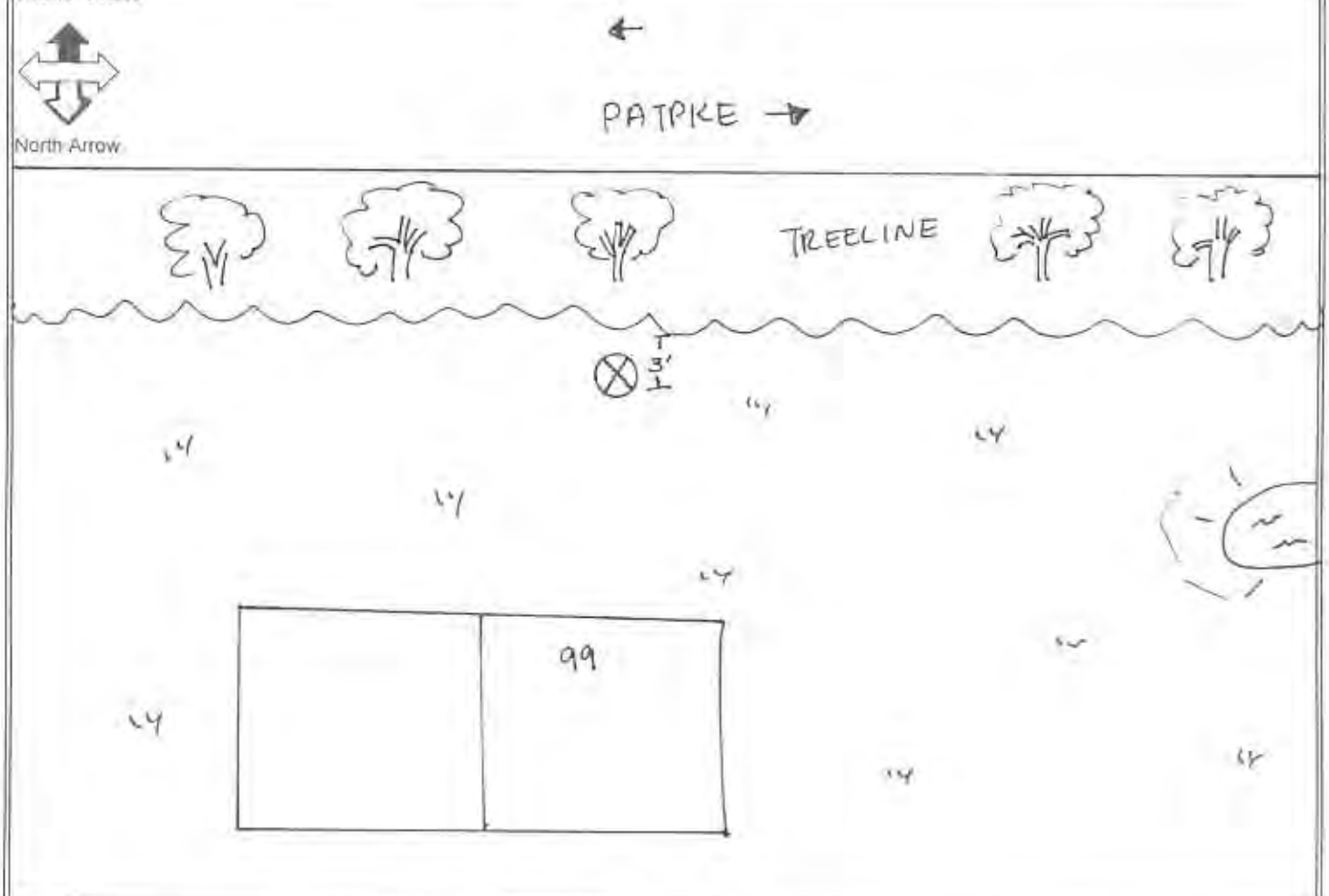
Field Noise Monitoring Site Diagram

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
3	11/1/2005	99 LIBERTY DRIVE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	TREELINE	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE GRADE	GRASS LAWN	3FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

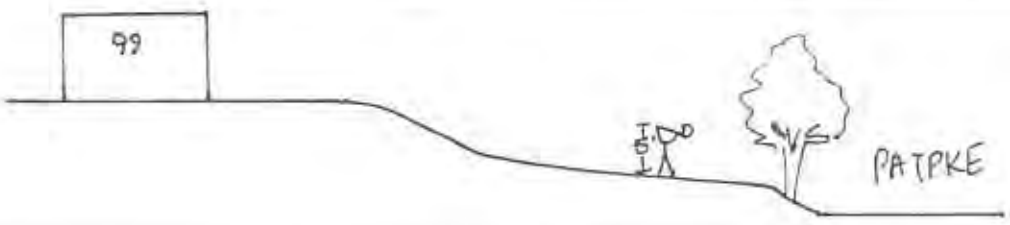
Plan View

North Arrow



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 3

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 3 Address 99 Liberty Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 Rec #
AM Peak	7:00 AM - 9:00 AM	11/1/05	8:13 A	68						4
			8:16	67.7	68.1					5
			8:20	68.5						6
Midday	9:00 AM - 3:00 PM	11/1/05	1:52 P	66.1						7
			1:57	66.0	66.6					8
			2:03	67.6						9
PM Peak	3:00 PM - 6:00 PM	11/1/05	5:31	67.3						16
			5:34	67.0	66.9					17
			5:38	66.5						18
Photo		177 - 185					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:13 AM - PREDOMINANT NOISE IS TRAFFIC ON PATPKE THE PROPERTY LINE IS ~~ALESS~~ LESS THAN 100 FT FROM PATPKE CAN HEAR: HEAVY TRUCKS AS THEY PASS BY

1:52 PM - Predominant noise is traffic on PA TPKE
BACKGROUND NOISE IS FROM INSECTS
LOTS OF TRUCKS ON THE PA TURNPIKE

2:06 PM - GUSTY WIND

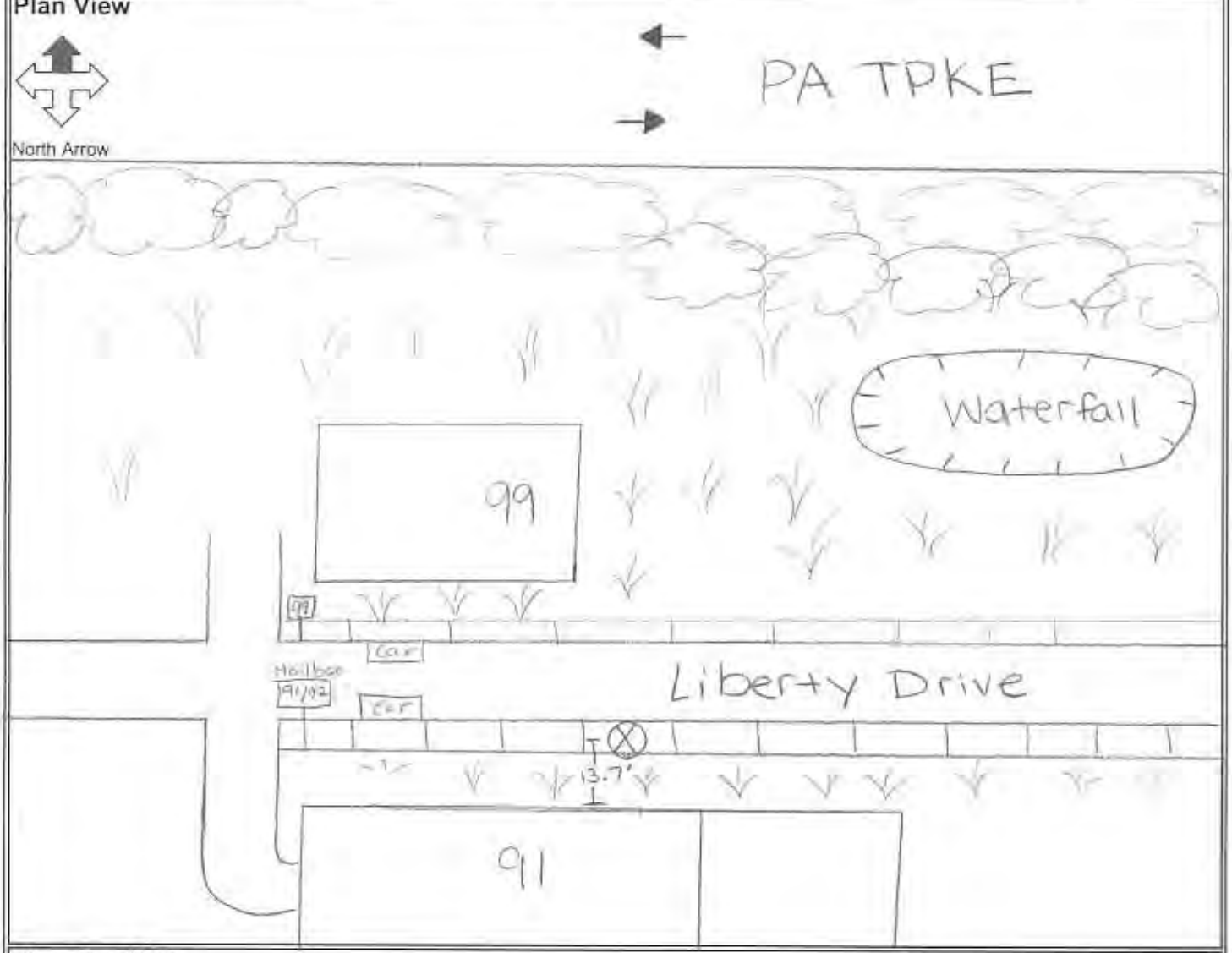
5:31 PM - HEAVY TRAFFIC ON THE PATPKE
- INSECT NOISES IN THE BACKGROUND

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

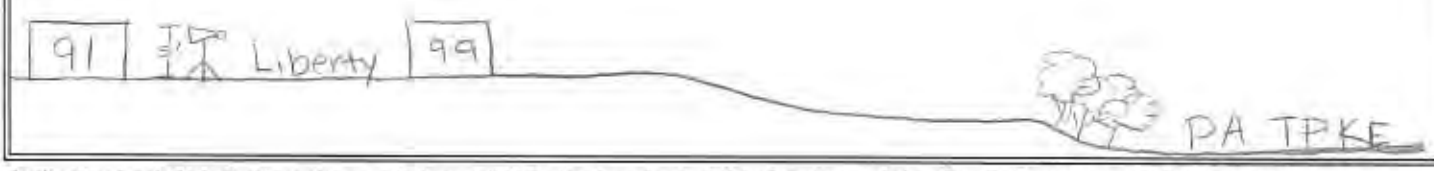
Location #	Date	Address	Observer
3A	11/1/05	91 Liberty Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Sidewalk	91/92 Liberty Drive	
Grade	**Pavement Type**	**Distance to Landmark**	
Above Grade	Concrete	13.7FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

** Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 3A

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 3A Address 91 Liberty Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/1/05	8:13							AU2_0002 (14 min.)
Midday	8:00 AM - 5:00 PM	11/1/05	1:52							AU2_0003 (17 min.)
PM Peak	5:00 PM - 6:00 PM	11/1/05	5:31							AU2_0008 ( )
Photo		59, 60, 61, 62, 68, 69					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!
BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM peak
- main noise source is from PA turnpike
↳ can hear loud trucks passing and car tires on pavement
~~- can hear birds chirping occasionally~~
- 8:13:26 car pulls out of Driveway @ 92/91 Liberty and drives on Liberty in front of meter
- when traffic decreases can faintly hear waterfall accross the street
- trucks passing often
- 8:23:51 very loud truck on turnpike → 65.7
- 8:24:47 very loud truck → 67.4

MD peak
- traffic on turnpike does not seem as loud as during AM
- 72.5 @ 1:53 pick-up truck passes on Liberty
- 1:54 car pulls
- 1:54:33 car drives by on Liberty 70.6
- 64.8 another pick-up drives by on Liberty @ 1:54
- 1:55:58 → car drives by
66.7 @ 1:56:26 → car drives by
* more cars driving by on Liberty during midday
1:57 someone yells from a distance and I go over to talk to them

64.8 @ 1:59 → car drives by on Liberty

Field Noise Monitoring Site Diagram

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
4	11/02/05	1507 POINT DRIVE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	TREE LINE	
Grade	**Pavement Type**	**Distance to Landmark**	
BELOW	GRASS LAWN	10 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List** Mike, Calibrator, Windscreen, Tripod	**Model #**
50s	0-5 MPH		BK 2236

Plan View

North Arrow

Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4 Address 1507 Point Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 Rec #
AM Peak	7:00 AM - 9:00 AM	11/3/05	7:36 A	73.5						1
			7:41	73.3	73.3					2
			7:44	73.2						3
Midday	9:00 AM - 3:00 PM	11/2/05	11:31A	69.8						7
			11:35	71.2	70.9					8
			11:41	71.8						9
PM Peak	3:00 PM - 6:00 PM	11/2/05	5:19	73.1						20
			5:23	72.3	72.6					21
			5:27	72.5						22
Photo		204 - 213 CANON					Diagram	✓		
			11:46	70.3						10

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

11/2/05

11:31 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE
- BREEZY APPROX 4-5 mph

11:42 AM - LOUD TRUCK PASSING BY

5:19 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

5:27 PM - HEAVY TRUCKS ARE LOUDER THAN CARS

5:29 PM - LOUD HEAVY TRUCK ON WB LANE

11/3/05

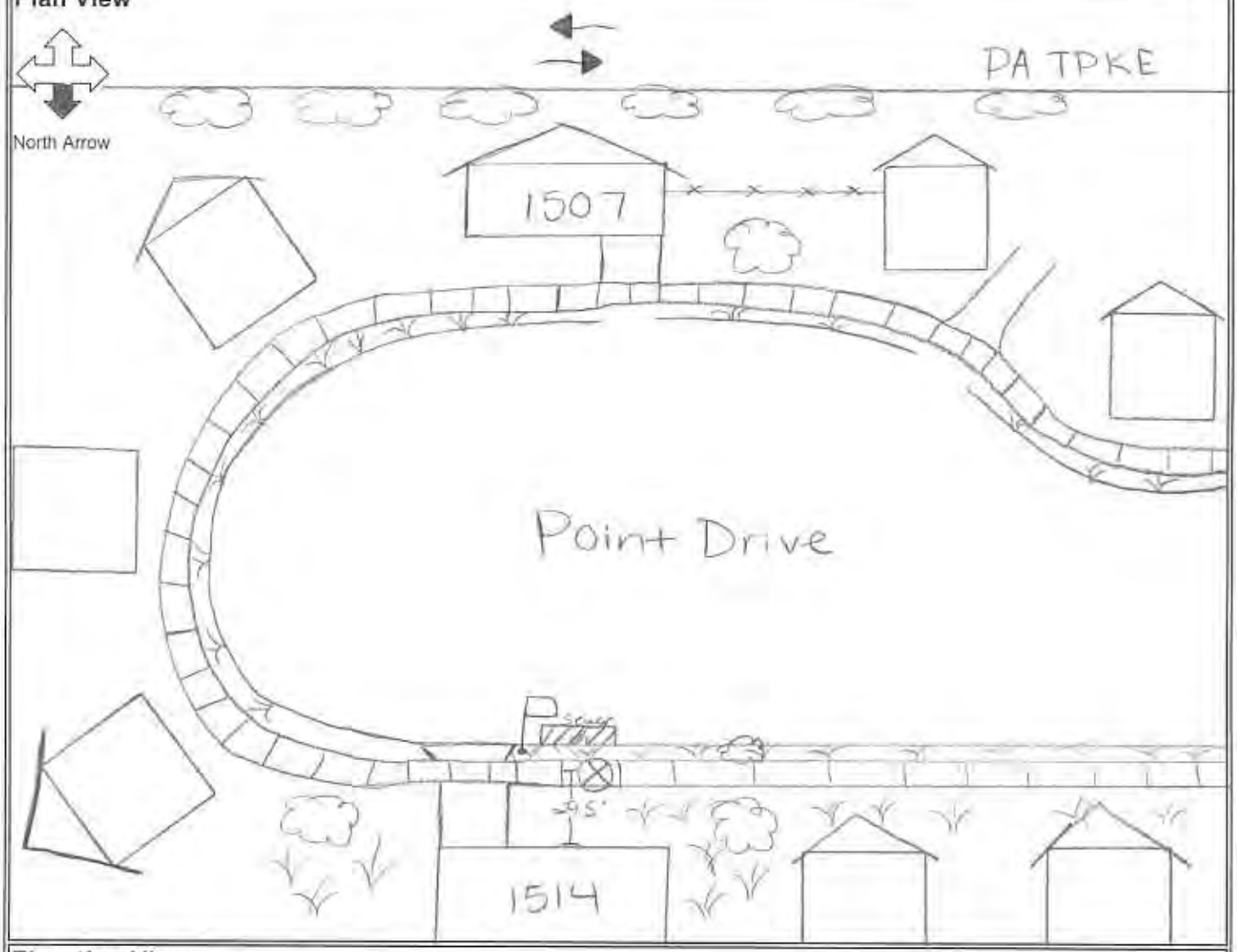
7:36 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE
- CAN SEE AND HEAR HEAVY TRUCKS & TRAILERS ON PATPKE

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
4A	11/2/05	1514 Point Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Sidewalk	1514 Point Drive	
Grade	**Pavement Type**	**Distance to Landmark**	
Below	Concrete	29.5 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-5mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4A

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4A Address 1514 Point Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #	
AM Peak	7:00 AM - 8:00 AM	11/3/05	7:36	62.9	63.4	61.4	63.4	63.2	63.6	AU2-0018	
				63.2	62.0	63.2	63.2	62.5	61.3		61-64
				0.0							
Midday	8:00 AM - 5:00 PM	11/2/05	11:30	59.4	57.7	57.8	60.0	58.7	58.5	AU2-0012	
				59.9	58.7	60.2	61.0	59.0	61.8		57-63
				62.8	58.4	59.1	56.6	59.2	58.9	58.9 59.2 57.4	59.6
PM Peak	5:00 PM - 6:00 PM	11/2/05	5:19	61.0	61.0	61.4	60.8	61.1	60.1	AU2-0016	
				60.2	60.3	61.9	60.9	59.6	61.1		60-62
				0.0							
Photo		79, 80, 81, 90					Diagram	✓			

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

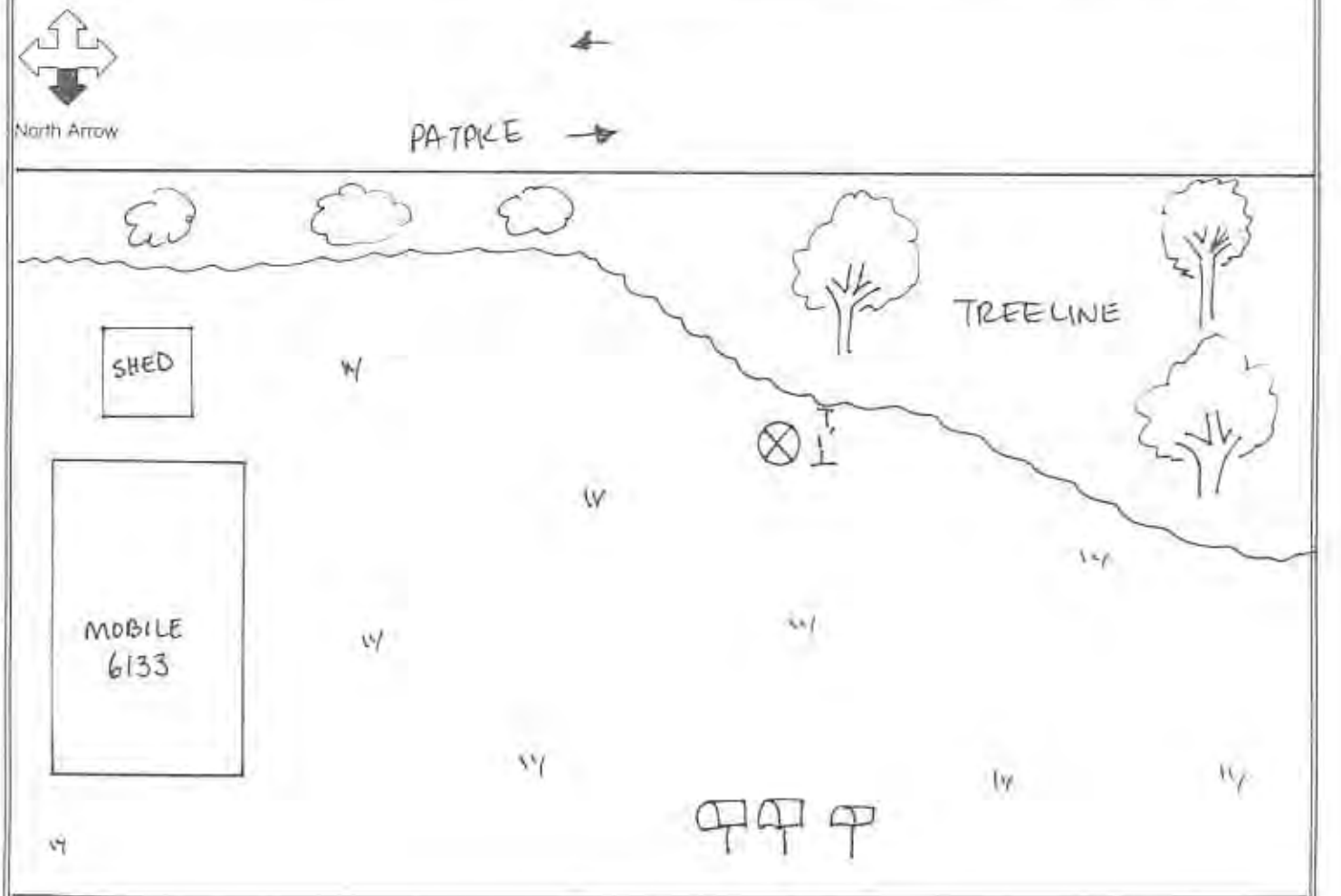
*relatively quiet neighborhood
*11:31 wind picks up → can hear leaves rustling
- main source of noise is turnpike
- 11:32 → Alex turns on car & drives away
*traffic not very constant
- 11:33 strong gust of wind (my papers start to fly up on clipboard → stronger than 1st gust at 11:31
- not many trucks on tpke. → mostly car tires on pavement
- traffic is more occasional than constant → many periods where traffic dies down
- 11:35 lt. wind gust → leaves rustle on ground
*can hear traffic hum in the east off in the distance
- 11:37 lt. wind rustles leaves
- 11:39 lt. gust of wind rustles leaves
- 11:42 lt. wind gust & loud truck on tpke
- 11:43 wind gust continues
- 11:43 helicopter overhead in distance (can't see it) & loud truck on turnpike
- 11:44 wind gust
- 11:45 woman @ Lucy's site closes car trunk (does not affect Level)

Field Noise Monitoring Site Diagram

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
4B	11-2-2005	VACANT LOT ON CLEARVIEW	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	VACANT LOT	TREELINE	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	GRASS	1FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-9 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4B

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4B Address 6133 Clearview

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/2/05	8:20A	68.6						4
			8:24A	67.9	68.3					5
			8:29	68.3						6
Midday	11:00 AM - 2:00 PM (1:00 PM)	11/2/05	12:44P	67.2						14
			12:49	66.4	66.8					15
			12:55	66.8						16
PM Peak	5:00 PM - 6:00 PM	11/2/05	5:44P	69.0						23
			5:47	67.5	68.4					24
			5:51	68.8						25
Photo		197-203, 214-217 CANON					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:20AM - QUIET MOBILE HOME COMMUNITY
- BREEZY AT TIMES
- PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

8:30 AM - TRUCK JAYBRAKING

8:31 AM - BREEZY WINDS

12:44 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE
- SOME INSECT NOISES
- SQUIRRELS PLAYING IN THE TREES CAUSING SOME RUSTLING.
- BREEZY FROM 0 - 9 MPH GUSTS

5:44 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE & ONE PICKUP TRUCK STARTED ENGINE & DROVE BY

5:51 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

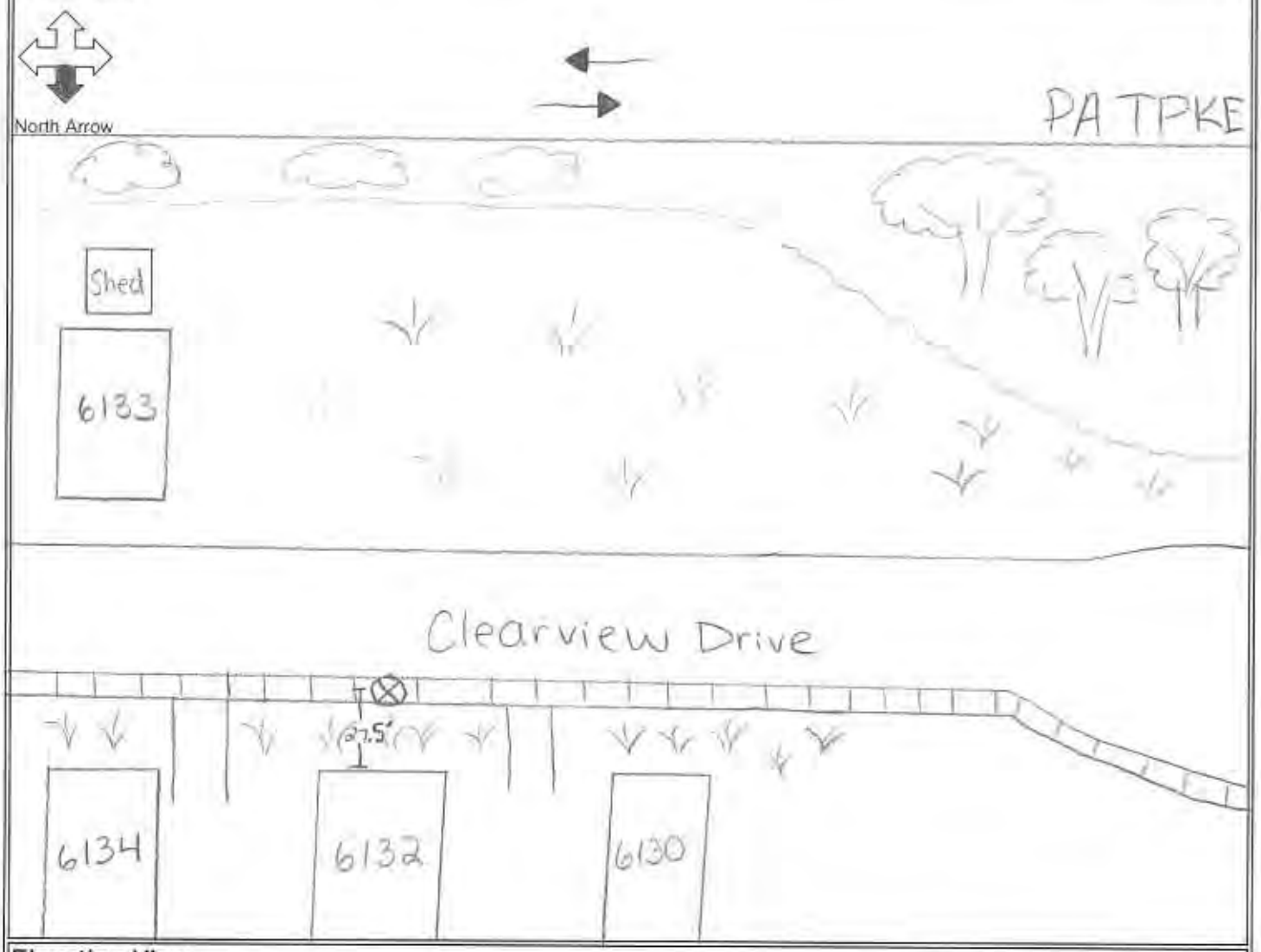
NEXT TO 6133 CLEARVIEW (MOBILE) 4B

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
4C	11/2/05	6132 Clearview Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Sidewalk	6132 Clearview Drive	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Concrete	21.7 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-9 mph	Mike. Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4C

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4C Address 6132 Clearview Drive

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/2/05	8:20							AU2_0011
Midday	8:00 AM - 5:00 PM	11/2/05	12:43							AU2_0014
PM Peak	5:00 PM - 6:00 PM	11/2/05	5:43							AU2_0017
Photo		86 - 89					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!
BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM peak
* relatively quiet neighborhood
- constant sounds of tires on pavement from tpke
- many trucks passing by on tpke
* 8:24 wind picks up
* occasional birds chirping
* 8:25 gust of wind
- 8:26 child at end of block yells something across street louder than a car engine
- 8:27 SUV w/ drives by and another person 2 houses down starts car
- 8:28 car drives by → engine quiet & barely heard
- 8:30 two planes overhead - faintly heard
- 8:30 truck jake breaks on turnpike

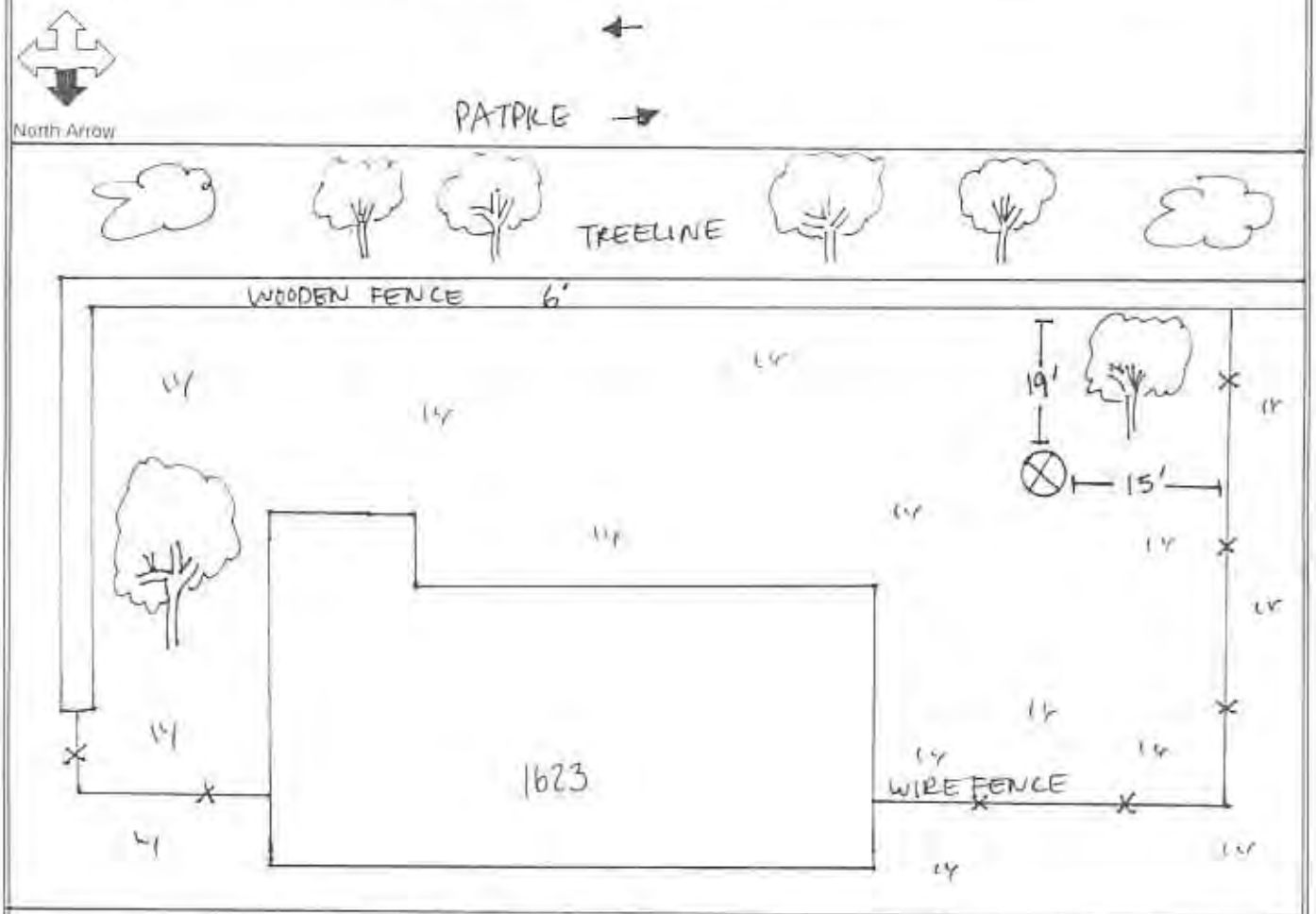
Midday peak
- trucks jake braking at 12:44
- traffic flow not as const. as AM
- 12:49 about 2 trailers away woman shouts a few words → not very loudly
- 12:51 → squeaking noise (from a bird?)
* not as many trucks as AM peak
12:55 wind gust & fedex truck passes → raises level above 60 dBA

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

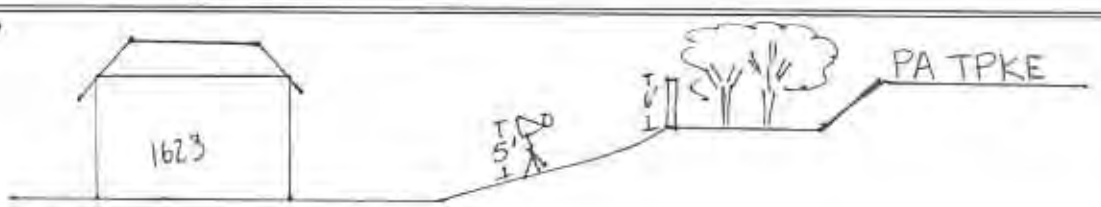
Location #	Date	Address	Observer
4D	11-2-2005	1623 CAROLYN COURT	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	FENCE - WEST - SOUTH	
Grade	**Pavement Type**	**Distance to Landmark**	
BELOW	GRASS	WEST 15', SOUTH 19'	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-6 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4D

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4D Address 1623 Carolyn Court

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 Rec #
AM Peak	7:00 AM - 8:00 AM	11/21/05	7:56A	66.5						1
			8:01	66.7	66.5					2
			8:05	66.4						3
Midday	12:00 AM - 5:00 PM (4:15 AM)	11/21/05	12:05P	65.0						11
			12:10	65.5	64.9					12
			12:17	64.2						13
PM Peak	5:00 PM - 6:00 PM	11/21/05	5:00P	66.1						17
			5:04	65.9	66					18
			5:08	65.9						19
Photo		186-195 CANON					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

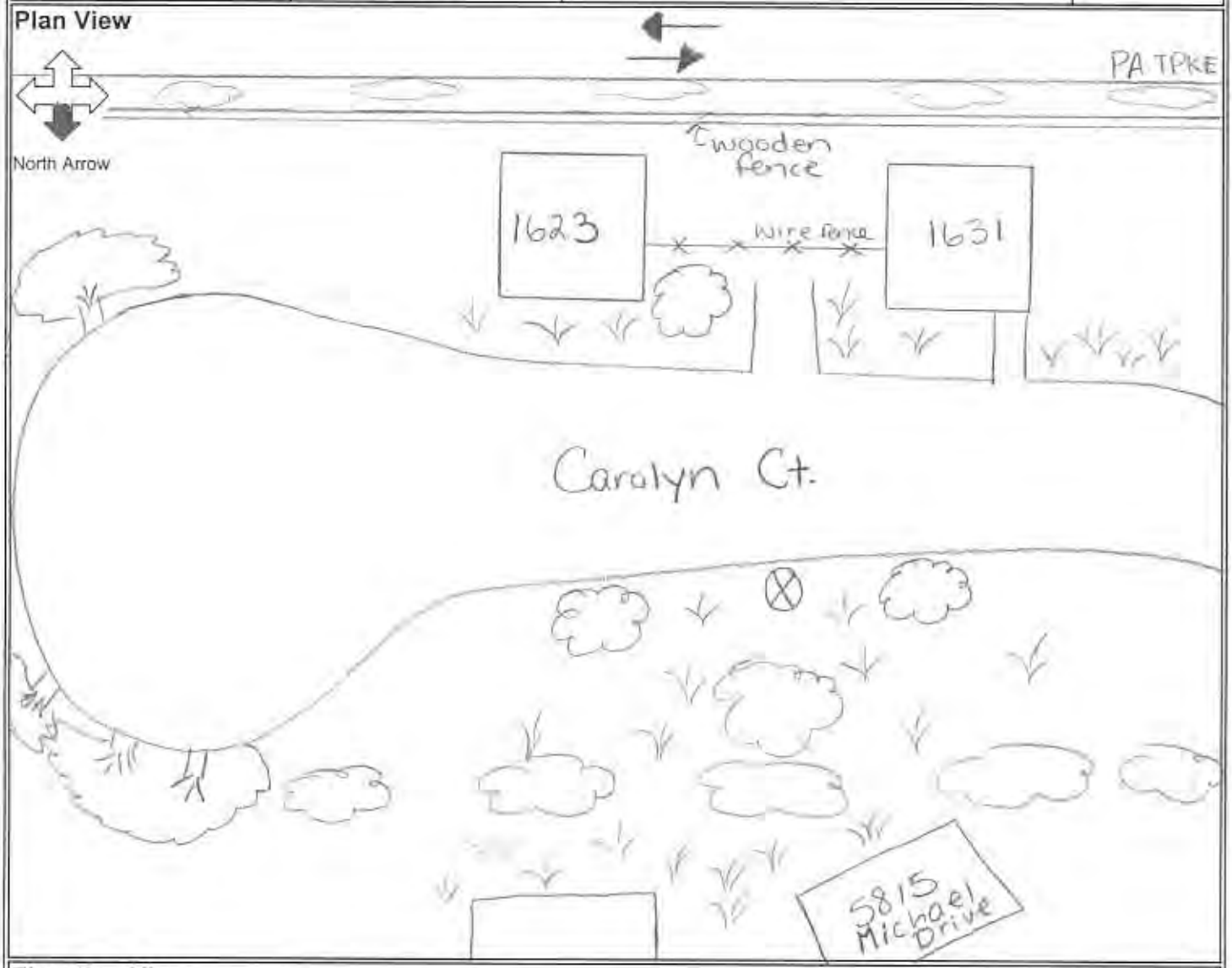
7:56 AM - PREDOMINANT NOISE IS TRAFFIC ON PATPKE
12:05 PM - " " " "
CAN HEAR TRUCKS AS THEY PASS BY
BREEZY - APPROXIMATELY 0-5 MPH
LEAVES RUSTLING
5:00 PM - PREDOMINANT NOISE IS TRAFFIC ON PATPKE

1623 CAROLYN COURT 4D

Field Noise Monitoring Data Sheet
The Louis Berger Group, Inc.

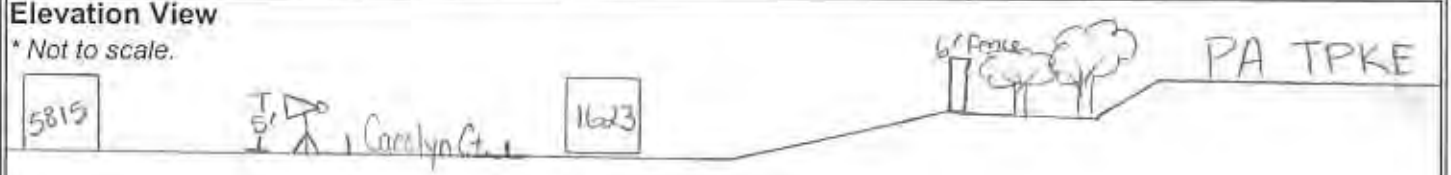
Location #	Date	Address	Observer
4E	11/2/05	5815 Michael Drive	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Lawn	Roadway → Carolyn Ct.	
Grade	**Pavement Type**	**Distance to Landmark**	
Below	Grass	On Edge of Grass line	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-6 mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



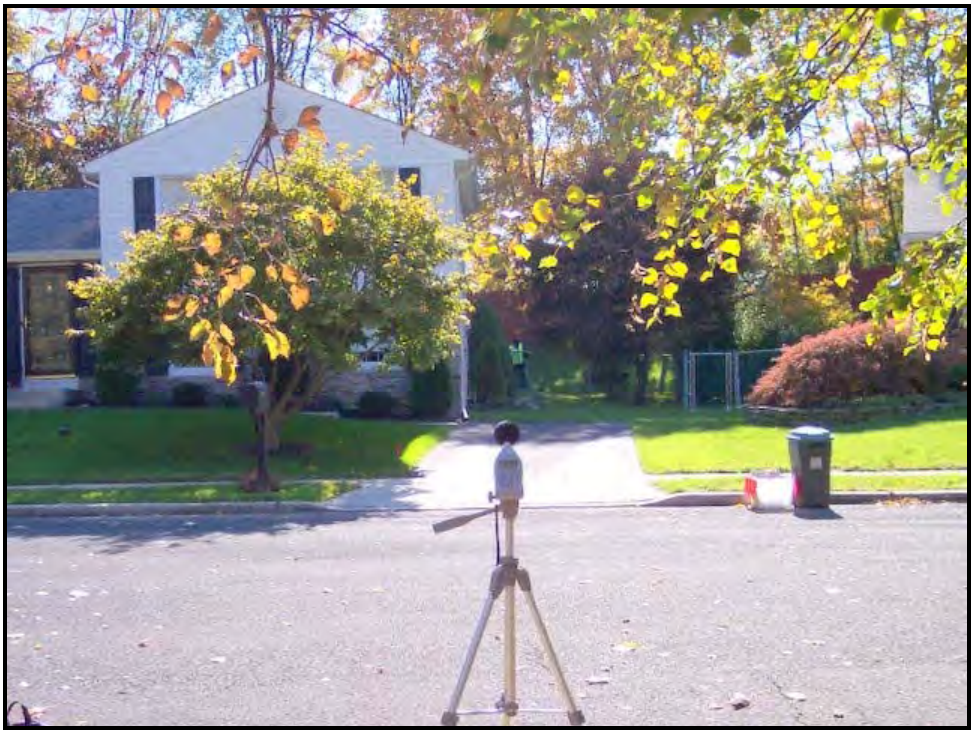
Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 4E



SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 4E Address Carolyn Ct. (Behind Michael Dr.)

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/2/05	7:57							AU2_0010
Midday	8:00 AM - 5:00 PM	11/2/05	12:05							AU2_0013
PM Peak	5:00 PM - 6:00 PM	11/2/05	5:00							AU2_0015
Photo		82 - 85					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!
BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM peak
- main noise source is turnpike
- very audible from second row of homes
* can easily see cars & trucks passing
- 7:58 wind picks up
* occasional birds chirping
- can hear a const. hum in the distance
* truck traffic not as ~~const.~~ as cars
- 8:08 wind picks up a bit

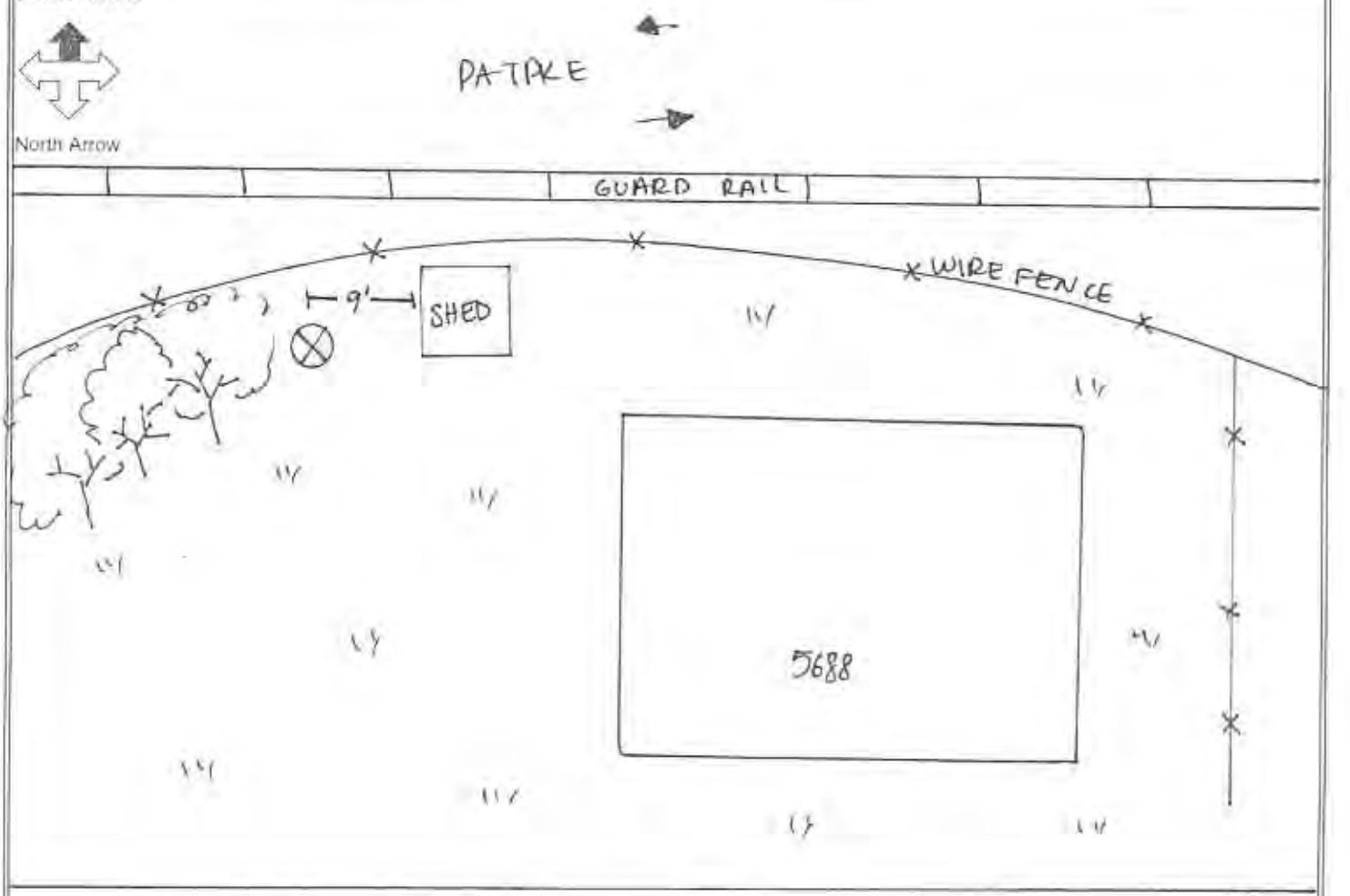
Midday peak
- 12:08 gust of wind
- faint sound of insects
- no birds chirping during this peak
* turnpike noise not as constant as AM peak
- 12:11 wind increases slightly
- 12:12 wind " & leaves on ground rustle a bit
- 12:12 loud truck on tpke.
→ several trucks pass by → traffic seems to drop off then pick up again (not a const. rush of
- 12:15 wind picks up & bird chirps → traffic also picks up a bit
- 12:16 wind picks up (very strong gust lifts my papers)

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

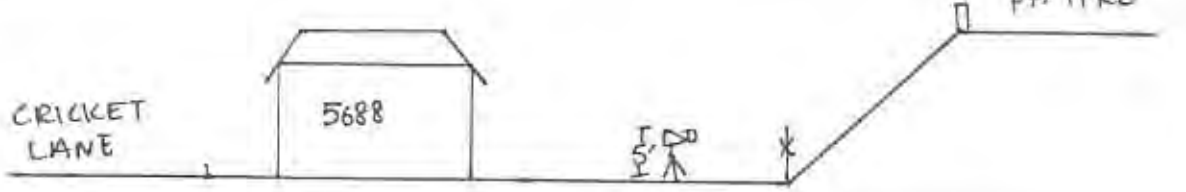
Location #	Date	Address	Observer
5	11-8-2005	5688 CRICKET LANE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	SHED	
Grade	**Pavement Type**	**Distance to Landmark**	
BELOW	GRASS	9 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

** Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5 Address 5688 Cricket Lane

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	8:02 AM	3 66.8						8
			8:05 AM	3 67.2						9
			8:08 AM	3 66.1						10
Midday	8:00 AM - 5:00 PM	11/8/05	12:51 pm	64.6 5						19
			12:56 PM	64.8 5						20
			1:02 PM	65.6 3						21
PM Peak	5:00 PM - 6:00 PM		5:09 PM	65.1 3						33
			5:12 PM	64.8 3						34
			5:16 PM	65.8						35
Photo		CANON 343 - 357					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:02 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

8:07 AM - GARBAGE TRUCK ON CRICKET LANE

	TIME	LEQ	REC
3	8:12	67	11

12:51 pm - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

- SOME BIRD NOISES

TIME	LEQ	REC
1:10 PM	65.4	22

1:11 PM - BIRD NOISES

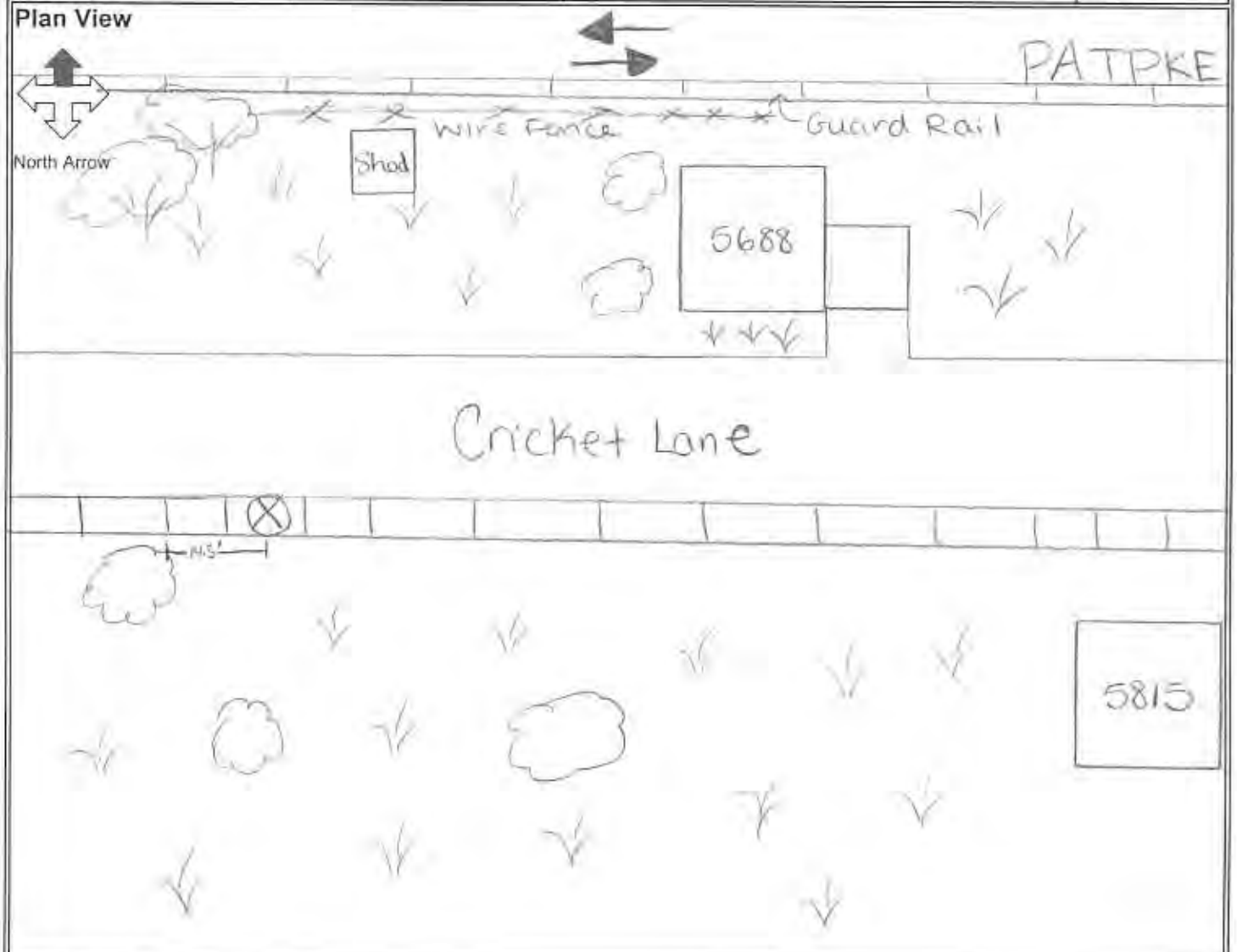
5:09 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
5A	11/8/05	Vacant Lot across from 5688	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Sidewalk	Tree	
Grade	**Pavement Type**	**Distance to Landmark**	
Below	Concrete	14.5 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5A

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5A Address 5689 Cricket Lane

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	8:01							AU2_0028
Midday	8:00 AM - 5:00 PM	11/8/05	12:51							AU2_0031
		11/8/05	1:09							AU2_0032
PM Peak	5:00 PM - 6:00 PM	11/8/05	5:09							AU2_0036
Photo		51-54, 59-60					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)
DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!
BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

- traffic flow relatively constant
- can hear tires on pavement & loud hum of trucks passing
- can hear birds chirping lightly
- 8:03 car drives past meter → levels remain const. (doesn't affect levels)
* main noise source is from PA tpke.
* lots of trucks passing on tpke.
- 8:07 73.9 dBA from garbage truck passing on Cricket Lane
- 8:11 jake breaking truck on tpke
* aside from tpke. → neighborhood is quiet → few birds chirping

---

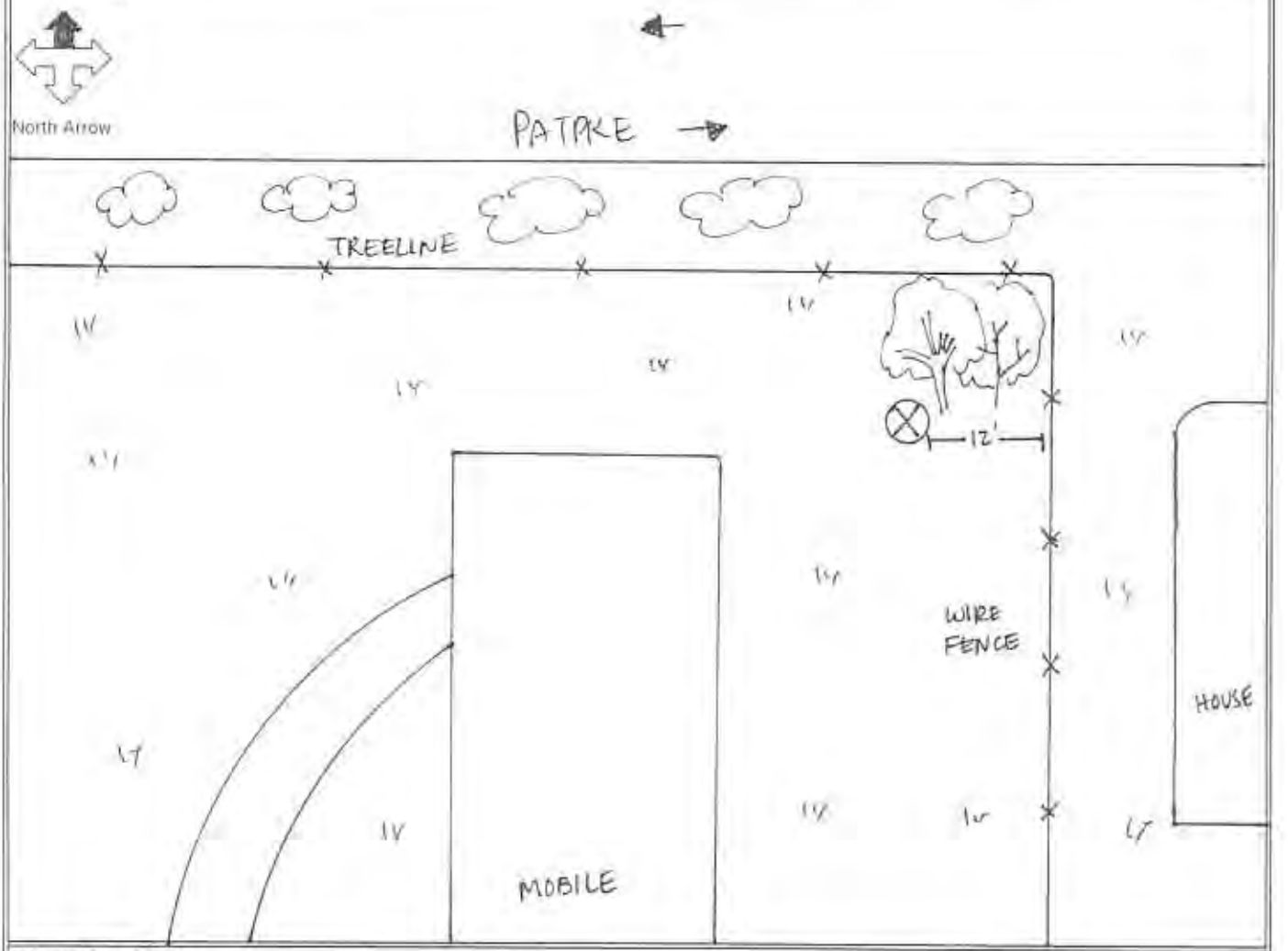
Midday peak
12:51 - 12:52 plane overhead & car passes on Cricket in front of meter, lt. wind
- birds chirping (more audile than AM)
- insects chirping / buzzing
12:55 car drives past meter on Cricket 64 dBA?
- 12:57 " " " " " "
* truck traffic not as const. as AM peak → traffic quiets down & picks up again

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
5B	11-3-05	1119 TENNESSEE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATRE	BACKYARD	TREE	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	GRASS	3FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
60s	0-6 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

* *Not to scale*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5B

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5B Address 1119 Tennessee Avenue

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 Rec#
AM Peak	7:00 AM - 8:00 AM	11/3/05	8:14 A	66.8						4
			8:17	67.0	66.6					5
			8:21	66.0						6
Midday	8:00 AM - 5:00 PM	11/3/05	12:12 P	64.9						12
			12:16	66.4	(65.6)					13
			12:17	65.6						14
PM Peak	5:00 PM - 6:00 PM	11/3/05	5:00 P	66.2						23
			5:03	66.3						24
			5:07	66.0						25
Photo		218 - 227 CANON					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:14 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE
- NO BACKGROUND SOUNDS

12:12 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE.
- BACKGROUND NOISE IS BIRDS & LEAVES RUSTLING ON TREES DUE TO BREEZY CONDITIONS

12:16 - AIRCRAFT FLYING OVERHEAD

12:24 - BIRD NOISES

	TIME	LEQ	REC
3	12:21 PM	63.9	15
3	12:24 PM	64.0	16
3	12:28 PM	65.0	17

5:00 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

5:05 PM - BIRD NOISES

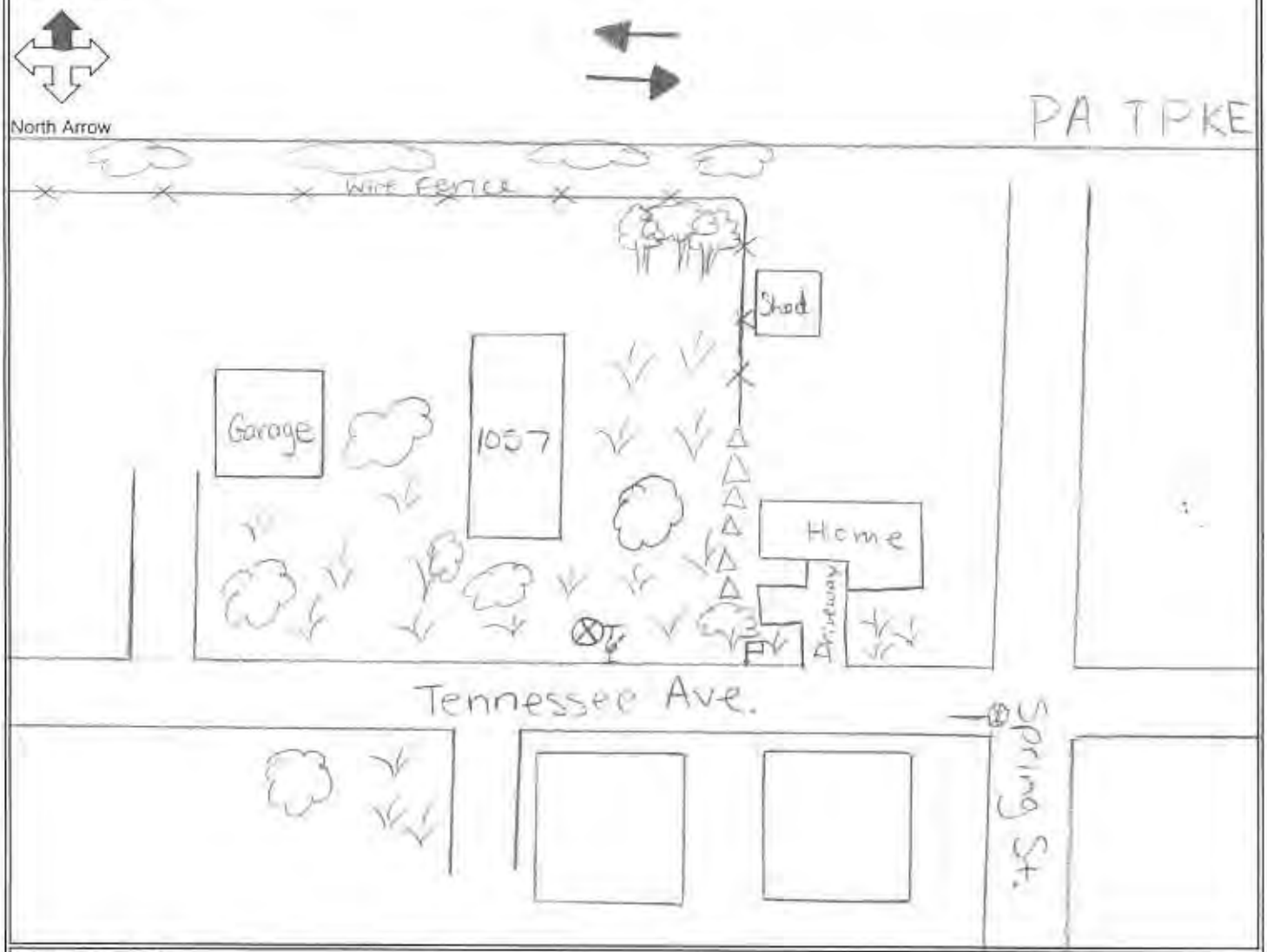
1119 TENNESSEE AVENUE 5B

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
5C	11/3/05	1057 Tennessee Ave.	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Front Lawn	Edge of Tennessee Ave.	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Grass	6 FT.	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
60s	0-6mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*

Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5C

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5C Address 1057 Tennessee Ave. (Mobile Home Park)

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/3/05	8:14	60.0	58.3	58.1	59.4	58.2	59.0	AU2_0019
				59.4	59.2	57.3	57.5	58.4	58.3	57-60
				58.9						
Midday	8:00 AM - 5:00 PM	11/3/05	12:12	63.9	62.1	61.2	58.1	62.0	60.0	AU2-0021
				59.3	59.8	58.7	60.4	59.2	58.4	
				60.0	61.2	57.8	59.6	59.2	58.7	57.2 61.0 0 57-64
PM Peak	5:00 PM - 6:00 PM	11/3/05	5:00							AU2_0023
Photo		94-98					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM Peak

- 8:14 birds chirping
- main noise source is from PA tpke.
- 8:16 leaves rustle a bit b/c of lt. wind

* can hear some cars on Bensalem Blvd. → loud SUV's, pick-ups, or constant sounds of tires on pavement

- 8:19 woman across street shutting car door & turning car on (not affecting levels much → levels remaining in the 50's)
- 8:21 lt wind makes leaves rustle

* occasional birds chirping

Midday Peak

* much windier than AM Peak
- 12:13-12:14 (btwn.) 63.0 dBA UPS truck passes in front of meter
- 12:16 plane overhead
- 12:17 strong wind gust
- 12:19 car passes on Tennessee → level remains const. @ 60

* traffic on tpke. quieter than AM Peak
- 12:25 strong wind gust → levels jump to 65.5
- 12:29 car drives by on Tennessee Ave.
- 12:31 " " " " " " → no jump in levels
- 12:32 → wind gust

* not much traffic heard on Bensalem at this time

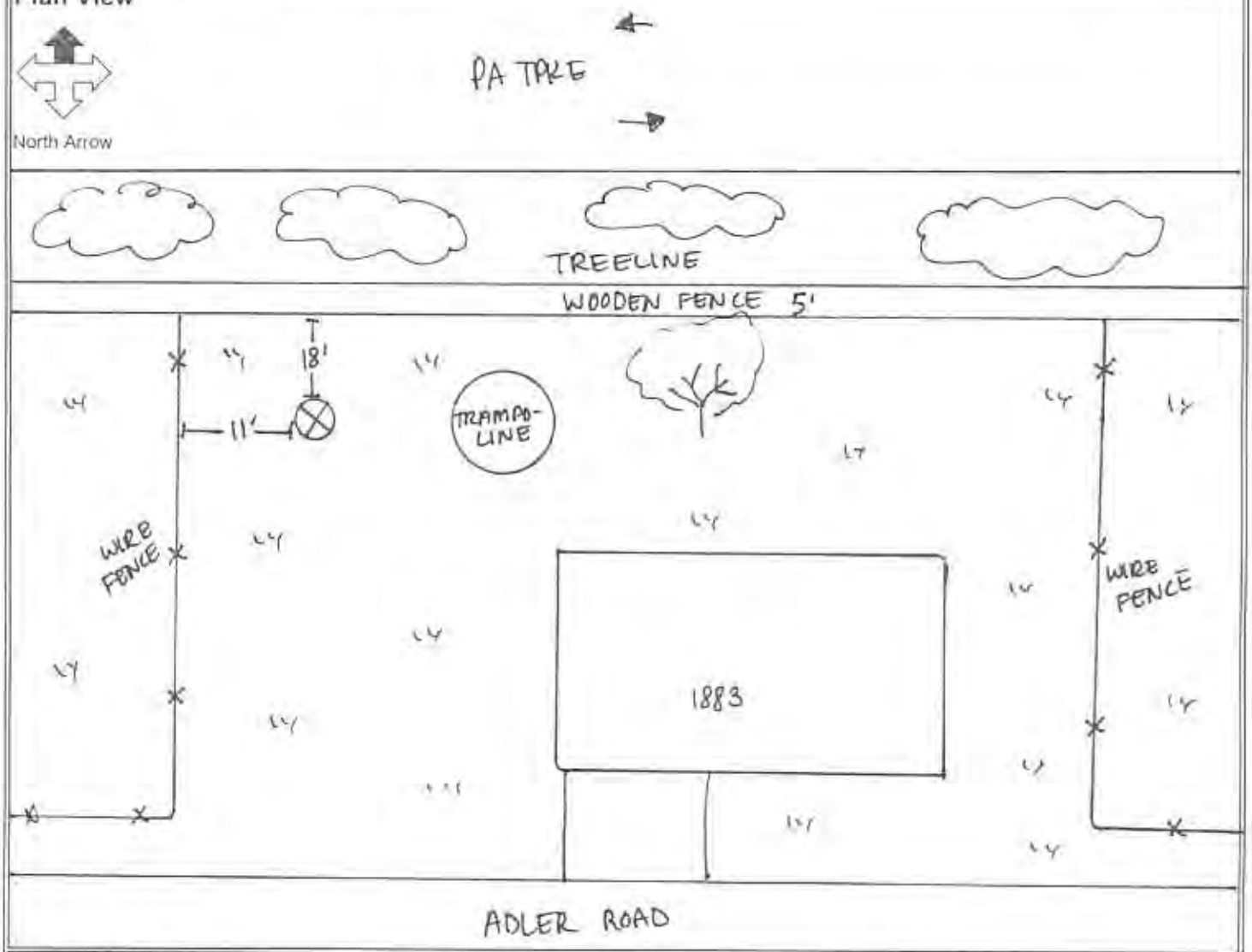
Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
5D	11-8-2005	1883 ADLER	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	FENCE < NORTH < WEST	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	GRASS	NORTH - 18 FT , WEST 11 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

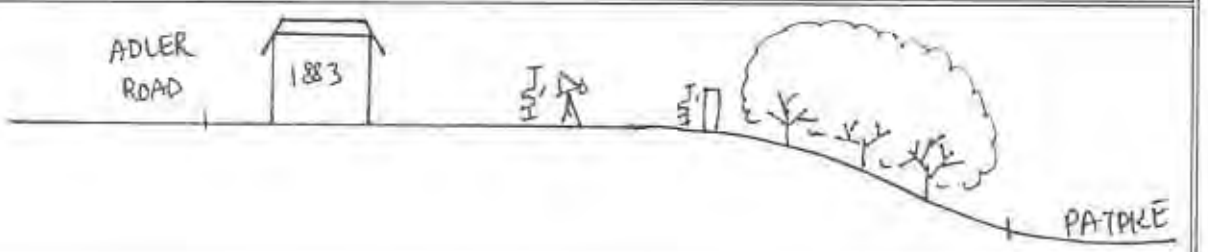
Plan View

North Arrow



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5D

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5D Address 1883 Adler Road

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	8:23 AM	67.5[3]						12
			8:27	67.7[4]						13
			8:32	66.9[4]						14
Midday	8:00 AM - 5:00 PM	11/8/05	1:28 PM	67.2[5]						23
			1:33 PM	67.5[5]						24
			1:39 PM	67.4[5]						25
PM Peak	5:00 PM - 6:00 PM	11/8/05	5:27 PM	67.9[3]						36
			5:30 PM	68.7[3]						37
			5:33 PM	67.2						38
Photo		CANON 358 - 366					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:23 AM – PREDOMINANT NOISE IS TRAFFIC ON PATPKE

1:28 PM – PREDOMINANT NOISE IS TRAFFIC ON PATPKE

→ – CONSTANT INSECT NOISE etc.

1:37 PM – DOG BARKING FROM NEXT DOOR - NOT LOUDER THAN TRAFFIC NOISE

5:27 PM – PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

5:30 PM – LOUD TRUCK PASSED BY ON PATPKE

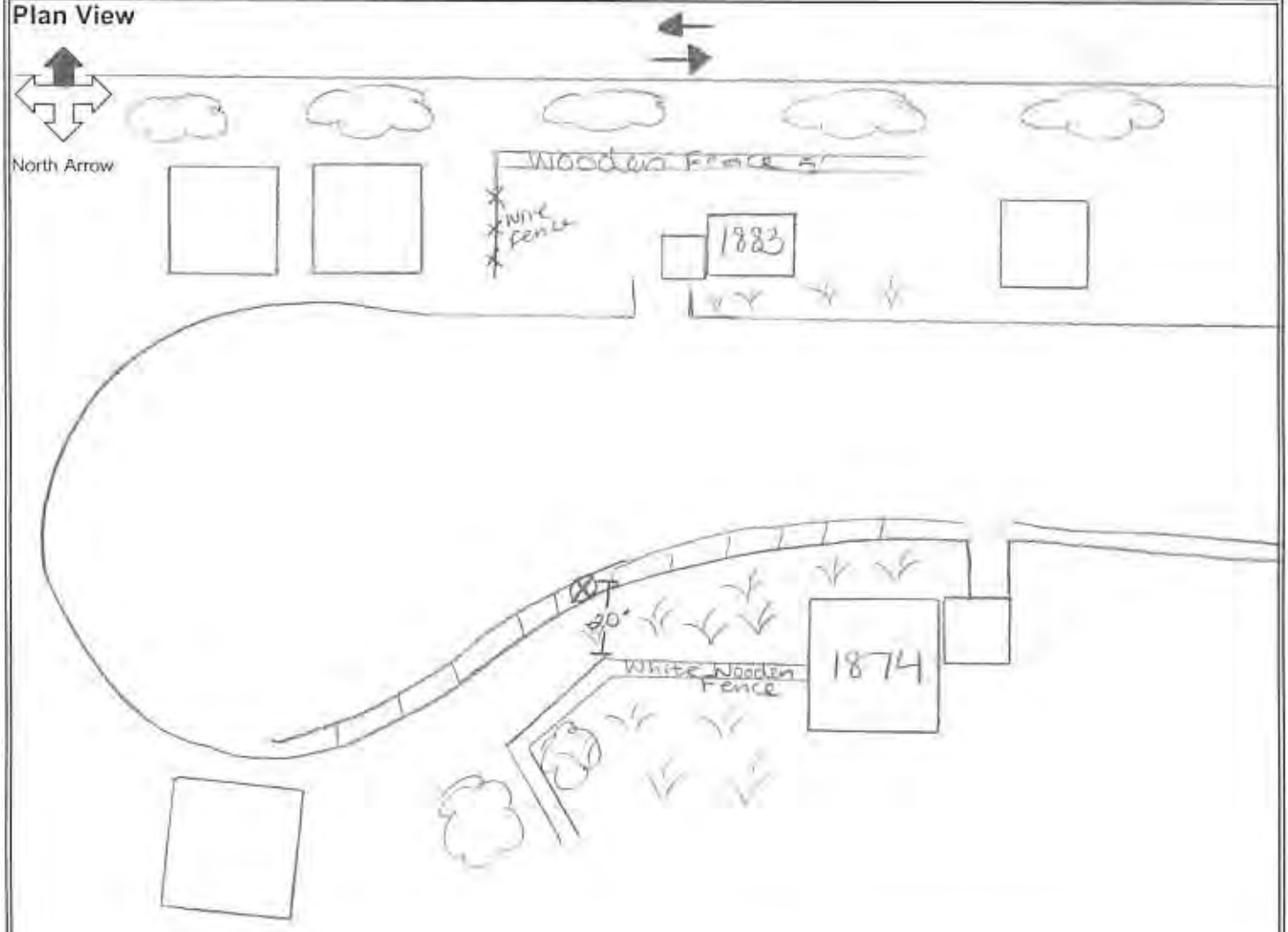
1883 ADLER ROAD 5D

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

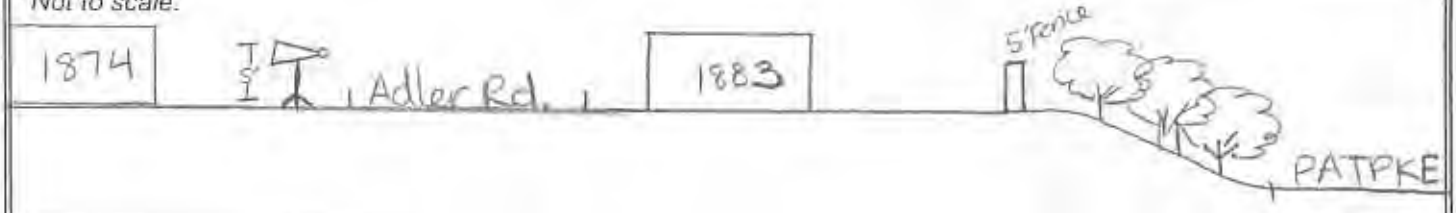
Location #	Date	Address	Observer
5E	11/8/05	1874 Adler Rd.	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Sidewalk	Property Fence	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Concrete	20FT.	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
50's	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5E

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5E Address 1874 Adler Ct.

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	8:24							AU2-0029
Midday	8:00 AM - 5:00 PM	11/8/05	1:28							AU2-0033
PM Peak	5:00 PM - 6:00 PM	11/8/05	5:27							AU2-0037
Photo		55 - 58					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

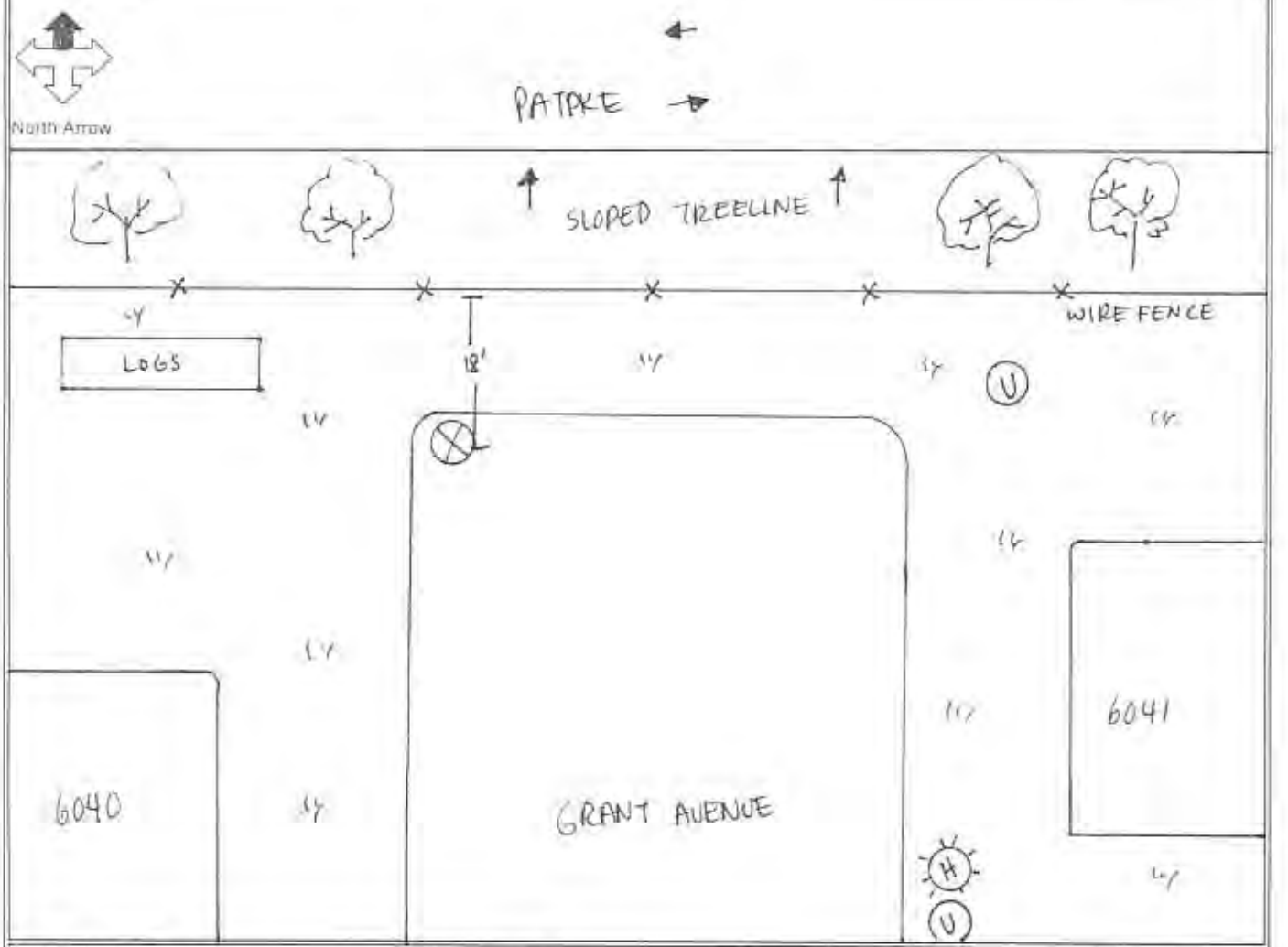
AM Peak
- birds chirping
*can hear occasional trucks/cars on Bensalem Rd.
- quiet neighborhood
- can hear trucks passing & tires on pavement from cars on +pke. but not as loudly as on Cricket Lane
-8:26 truck on Bensalem → levels seem to remain const.
-8:27 louder car on Bensalem → ~~noticeable~~
8:26-8:27 traffic on Bensalem quiets down a bit
8:30 man across street closes 2 car doors & turns car on → drives past meter → levels go into L60's
*towards end of meas. traffic on +pke. quiets down → ask Lucy if she has specific times

Midday Peak
- insects buzzing/chirping
- birds chirping occasionally
1:33-1:34 plane overhead
1:37 lt. wind & plane overhead
1:39 plane overhead & truck on Bensalem, person closing van trunk across street next door
- traffic lighter than AM peak
1:41 loud car on Bensalem

Field Noise Monitoring Data Sheet
The Louis Berger Group, Inc.

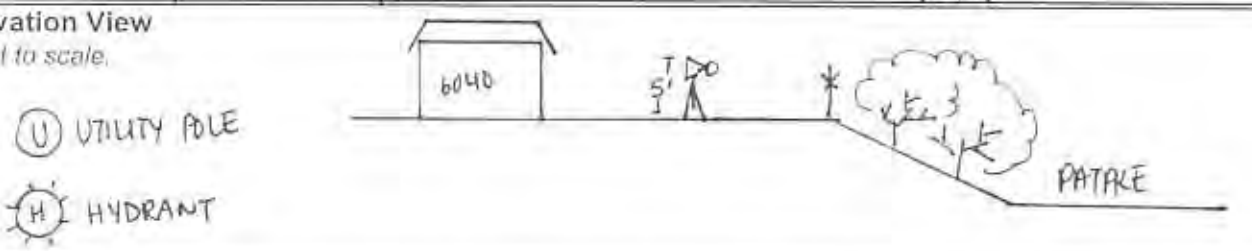
Location #	Date	Address	Observer
5F	11-3-05	6040 GRANT AVE	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	ROAD	END OF GRANT AVE / FENCE	
Grade	**Pavement Type**	**Distance to Landmark**	
ABOVE	ASPHALT	18' TO FENCE	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
60s	0-6 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View



Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5F

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 5F Address 6040 Grant Avenue

Time Periods	Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	BK2236 ~~Rec #~~
AM Peak 7:00 AM - 8:00 AM	11/3/05	8:38A	67.9						7
		8:41	67.7	67.6					8
		8:44	68.8						9
Midday 8:00 AM - 5:00 PM	11/3/05	12:47P	66.6[3]						18
		12:50	67.3[3]	67					19
		12:54	67.5[3]						20
PM Peak 5:00 PM - 6:00 PM	11/3/05	5:20P	67.5						26
		5:24P	66.6						27
		5:27P	67[4]						28
Photo	228 - 240		CANON			Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

8:38 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

8:47 AM - BREEZY UPTO 7MPH

8:46 AM 67.0 LA REC 10

8:50 AM - 66.4 REC 11

12:47 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

12:50 PM - BREEZY CONDITIONS

12:56 PM - BREEZY CONDITIONS - TREES RUSTLING

TIME	LEQ	REC
12:57 PM	66.9[3]	21
1:01 PM	66.6[4]	22

5:20 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE

- BREEZY, SOME RUSTLING OF TREE LEAVES
- SOME CRICKET SOUNDS

5:23 PM - LOUD TRACTOR TRAILER ON PATPKE

TIME	LEQ	REC
5:32 PM	66.9[2]	29

6040 GRANT AVE 5F

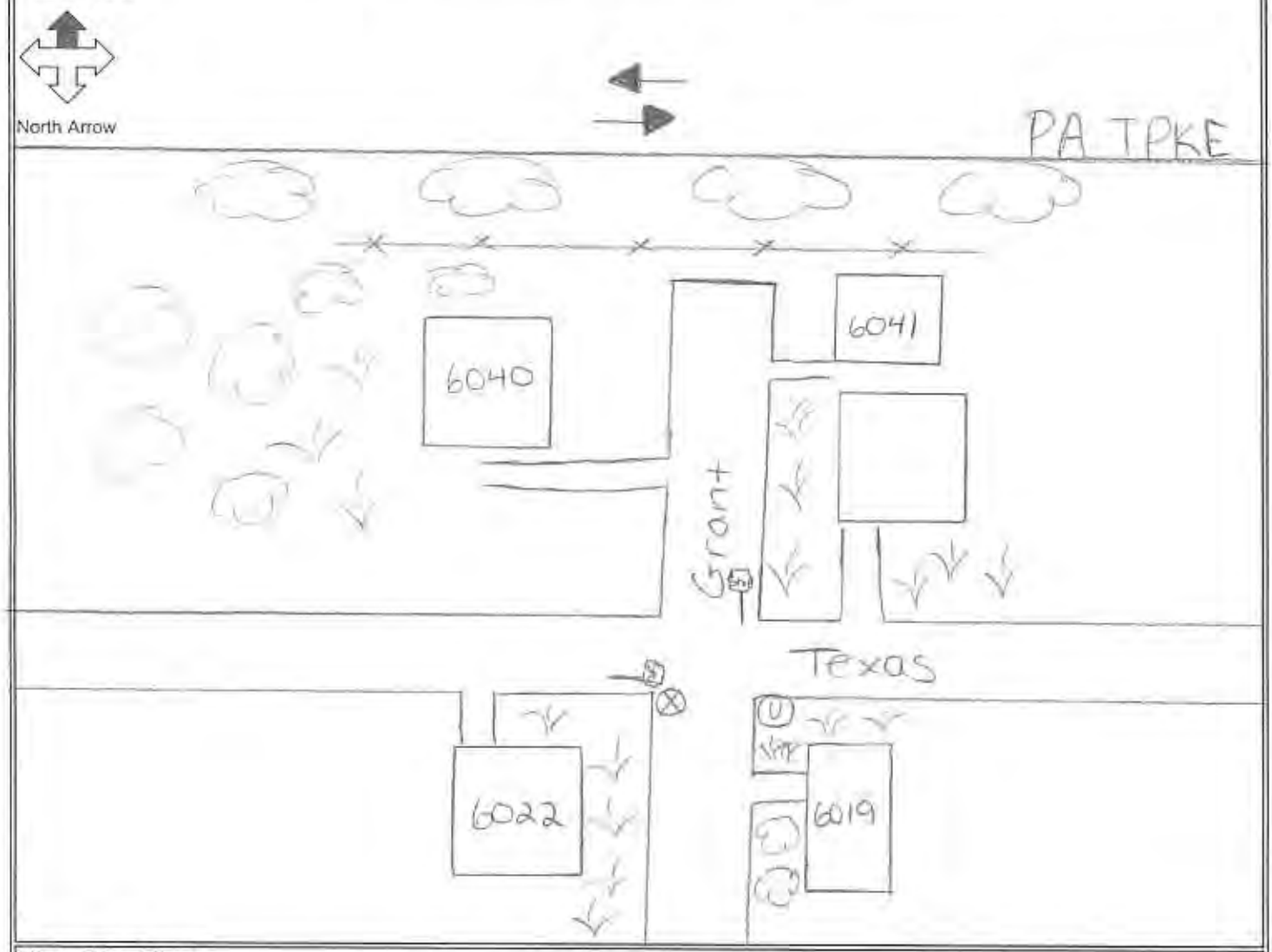
Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

Location #	Date	Address	Observer
5G	11/3/05	6022 Grant Ave.	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Road - Grant/Texas	Street Corner = Grant/Texas	
Grade	**Pavement Type**	**Distance to Landmark**	
Above	Asphalt	On Corner Grant/Texas	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
60s	0-6mph	Mike, Calibrator, Windscreen, Tripod	NL-22

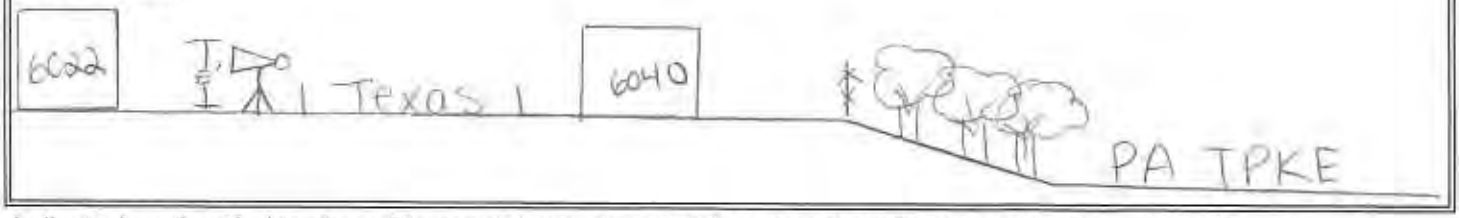
Plan View

North Arrow



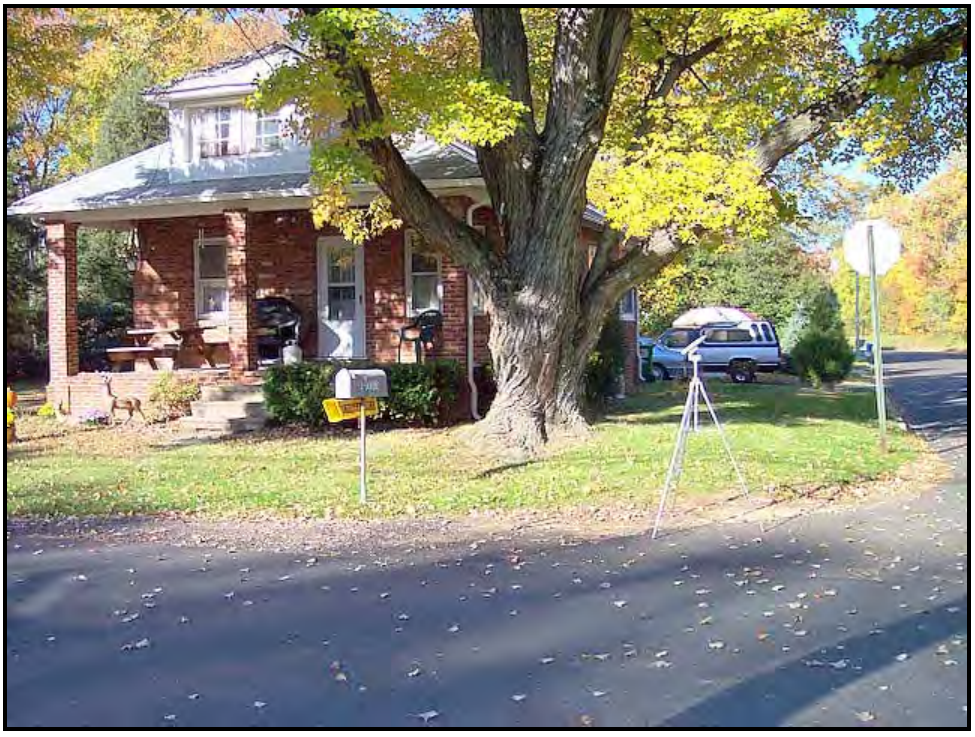
Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 5G



SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 56 Address 6022 Grant Avenue

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #	
AM Peak	7:00 AM - 8:00 AM	11/3/05	8:37	60.5	60.9	61.9	61.0	60.9	62.3	AU2-0020	60-62
				60.0	61.5	62.7	59.9	60.5	60.8		
				60.3	60.2	60.4	0.0				
Midday	8:00 AM - 5:00 PM	11/3/05	12:47	61.0	61.0	60.3	61.9	60.9	60.8	AU2_0022	
				62.2	60.0	59.2	62.3	63.0	62.7		59-63
				60.8	60.5	62.7	61.5	61.7	63.0	60.4 0.0	
PM Peak	5:00 PM - 6:00 PM	11/3/05	5:20							AU2_0024	
Photo		91, 92, 93					Diagram	✓			

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

AM Peak

* main noise source is from PA + pkg.
- occasional birds chirping
- hear tires on pavement, + loud trucks passing
- 8:42 → SUV driving on Texas Av. turns onto Grant in front of meter → level jumps to 63 → @ end of 8:42, begin 8:43
- 8:43 lt. wind causes leaves to rustle
- 8:47 lt. wind causes leaves to rustle
- 8:48 lt. wind gust

Midday Peak

- occasional birds chirping
- relatively quiet neighborhood
- 12:48 dog barking from house next door to house & accross Street
- 12:49 0 mph wind
- 12:50 dog barking again

* windier than AM peak
* traffic noise seems to be mainly tires on pavement
- dog barking @ 12:51 again
- 12:52 5.5 mph wind
- 12:53 5 mph
- 12:57 3 mph & van drives from Grant to Texas

dog barks

Field Noise Monitoring Data Sheet

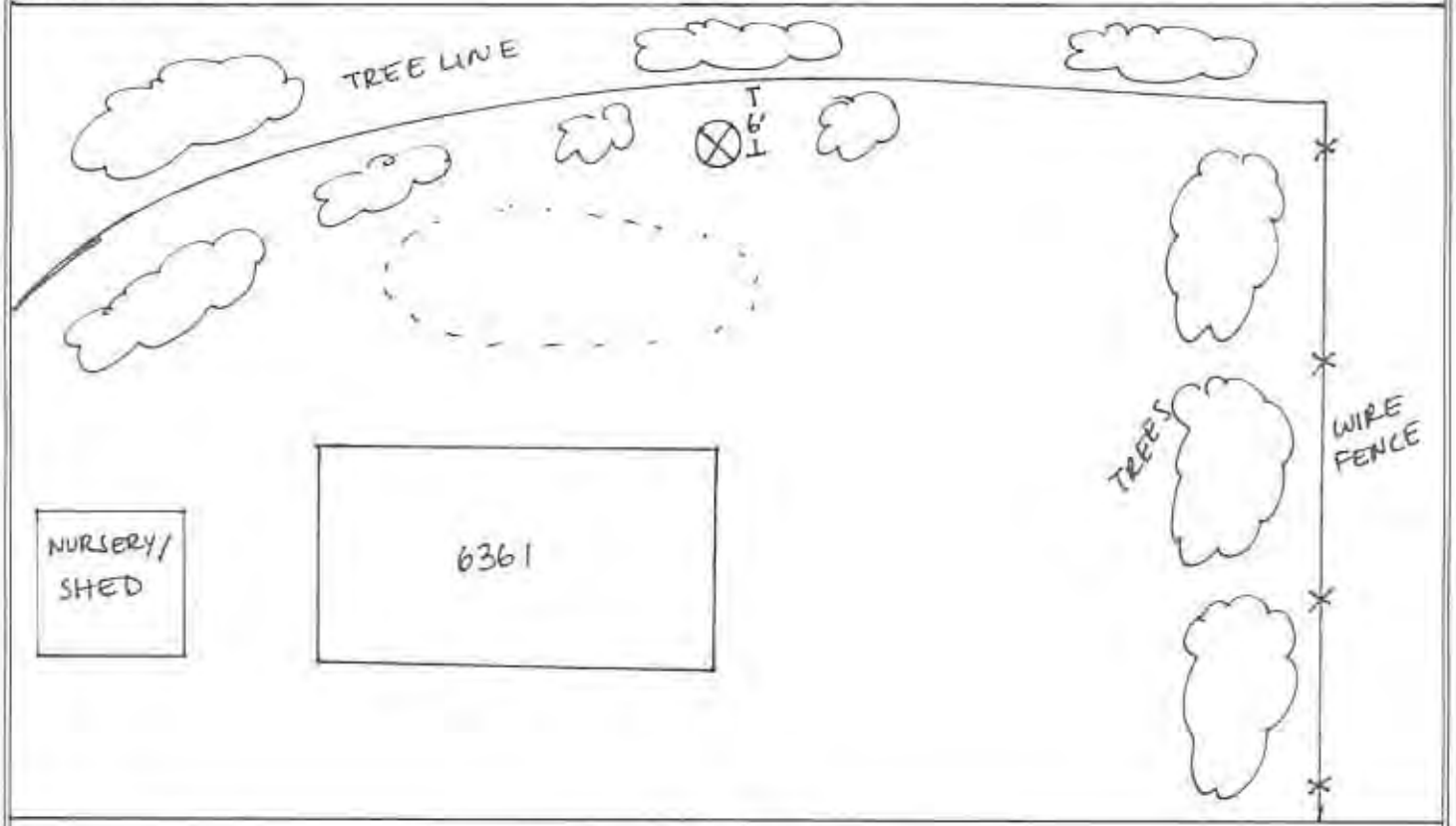
The Louis Berger Group, Inc.

Location #	Date	Address	Observer
6	11-8-2005	6361 LEONARD	LL
Lane Direction	**Site Surface**	**Nearby Landmark**	
PATPKE	BACKYARD	PROPERTY LINE	
Grade	**Pavement Type**	**Distance to Landmark**	
BELOW	GRASS	6FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
40s	0-1 MPH	Mike, Calibrator, Windscreen, Tripod	BK2236

Plan View

North Arrow

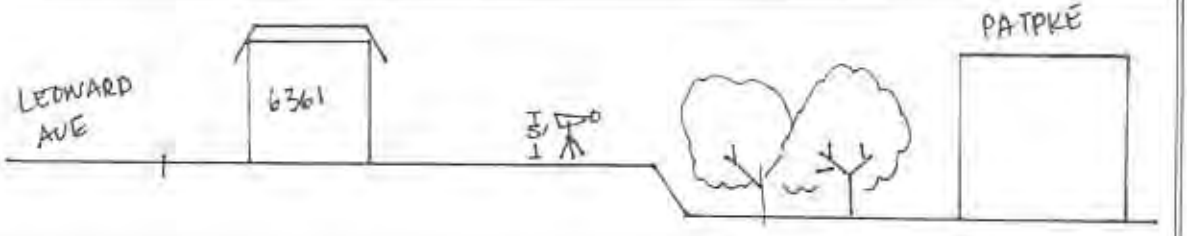
PATPKE (ELEVATED ON A BRIDGE)



LEONARD AVE

Elevation View

* Not to scale.



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 6

SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 6 Address 6361 Leonard

Time Periods	Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak 7:00 AM - 9:00 AM	11/8/05	7:37 AM	68.7						4
		7:40 AM	68.4						5
		7:44 AM	67.8						6
Midday 9:00 AM - 5:00 PM	11/8/05	2:00 PM	65.8						26
		2:05 PM	66.7						27
		2:10 PM	66.3						28
PM Peak 5:00 PM - 6:00 PM	11/8/05	4:45 PM	66.5						30
		4:48	67.3						31
		4:53	66.4						32
Photo	CANON 367 - 376					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

7:37 AM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE BRIDGE

7:47 AM - HEARD TRAIN WHISTLE

Time	LEQ	Rec
7:48 AM	68.5	7

7:48 AM - BIRD CHIRPING

2:00 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE ON BRIDGE

- A FEW BARKS FROM ROTTWEILERS IN THE NEXT YARD.

Time	LEQ	Rec
2:16	64.3	29

4:45 PM - PREDOMINANT NOISE IS VEHICULAR TRAFFIC ON PATPKE ON BRIDGE

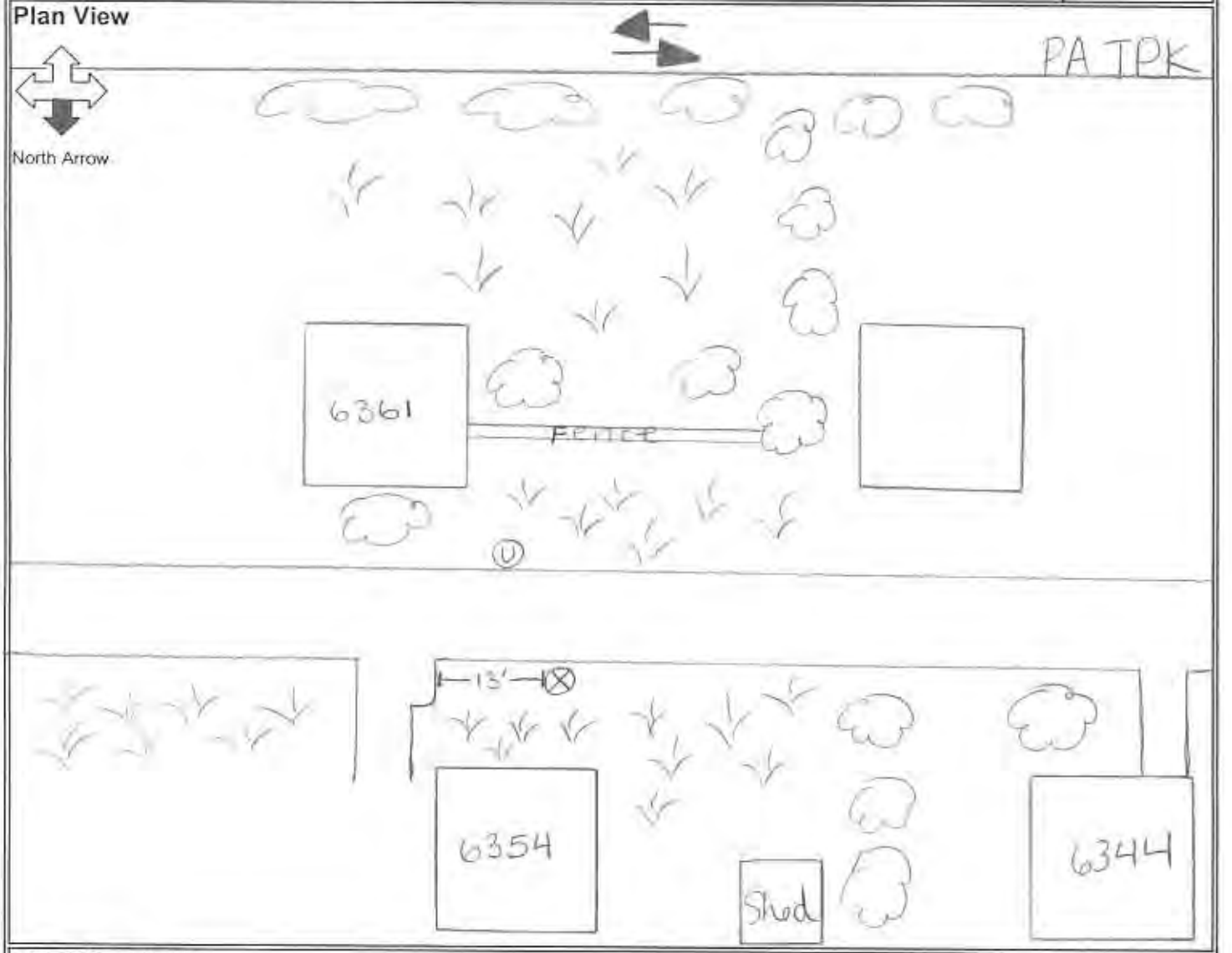
4:56 PM - BIRD NOISES - SHORT TERM - FEW SECONDS

Field Noise Monitoring Data Sheet

The Louis Berger Group, Inc.

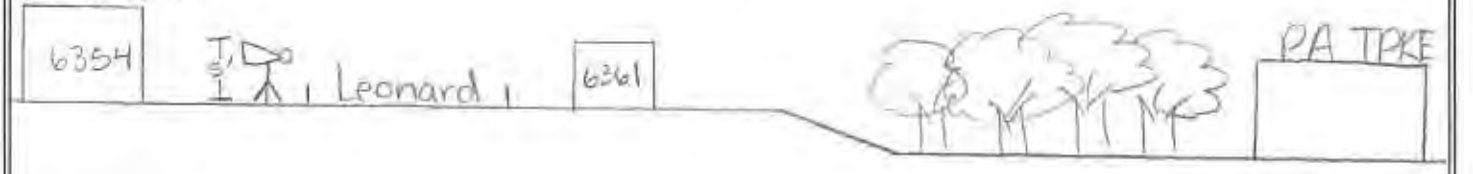
Location #	Date	Address	Observer
6A	11/8/05	6354 Leonard Ave.	D.S.
Lane Direction	**Site Surface**	**Nearby Landmark**	
PA TPKE	Front Lawn	Edge of Driveway	
Grade	**Pavement Type**	**Distance to Landmark**	
Below	Grass	13 FT	
Temperature	**Wind Speed**	**Equipment B&K Check List**	**Model #**
40s	0-1mph	Mike, Calibrator, Windscreen, Tripod	NL-22

Plan View



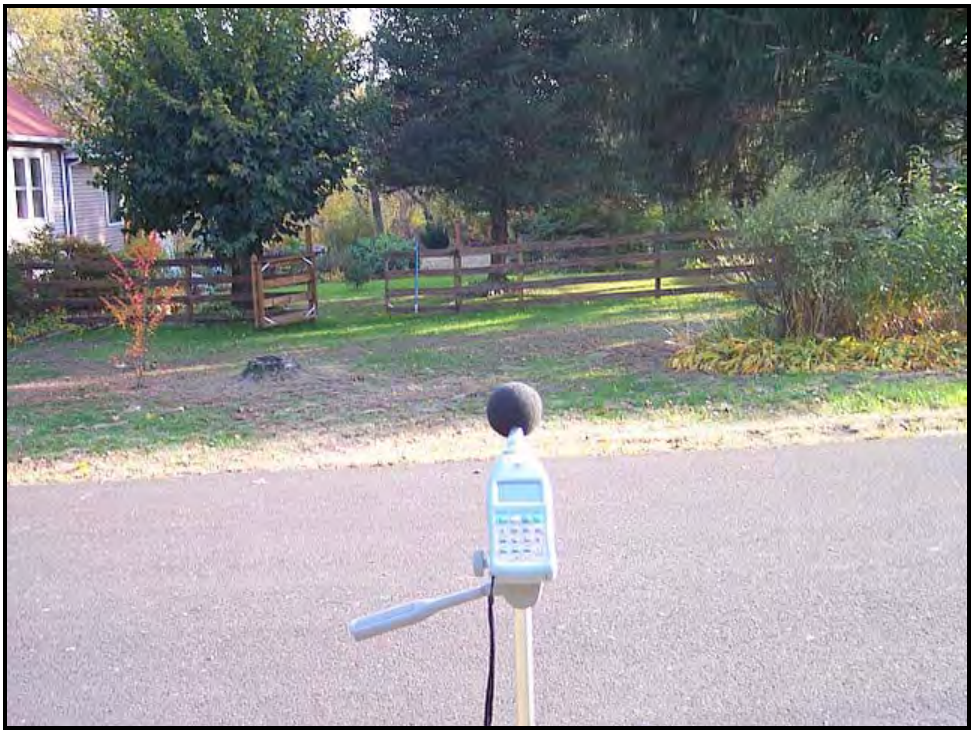
Elevation View

* *Not to scale.*



Indicate: Location of microphone, Distance (Ft) to landmarks, height of meter, height of walls/fence, travel direction, store names, hydrants, telephone poles, manholes, etc.

Site 6A



SHORT TERM NOISE MEASUREMENTS (10-15 minutes) Worksheet

SITE 6A Address 6354 Leonard Ave.

Time Periods		Date	Starting Time	PARAMETERS (dBA) Leq	L10	L50	L90	MaxL	MinL	Rec #
AM Peak	7:00 AM - 8:00 AM	11/8/05	7:36							A02_0027
Midday	8:00 AM - 5:00 PM	11/8/05	1:59							A02_0034
PM Peak	5:00 PM - 6:00 PM	11/8/05	4:45							A02_0035
Photo		49, 50, 61-65					Diagram	✓		

Notes / Unusual Noises (e.g. helicopter, airplane, ambulance, motorcycle, police, ambulance, fire truck, garbage truck, people yelling/shouting, barking dog, etc.)

DO NOT PAUSE FOR UNUSUAL NOISES. JUST INDICATE NOISE TYPE AND TIME OF OCCURRENCE!!

BK2236 - Measure for 3 min, 3 min and 4 mins per site & UPLOAD DATA EVERY NIGHT!

Meak
:36- 7:37 man yelled @ dog to leave me alone
7:38? woman across street closes car door
7:40 " " " turns car on
- quiet neighborhood
- can occasionally hear birds chirping
- traffic flow sounds const. → can hear a lot of trucks
7:41 plane overhead - doesn't seem to peak the levels
7:46 train horn in background
to 7:47
* can hear traffic from Bensalem when loud truck passes

dday * dog barking throughout measurement
ak - can hear music from down the street b/c kids outside playing basketball / listening to music
2:05 plane overhead
1:13 - 1:14 H. wind
1:14 loud car horn → 65 dBA (from 2 houses down)
1:15 truck pulls out of driveway @ 6351 & drives past meter → 63 dBA
1:16 car horn

Appendix C

Traffic Data

PA Turnpike / I-95 Interchange Project
Traffic Volume Projections (Build Year 2030, Design Year 2050)

Date: April 19, 2024
Project name: PA Turnpike / I-95 Interchange Project
Attention: Project File
Company: Jacobs
Prepared by: Megan Peppard, PE
Checked by: Dominic Marchesano, PE

5 Neshaminy Interplex, Suite 205
Trevose, PA 19053
T 215.355.3577

The following is a summary of the history and explanation of the methodology used in the 2024 Project Traffic Forecasts Effort for the PA Turnpike/I-95 Interchange Project.

I. Background Information

A traffic capacity analysis was conducted as part of the project's 1993 Needs Study to identify levels of service (LOS) for I-95, I-276, and local roadways and to evaluate the performance of the roadway network. The analysis was based on existing (1992) and projected Year (2020) traffic volumes as presented in *Delaware Valley's Direction 2020 Transportation Plan* (DVRPC, 1995).

The re-staging of the PA Turnpike/I-95 Interchange Project in 2010 necessitated an update to the traffic projections to reflect the prioritized opening of the interchange movements that would satisfy the lack of I-95 continuity along the East Coast. For this projection effort, a 2014 Opening Year for the I-95 Northbound to I-276 Eastbound and I-276 Westbound to I-95 Southbound flyovers and Design Years of 2025 and 2030 were presented.

In 2021, following the 2018 opening of the I-95 Northbound to I-276 Eastbound and I-276 Westbound to I-95 Southbound flyovers, traffic projections were revisited primarily for use in Stage 2 design section noise analyses. This effort utilized updated existing year (2019), build year (2030), and design years (2050). Additionally, DVRPC had conducted post flyover opening traffic data collection and project area forecasting in support of ongoing/planned regional transportation improvement projects on I-95 and US1 in Bucks County.

Changes to area traffic patterns resulting from the COVID-19 pandemic in addition to the initiation of the Delaware River Bridge (Stage 3) Project have necessitated a re-evaluation of the Project's Traffic Projections.

II. Traffic Data Sources

Recent, historical traffic data was provided by the Pennsylvania Turnpike Commission (PTC) and the New Jersey Turnpike Authority (NJTA) for the 2023 calendar year.

Additionally, the Delaware Valley Regional Planning Commission (DVRPC) conducted a traffic study in the Lower Bucks area of the interchange utilizing the regional travel demand model and Long-Range Plan adopted population and employment forecasts in partnership with the Bucks County Planning Commission. This effort demonstrated traffic effects that would occur by constructing the six remaining movements of the interchange.

III. Existing and No-Build Volumes

As discussed above, the PTC and NJTA provided traffic data is based on the 2023 calendar year. While the lasting effects of the Coronavirus pandemic on traffic patterns is yet to be known, these volumes are likely more representative of driver trends moving forward. Therefore, the collected 2023 volumes were used as the existing year for this traffic projection effort.

IV. Build Volumes (2030 and 2050)

The years 2030 and 2050 were used for Build Volumes. The Delaware River Bridge (DRB) project schedule anticipates construction may begin on Stage 3 of the project in 2030 and several remaining Stage 2 components of the project will be into construction or entering the construction phase by 2030. For this reason, all eight ramp movements between the PA Turnpike and I-95 were included in the traffic projections for 2030 and 2050 to offer a common basis of comparison for future years.

V. Design Volumes (2050)

Design Volumes were projected for the year 2050 to account for a 20-year period following the build year timeframe.

VI. Volume Balancing

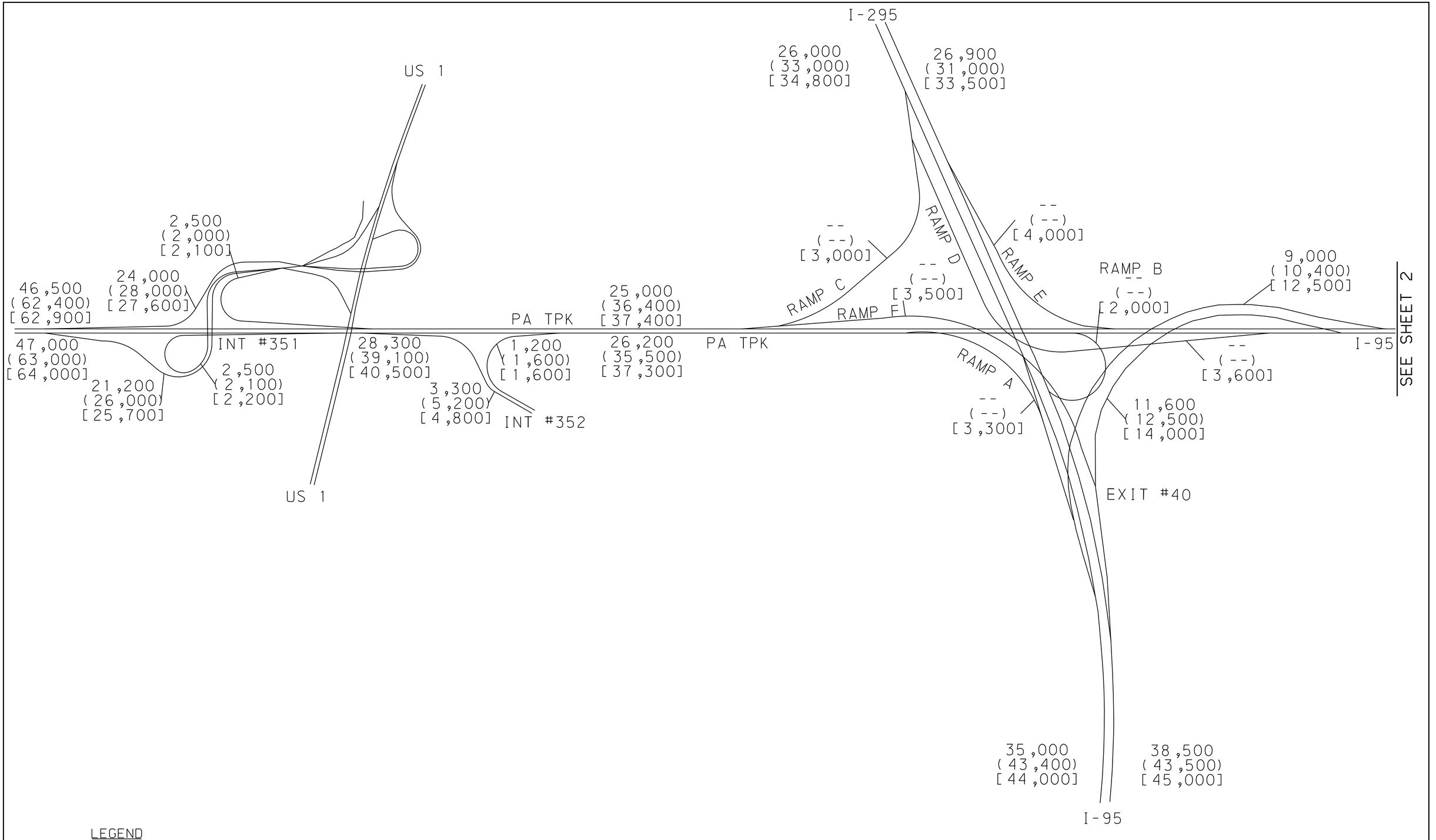
Volume balancing is an effort to develop a logical set of volumes that is representative of the current and projected year of traffic demand. The volumes projected in the No Build and Build scenario for both 2030 and 2050 are based on conservative growth factors that vary between 1.0% and 1.31% per year between 2023 and 2050. This range is comparable to the provided PennDOT BPR factor of 1.31% for September 2023 to July 2024 for this classification of highway in this portion of the state. The PennDOT BPR growth factor was used as a starting point for developing the traffic projections in the study area in order to be sure that the projected volumes have a conservative annual growth for all movements in design year.

The traffic volumes that were used for 2023 are a result of several sources and, in some cases, the projected volumes may fall above or below this growth factor range in order to balance the overall network. The volumes were rounded to facilitate balancing. PA Turnpike Interchange #351 and #352 and I-95 Exit #40 and #42 ramp volumes were determined by using the DVRPC modeled volumes and factoring those into the balancing effort, specifically for the build scenarios, to account for traffic volume shifts at the heaviest interchange movements.

When the PA Turnpike/I-95 Interchange is fully built, an example of an anticipated volume shift would be a decrease in traffic utilizing the eastbound off-ramp at Interchange #351 (intended for US 1 to Woodhaven Road to I-95). This traffic would shift to travel eastbound on the PA Turnpike for the on-ramp to Southbound I-95 (future Ramp A). Additionally, it is anticipated that the westbound on-ramp at Interchange #351 will experience a decrease in volume since vehicles will instead utilize I-295 Westbound to the Westbound on-ramp (future Ramp C) to the PA Turnpike for travel westbound on the PA Turnpike.

Overall, the completion of the PA Turnpike/I-95 Interchange project will result in the redistribution of some traffic volumes based on a change in driver behavior. Additionally, other regional projects simultaneously being built will affect travel patterns of some motorists based upon origins and destinations. These effects do not result in a significant change to the volumes presented.

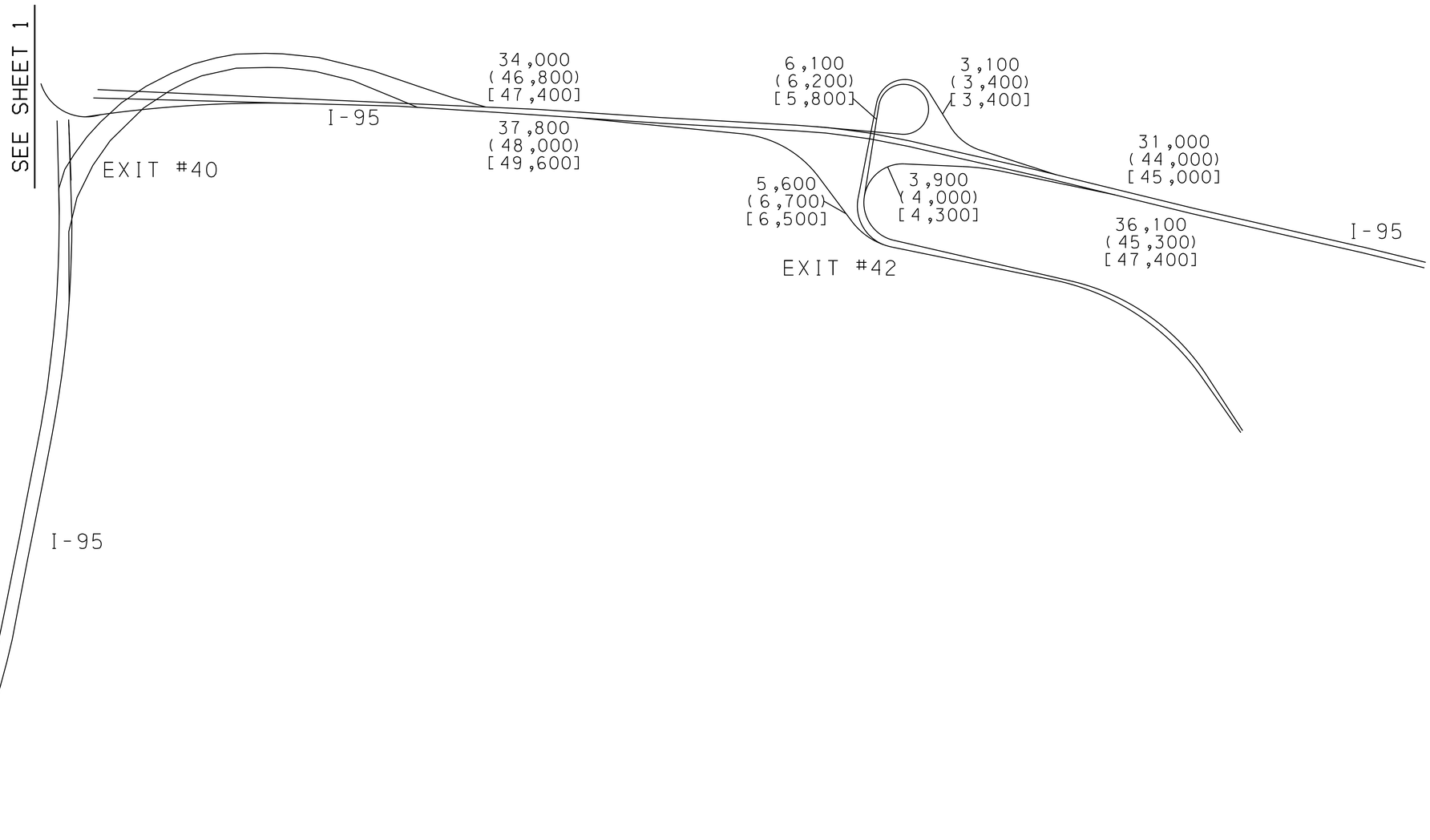
In summary, previous trends associated with the ability to keep interstate to interstate traffic on the highways continues to be apparent. This trend is due to the connections being provided at the PA Turnpike/I-95 Interchange, removing traffic from the local road (arterial state route) system. In addition to providing a fully directional high-speed connection where the highways cross, the additional capacity to be provided on the mainline highway segments and the bridge over the Delaware River allows for favorable Levels of Service in the design year and beyond.



LEGEND

2023 ADT
(2050 NO BUILD ADT)
[2050 BUILD ADT]

I-95/PA TURNPIKE INTERCHANGE
STAGE 2/3 TRAFFIC VOLUMES
APRIL 2024
SHEET 1



LEGEND
2023 ADT
(2050 NO BUILD ADT)
[2050 BUILD ADT]

I-95/PA TURNPIKE INTERCHANGE
STAGE 2/3 TRAFFIC VOLUMES
APRIL 2024
SHEET 2

I-95/PA Turnpike Interchange Stage 2/3 Traffic Volumes April 2024	2023 EXISTING ADT	2030 NO BUILD ADT	2030 BUILD ADT	2050 NO BUILD ADT	2050 BUILD ADT
PA Turnpike Mainline:					
1. EB - Int #343 to Int #351	47,000	53,600	54,000	63,000	64,000
1. WB - Int #343 to Int #351	46,500	52,000	52,700	62,400	62,900
2a. EB - Int #351 to #352	28,300	31,200	34,500	39,100	40,500
2. EB - Int #352 to Int #353	26,200	28,200	31,800	35,500	37,300
2. WB - Int #351 to Int #353	25,000	28,900	33,000	36,400	37,400
I-95 Mainline:					
3. NB - PA Turnpike (Exit #40) to Exit #42	37,800	41,200	42,400	48,000	49,600
3. SB - PA Turnpike (Exit #40) to Exit #42	34,000	38,400	38,500	46,800	47,400
4. NB - Exit #42 to Exit #43	36,100	39,200	39,700	45,300	47,400
4. SB - Exit #42 to Exit #43	31,000	35,000	35,700	44,000	45,000
PA Turnpike Int #351 Ramps:					
PA Turnpike WB Off Ramp to Int #351	2,500	2,400	2,500	2,000	2,100
PA Turnpike EB Off Ramp to Int #351	21,200	25,000	21,500	26,000	25,700
PA Turnpike EB On Ramp from Int #351	2,500	2,600	2,000	2,100	2,200
PA Turnpike WB On Ramp from Int #351	24,000	25,500	22,200	28,000	27,600
PA Turnpike Int #352 Ramps:					
PA Turnpike EB Off Ramp to Int #352	3,300	4,500	4,300	5,200	4,800
PA Turnpike EB On Ramp from Int #352	1,200	1,500	1,600	1,600	1,600
I-95 Exit #42 Ramps:					
I-95 NB Off Ramp to Exit #42	5,600	6,500	6,500	6,700	6,500
I-95 SB Off Ramp to Exit #42	3,100	3,100	3,100	3,400	3,400
I-95 SB On Ramp from Exit #42	6,100	6,500	5,900	6,200	5,800
I-95 NB On Ramp from Exit #42	3,900	4,500	3,800	4,000	4,300
I-95 / Turnpike Ramps:					
I-95 SB (NJ to Phila)	9,000	9,500	10,000	10,400	12,500
I-95 NB (Phila to NJ)	11,600	13,000	13,200	12,500	14,000
I-95 SB to I-295 EB (Ramp E)	--	--	2,800	--	4,000
I-295 WB to PA Turnpike WB (Ramp C)	--	--	3,500	--	3,000
PA Turnpike EB to I-95 SB (Ramp A)	--	--	3,600	--	3,300
PA Turnpike EB to I-295 EB (Ramp B)	--	--	2,300	--	2,000
I-95 NB to PA Turnpike WB (Ramp F)	--	--	3,800	--	3,500
I-295 WB to I-95 NB (Ramp D)	--	--	3,300	--	3,600
I-295 / I-95:					
I-295 WB - NJ to PA Turnpike	26,000	28,500	31,500	33,000	34,800
I-295 EB - PA Turnpike to NJ	26,900	27,000	29,100	31,000	33,500
I-95 NB - Exit #39 to Exit #40	38,500	40,000	41,000	43,500	45,000
I-95 SB - Exit #40 to Exit #39	35,000	38,000	38,300	43,400	44,000

Note: Build Years 2030 and 2050 assume the Stage 2 widening and the PA Turnpike/I-95/I-295 Interchange (including 8 ramp movements) are completed in addition to 6 lanes on the Bridge over the Delaware River to New Jersey.

Appendix D

PennDOT Noise Barrier Warranted, Feasible, and Reasonable Worksheets APPENDICES

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – NSA 13

Date	3/3/2025
Project Name	I-95/I-276 Interchange, Section I-95-C
County	Bucks
SR, Section	I-276 Section I-95-C
Community Name and/or NSA #	NSA 13
Noise Wall Identification (i.e., Wall 1)	Barrier 13

General

1. Type of project (new location, reconstruction, etc.):	widening and reconstruction
2. Total number of impacted receptor units in community	
Category A units impacted	
Category B units impacted	17
Category C units impacted	
Category D units impacted (if interior analysis required)	
Category E units impacted	

Warranted

1. Community Documentation		
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A	
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):		
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	____ Yes	____ No

2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.		
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	X Yes	____ No
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	____ Yes	X No
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?	____ Yes	X No

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

1. Impacted receptor units			
a. Total number of impacted receptor units:	17		
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	100%		
c. Is the percentage 50 or greater?	X Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X Yes		No

Reasonableness

1. Community Desires Related to the Barrier			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise wall."	TBD Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation			
a. Area (SF) of the proposed noise wall	42,231		
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	46		
c. SF/BR = 2a/2b	918		
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	X Yes		No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.			
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X Yes		No

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

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? X Yes ____ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Pennsylvania Turnpike Commission Project Environmental Manager — Date

Nathaniel Weinstock, Acoustical Scientist, Navarro & Wright — 3/3/2025

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

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – NSA 14

Date	3/3/2025
Project Name	I-95/I-276 Interchange, Section I-95-C
County	Bucks
SR, Section	I-276 Section I-95-C
Community Name and/or NSA #	NSA 14
Noise Wall Identification (i.e., Wall 1)	Barriers 14-1 and 14-2

General

1. Type of project (new location, reconstruction, etc.):	widening and reconstruction
2. Total number of impacted receptor units in community	
Category A units impacted	
Category B units impacted	23
Category C units impacted	1
Category D units impacted (if interior analysis required)	
Category E units impacted	

Warranted

1. Community Documentation		
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A	
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):		
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	____ Yes	____ No
2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.		
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	X Yes	____ No
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	____ Yes	X No
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?	____ Yes	X No

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

1. Impacted receptor units				
a. Total number of impacted receptor units:	24			
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	92%			
c. Is the percentage 50 or greater?	X	Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X	Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X	Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X	Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X	Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X	Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X	Yes		No

Reasonableness

1. Community Desires Related to the Barrier				
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise wall."	TBD	Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation				
a. Area (SF) of the proposed noise wall	44,995			
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	61			
c. SF/BR = 2a/2b	738			
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	X	Yes		No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.				
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X	Yes		No

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

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? X Yes ____ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Pennsylvania Turnpike Commission Project Environmental Manager — Date

Nathaniel Weinstock, Acoustical Scientist, Navarro & Wright — 3/3/2025

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

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – NSA 15

Date	3/3/2025
Project Name	I-95/I-276 Interchange, Section I-95-C
County	Bucks
SR, Section	I-276 Section I-95-C
Community Name and/or NSA #	NSA 15
Noise Wall Identification (i.e., Wall 1)	Barriers 15-1 and 15-2

General

1. Type of project (new location, reconstruction, etc.):	widening and reconstruction
2. Total number of impacted receptor units in community	
Category A units impacted	
Category B units impacted	63
Category C units impacted	
Category D units impacted (if interior analysis required)	
Category E units impacted	

Warranted

1. Community Documentation		
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A	
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):		
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	____ Yes	____ No
2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.		
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	X Yes	____ No
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	____ Yes	X No
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?	____ Yes	X No

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

1. Impacted receptor units			
a. Total number of impacted receptor units:	63		
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	100%		
c. Is the percentage 50 or greater?	X Yes		No
2. Can the noise wall be designed and physically constructed at the proposed location?	X Yes		No
3. Can the noise wall be constructed without causing a safety problem?	X Yes		No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X Yes		No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X Yes		No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X Yes		No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X Yes		No

Reasonableness

1. Community Desires Related to the Barrier			
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise wall."	TBD Yes		No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation			
a. Area (SF) of the proposed noise wall	79,005		
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	135		
c. SF/BR = 2a/2b	585		
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	X Yes		No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.			
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X Yes		No

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

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? X Yes ____ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Pennsylvania Turnpike Commission Project Environmental Manager — Date

Nathaniel Weinstock, Acoustical Scientist, Navarro & Wright — 3/3/2025

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

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – NSA 16

Date	3/3/2025
Project Name	I-95/I-276 Interchange, Section I-95-C
County	Bucks
SR, Section	I-276 Section I-95-C
Community Name and/or NSA #	NSA 16
Noise Wall Identification (i.e., Wall 1)	Barriers 16-1 and 16-2

General

1. Type of project (new location, reconstruction, etc.):	widening and reconstruction
2. Total number of impacted receptor units in community	
Category A units impacted	
Category B units impacted	47
Category C units impacted	
Category D units impacted (if interior analysis required)	
Category E units impacted	

Warranted

1. Community Documentation		
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A	
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):		
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	____ Yes	____ No
2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.		
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	X Yes	____ No
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	____ Yes	X No
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?	____ Yes	X No

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

1. Impacted receptor units		
a. Total number of impacted receptor units:	47	
b. Percentage of impacted receptor units receiving 5 dB(A) or more insertion loss:	100%	
c. Is the percentage 50 or greater?	X Yes	No
2. Can the noise wall be designed and physically constructed at the proposed location?	X Yes	No
3. Can the noise wall be constructed without causing a safety problem?	X Yes	No
4. Can the noise wall be constructed without restricting access to vehicular or pedestrian travel?	X Yes	No
5. Can the noise wall be constructed in a manner that allows for access for required maintenance and inspection operations?	X Yes	No
6. Can the noise wall be constructed in a manner that permits utilities to function in a normal manner?	X Yes	No
7. Can the noise wall be constructed in a manner that permits drainage features to function in a normal manner?	X Yes	No

Reasonableness

1. Community Desires Related to the Barrier		
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise wall."	TBD Yes	No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation		
a. Area (SF) of the proposed noise wall	90,080	
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	112	
c. SF/BR = 2a/2b	804	
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	X Yes	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.		
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X Yes	No

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

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? X Yes ____ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Pennsylvania Turnpike Commission Project Environmental Manager — Date

Nathaniel Weinstock, Acoustical Scientist, Navarro & Wright — 3/3/2025

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

Highway Traffic Noise Abatement
Warranted, Feasible, and Reasonable Worksheet – NSA 29

Date	3/3/2025
Project Name	I-95/I-276 Interchange, Section I-95-C
County	Bucks
SR, Section	I-276 Section I-95-C
Community Name and/or NSA #	NSA 29
Noise Wall Identification (i.e., Wall 1)	Barrier 29

General

1. Type of project (new location, reconstruction, etc.):	widening and reconstruction
2. Total number of impacted receptor units in community	
Category A units impacted	
Category B units impacted	
Category C units impacted	4
Category D units impacted (if interior analysis required)	
Category E units impacted	

Warranted

1. Community Documentation			
a. Date community was permitted (for new developments or developments planned for or under construction)	N/A		
b. Date of approval for the Categorical Exclusion (CE), Record of Decision (ROD), or Finding of No Significant Impact (FONSI):			
c. Does the date in 1.a precede the date in 1.b? If yes, proceed to Warranted Item 2. If no, consideration of noise abatement is not warranted. Proceed to "Decision" block and answer "no" to warranted question. As the reason for this decision, state that "Community was permitted after the date of approval of *CE, ROD, or FONSI, as appropriate* ."	____ Yes	____ No	
2. Criteria requiring consideration of noise abatement (note N/A if category is not impacted or present or analysis not required). A "yes" answer to any of the following three questions requires the consideration of noise abatement.			
a. With the proposed project, are design year noise levels predicted to approach or exceed the NAC level(s) in Table 1?	X Yes	____ No	
b. With the proposed project, is there predicted to be a substantial design year noise level increase of 10 dB(A) or more at Activity Category A, B, C, D, or E receptor(s)?	____ Yes	X No	
c. With the proposed project, are design year noise levels predicted to be less than existing noise levels, but still approach or exceed the NAC levels in Table 1 for the relevant Activity Category?	____ Yes	X No	

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

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

Reasonableness

1. Community Desires Related to the Barrier		
a. Do at least 50 percent of the responding benefited receptor unit owner(s) and renters desire the noise wall? If yes, continue with Reasonableness questions. If no, the noise wall can be considered not to be reasonable. Proceed to "Decision" block and answer "no" to reasonableness question. As the reason for this decision, state that "The majority of the benefited receptor unit owners do not desire the noise wall."	TBD Yes	No
2. Square Footage Per Benefited Receptor (SF/BR) Evaluation		
a. Area (SF) of the proposed noise wall	17,952	
b. Number of benefited receptor units (any unit receiving 5 dB(A) or more insertion loss)	13	
c. SF/BR = 2a/2b	1,381	
d. Is 2c less than or equal to the MaxSF/BR value of 2000?	X Yes	No
3. Noise Reduction Design Goals (Activity Categories A, B, C, and E) A "yes" answer is required to Question 3a. for the noise wall to be determined to be reasonable. Questions 3b through 3e represent desirable goals that need not be met for a noise wall to be determined reasonable. However, they must be addressed and should be considered in the determination of the recommended noise wall.		
a. Does the noise wall reduce design year exterior noise levels by at least 7 dB(A) for at least one benefited receptor?	X Yes	No

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

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

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

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

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

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

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

Decision

Is the Noise Wall WARRANTED? X Yes ____ No

Is the Noise Wall FEASIBLE? X Yes ____ No

Is the Noise Wall REASONABLE? X Yes ____ No

Additional Reasons for Decision:

Responsible/Qualified Individuals Making the Above Decisions

Pennsylvania Turnpike Commission Project Environmental Manager — Date

Nathaniel Weinstock, Acoustical Scientist, Navarro & Wright — 3/3/2025

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

Appendix E

Parallel Barrier Analysis

As identified in **Section 3.0 Noise Analysis Methodology**, absorptive-faced barriers are required to be evaluated for parallel barrier configurations (a barrier located on both sides of the highway) where the ratio of the distance between the barriers to barrier-height is less than 10:1 (e.g., a configuration such that a 100-foot cross section is flanked on both side by sound barriers at least 10 feet high). Parallel barriers in this configuration have the potential to degrade barrier performance, due to multiple reflections creating an effect similar to a resonating chamber.

The analysis uses TNM's "Parallel Barrier Analysis Module" and requires evaluation at a minimum of three (3) cross-sections, including one within 500-feet of the barrier terminus. Cross-sections chosen for analysis should include known variations of varying geometric relationships between roadway and receivers within the affected NSA(s), such as roadway in cut, at-grade, or on fill. Both a reflective and absorptive scenario are run for each cross-section to provide data for comparative analysis.

This project area includes several areas where the width: height ratio is less than 10:1. These areas can be found in:

- NSAs 13 and 14, between approximate Stations 217 +50 and 226 +00,
- NSAs 15 and 16, between approximate Stations 250 +00 and 292 +00.

Multiple cross-section analyses were performed for each of these NSAs at representative receptor locations. This was done to both quantify the increase in noise levels due to multiple reflections as well as to test the efficacy of absorptive treatment.

The selected cross-sections represent qualifying study areas with varying receptor setbacks, barrier width: height ratios, and geometric relationships. The model-predicted degradation at multiple locations was compared to the post-abatement community noise levels to assist in evaluating ultimate barrier performance versus Publication 24 design goals. The NSA 13/14 analysis utilized four (4) cross-sections, generally aligned with the receptor sets listed in the Table below. The NSA 15/16 analysis utilized three cross-sections, generally aligned with the receptor sets listed. Noise propagation fundamentals were also considered e.g., the environmental absorption provided by grassy cut-slopes and the effects of distance and elevation disparities on sound pressure levels.

Reflected/reverberation noise was generally found to have a limited effect in the evaluated areas given multiple variables. These include community elevations relative to the roadway, increased ground absorption and a change in reflection angles where barriers are up-slope and set back from the roadways, and opposing barrier angle relationships.

As shown in the following table, a portion of the potentially affected receptors will experience up to a four (4) dBA performance reduction due to the parallel barrier configuration. However, even in the absence of an absorptive treatment at these locations, the insertion loss exceeds the PennDOT/PTC primary abatement design goals outlined in Publication 24. The affected receptors continue to receive nine (9) to eleven (11) dBA insertion losses due to the proposed abatement without the introduction of an absorptive treatment.

Therefore, the use of absorptive treatments on the highway side of the barriers is not recommended for this project.

PARALLEL BARRIER ANALYSIS*

NSAs 13/14 and 15/16

Location	Site	Design Year (2050) Build Noise Level	Initial Abated Level	Initial Insertion Loss	Adjustment Factor		Final Abated Noise Level		Final Insertion Loss	
					Reflective	Absorptive	Reflective	Absorptive	Reflective	Absorptive
13/14-1	13.3-A	76	62	14	3	0	65	62	11	13
	14-G	73	60	13	4	1	64	61	8	12
13/14-2	13.3-C	77	63	14	2	0	65	63	11	14
	14-I	73	60	12	3	1	63	61	9	12
13/14-3	13.3-G	71	62	10	0	0	62	62	10	10
	14-J	69	60	9	1	0	61	60	8	9
13/14-4	13.3-E	75	62	13	1	1	63	63	12	13
15/16-1	16-G	75	63	13	2	0	64	63	11	12
15/16-2	15-C	74	62	12	3	0	65	62	9	12
	16-N	75	62	13	2	0	65	62	10	13
15/16-3	15-NNN	78	64	14	0	0	65	64	13	14
	16-CC	73	62	11	1	0	62	62	11	11

*Arithmetic inconsistencies are due to noise levels that have been calculated to the tenth of a dBA, but are reported as whole numbers.