NOISE TECHNICAL REPORT

For

Washington Pike Roadway Improvements
From I-640 to Murphy Road

City of Knoxville, Knox County, Tennessee

TDOT PIN: 043090.00

State Project No: 47953-3518-54

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Executive Summary

The Tennessee Department of Transportation (TDOT) proposes to improve Washington Pike, a four lane facility from Interstate 640 to Murphy Road in Knox County, Tennessee. The proposed section consist of four travel lanes, curb and gutter, sidewalks, and bike lanes. The project length is approximately 1.73 miles (9,130 feet). This Noise Technical Report (NTR) identifies all traffic noise impacts, and in accordance with TDOT Policy on Highway Traffic Noise Abatement (PHTNA), presents the recommendations for, or against, the construction of traffic noise abatement measures for Washington Pike.

This NTR documents the evaluation of existing ambient noise levels at 10 noise monitoring receptor locations, and the assessment of predicted loudest-hour equivalent for existing (2012) and design year (2033) traffic noise levels and traffic noise impacts at 153 noise sensitive receptor locations in the vicinity of the proposed improvements to Washington Pike. In accordance with TDOT PHTNA, abatement measures were considered for the benefit of all 13 predicted Design Year 2033 build-condition traffic noise impacts.

Washington Pike is not a limited access roadway. Most of the impacted receptors have driveways along the existing Washington Pike and are expected to remain the same with the proposed improvements. The openings would prevent the construction of a continuous and acoustically effective noise barrier and would negatively affect property access and possible maintenance requirements. Therefore, construction of noise barriers is not feasible for this project.

Loud construction noise activities such as usage of pile-drivers and impact hammers will cause temporary, sporadic, and acute construction noise impacts in isolated areas. The contractor shall notify TDOT if construction activities are required in the vicinity of one or more residential neighborhoods.

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Acronyms and Abbreviations Used in This Report

FHWA	Federal Highway Administration
CFR	Code of Federal Regulations
dB	decibel
dB(A)	A-weighted sound level in decibels
Leq	equivalent sound pressure level
NAC	Noise Abatement Criteria
TNM 2.5	FHWA Traffic Noise Model Version 2.5
TDOT	Tennessee Department of Transportation
TIP	Transportation Improvement Program
NW	Noise Wall
LRTP	Long Range Transportation Plan
TPO	Knoxville Region Transportation Planning Organization
NSA	Noise Sensitive Area
NTR	Noise Technical Report
PHTNA	Policy on Highway Traffic Noise Abatement
vpd	vehicles per day

1.0 INTRODUCTION & PROJECT DESCRIPTION

Washington Pike is an urban minor arterial street that extends northeast and southwest to the I-640 interchange. This minor arterial provides a multi-lane section through the I-640 interchange and across the Norfolk Southern Railway to Greenway Drive where Washington Pike turns right and continues as a two lane facility to the City Limits at Murphy Road as shown in **Figure 1**. Signalized intersection exists at I-640 interchange ramp, Greenway Drive, Mill Road, and Murphy Road within the corridor.

Existing traffic volumes along Washington Pike range from 12,100 vehicles per day (vpd) near Mill Road to 8,200 vpd east of Murphy Road. For the design year 2033, the projected traffic volumes are expected to be approximately 33,000 vpd.

The proposed project is a four lane facility from Interstate 640 to Murphy Road. The proposed section consist of four travel lanes, curb and gutter, sidewalks, and bike lanes. The project length is approximately 1.73 miles (9,130 feet). The proposed right of way width is 200 feet to accommodate future capacity and innovative storm water treatment.

The goals and objectives of the project are to:

- Create a traffic circulation system that minimizes conflicts between pedestrians, bicyclists and vehicles;
- Enhance Washington Pike to adequately serve the commercial/retail/residential development in the area relative to capacity, safety, circulation and access to I-640;
- Improve east-west mobility in the Knoxville Center Mall area;
- Enhance regional and local economic development opportunities;
- Modify key intersections to increase operational safety and capacity;
- Create a greenway system in conjunction with storm water control programs;
- Improve transportation linkages throughout the northeastern quadrant of the City; and
- Be compatible with and serve the needs of the surrounding neighborhoods.

The estimated construction cost for the proposed Washington Pike Roadway improvements and widening is approximately $11.8 million. Construction is expected to begin in summer 2015.

This Noise Technical Report (NTR) identifies all traffic noise impacts, and in accordance with TDOT Policy on Highway Traffic Noise Abatement (PHTNA), presents the recommendations for, or against, the construction of traffic noise abatement measures for Washington Pike Roadway Improvements from I-640 to Murphy Rd.

Washington Pike looking East at Nehemiah Church

2.0 STATEMENT OF COMPLIANCE

This analysis will follow Federal Highway Administration (FHWA) Regulation 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise" and the Tennessee Department of Transportation (TDOT) "Policy on Highway Traffic Noise Abatement", July 13, 2011.

According to FHWA and TDOT, there are three types of projects:

Type I Project - Noise abatement accomplished in conjunction with a construction or reconstruction project on a section of federal-aid highway, as designated in 23 CFR Part 772.

Type II Project - Noise abatement on an existing section of a federal-aid highway which does not include construction or reconstruction, as designated in 23 CFR Part 772.

Type III Project - A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project, as designated in 23 CFR Part 772.

The proposed project is designated as a Type I project due to the following:

- Increase in the number of through-traffic lanes on an existing highway

3.0 DATE OF PUBLIC KNOWLEDGE

The Date of Public Knowledge or the date of approval of the final environmental document for this project will be the date of approval of the ongoing D-List CE document.

The criteria for determining when undeveloped land is "permitted" for development will be the approval date of a building permit for an individual lot. After the Date of Public Knowledge for the project, federal and state governments are no longer responsible for providing noise abatement measures for new development within the noise impact area of the proposed highway project. It is the responsibility of local governments and private landowners to ensure that noise compatible designs are used for development permitted after the Date of Public Knowledge.

The state and federal policy applies only to developed land and to undeveloped land for which development is permitted before the project Date of Public Knowledge. Mitigation measures studied in this NTR are evaluated for locations to developed and undeveloped land permitted prior to the date of public knowledge.

WASHINGTON PIKE ROADWAY PROJECT
CITY OF KNOXVILLE, KNOX COUNTY, TENNESSEE
TDOT PIN: 043090.00
STATE PROJECT NO: 47953-3518-54

PROJECT LOCATION

Washington Pike Roadway Project

0 0.5 1 2 3 4 Miles

FIGURE 1

4.0 FUNDAMENTALS OF NOISE

Noise can be defined as unwanted sound. Traffic noise (or any noise) can disrupt normal activities when the noise reaches certain levels and when noises are distinctly louder than the typical ambient noise environment. Sound is commonly represented by the dimensionless units of "decibels", represented by the abbreviation "dB". Sound from highway traffic is primarily generated from tire-pavement interaction, vehicle exhaust, and engines. Vehicle traffic sounds are generally considered to be unwanted, or noise, to most people.

The magnitude of noise or the deviation from the ambient is usually described by sound pressure. The magnitude of noise is usually described by a ratio of its sound pressure to a reference sound pressure, which is usually twenty micro-Pascals (20 Pa). A logarithmic scale is used to relate sound pressure to a common reference pressure, yielding the Sound Pressure Level (SPL). SPL is measured in dimensionless units of decibels (dB) and are modified by frequency response of human hearing or weighting. Three weightings have been established for measuring sound pressure: A, B, and C. The commonly accepted limits of human hearing to detect sound magnitudes are between the threshold of hearing at 0 decibels and the threshold of pain at 140 decibels. **Figure 2** shows some examples of common noise sources and their sound levels.

Sound occurs over a wide range of frequencies. Sound frequencies are represented in units of Hertz (Hz), which correspond to the number of vibrations per second of a given tone. The commonly accepted audible frequency is between 20 Hz and 20,000 Hz, and human hearing is most sensitive to the frequencies between 1,000 Hz – 6,000 Hz.

The A-weighted scale is commonly used in highway traffic noise studies because it falls within the most sensitive human ear frequency (1,000 Hz to 6,000 Hz). Sound levels that are measured using the A-weighted scale are often expressed as dB(A). All noise levels in this NTR will be expressed in dB(A).

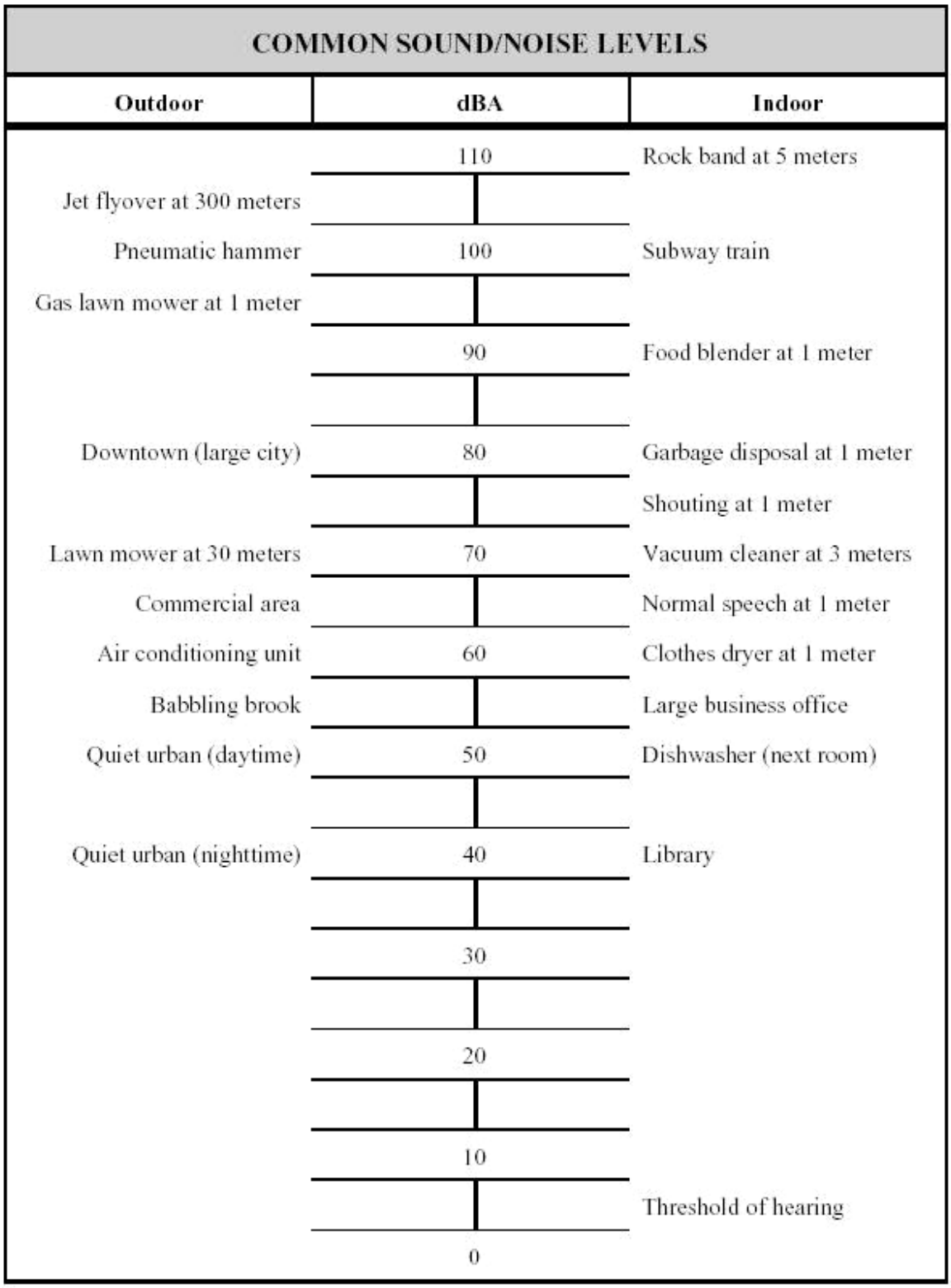
A key concept in evaluating potential noise impacts is the perceived effect of incremental increases in existing noise levels. The relationships between changes in sound levels, loudness, and acoustic energy are presented in **Table 1**. For example, the table shows that an increase of 3 dB(A) is barely perceptible, an increase of 5 dBA is noticeable, and that a 10 dB(A) increase would be perceived by someone to be a doubling of the noise level (loudness). Increases of 5-10 dB(A) would tend to be noticeable to most but not substantial. An increase of 10 dB(A) or more would be perceived by most as a substantial impact.

Table 1 - Relationships Between Changes in Sound Levels, Loudness, and Acoustic Energy

Sound Level Change	Change in Loudness[1,2]	Relative Change in Acoustic Energy[3]
+30 dB(A)	Eight Times as Loud	1,000
+20 dB(A)	Four Times as Loud	100
+10 dB(A)	Twice as Loud	10
+5 dB(A)	Readily Perceptible	~3
+3 dB(A)	Barely Perceptible	2
0 dB(A)	**No Change**	**0**
-3 dB(A)	Barely Perceptible	1 / 2
-5 dB(A)	Readily Perceptible	~1 / 3
-10 dB(A)	Half as Loud	1 / 10
-20 dB(A)	1/4 as Loud	1 / 100
-30 dB(A)	1/8 as Loud	1 / 1000

1. Loudness pertains only to the perceived magnitude of a sound or sounds. Loudness does not describe the tonal qualities of one or more sounds. Two sounds can have the same sound level magnitudes, and can sound "just as loud", and be distinguishable because of differing tones (frequencies).
2. Relative to the loudness of an initial sound level. E.g., the loudness of a 63 dB(A) sound would be barely perceptible from the loudness of a 60 dB(A) sound. An 80 dB(A) sound would generally be perceived as four times as loud as a 60 dB(A) sound.
3. Relative to the acoustic energy of an initial sound level. E.g., a sound level of 63 dB(A) has twice the acoustic energy as an initial sound level of 60 dB(A). A sound level of 80 dB(A) has 100 times the acoustic energy as 60 dB(A).

Figure 2 Common Sound/ Noise Levels



Source: Guide on Evaluation and Attenuation of Traffic Noise, American Association of State Highway and Transportation Officials (AASHTO), 1974 (revised 1993)

The degree of disturbance or annoyance of unwanted sound depends essentially on three things:

1. The amount and nature of intruding noise,
2. The relationship between the ambient noise and the intruding noise, and
3. The type of activity occurring when the intruding noise is heard.

In considering the first of these three factors, it is important to note that individuals have different hearing sensitivity to noise. Loud noises bother some more than others and some individuals become angered if an unwanted noise persists. The time patterns of noise also enter into a person's judgment of whether or not a noise is objectionable. For example, noises occurring during sleeping hours are usually considered to be more objectionable than the same noises in the daytime.

With regard to the second factor, individuals tend to judge the annoyance of an unwanted sound in terms of its relationship to noise from other sources (ambient noise). The blowing of a car horn at night, when ambient noise levels are approximately 45 dB(A), would generally be much more objectionable than the blowing of a car horn in the afternoon, when ambient noise levels might be 55 dB(A).

The third factor is related to the disruption of an individual's activities due to noise. In a 60 dB(A) environment, normal conversation would be possible while sleep might be difficult. Work activities requiring high levels of concentration may be interrupted by loud noises while activities requiring manual effort may not be interrupted to the same degree.

Over a period of time, individuals tend to accept the noises that intrude into their daily lives, particularly if the noises occur at predicted intervals and are expected. Attempts have been made to regulate many types of noises including airplane noise, factory noise, railroad noise, and highway traffic noise. In relation to highway traffic noise, methods of analysis and control have developed rapidly over the past few years.

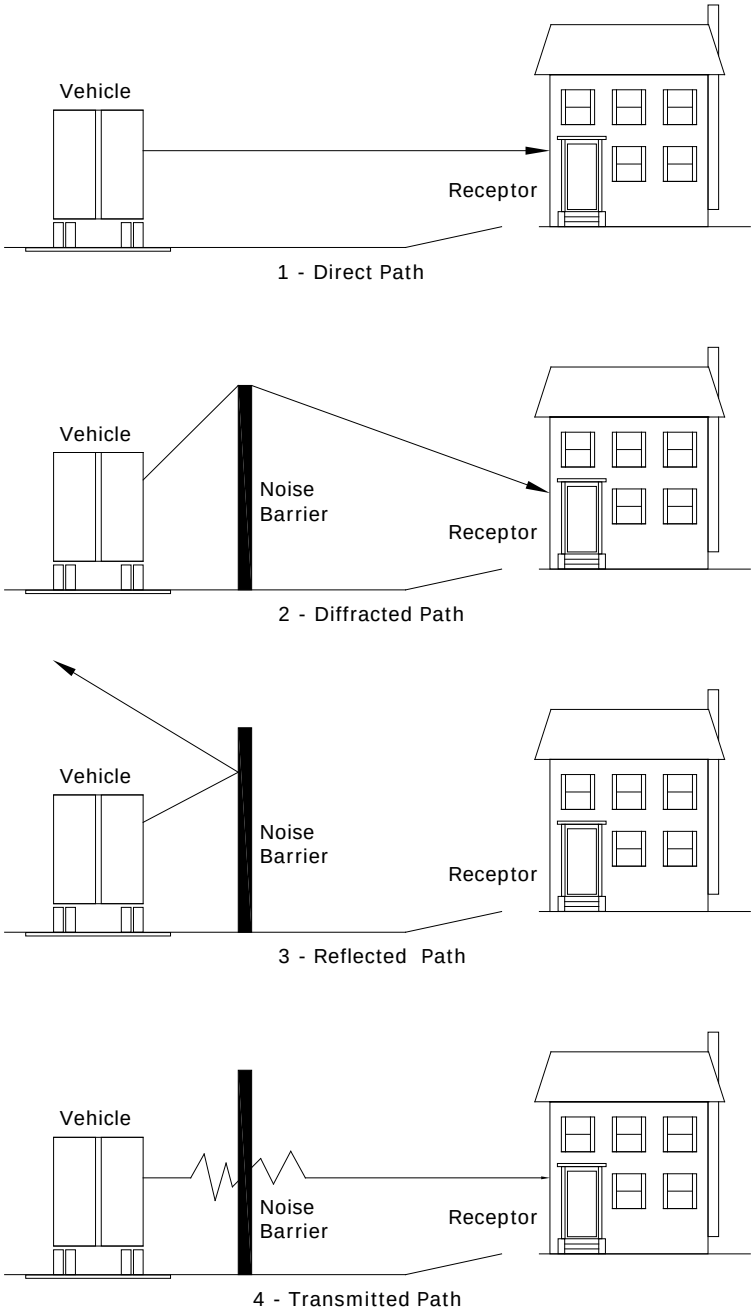
Noise levels in this analysis are based on an L_{eq} descriptor. The L_{eq} descriptor, or equivalent sound level, refers to the steady-state (constant sound) A-weighted sound level, which contains the same acoustic energy as the actual time-varying sound levels during the same time period. In other words, the fluctuating sound levels of the traffic noise over a period of time are represented in terms of a constant noise level with the same energy content. The time period used corresponds with the loudest hour.

Noise emanating from a roadway can follow four paths to reach nearby receptors (**Figure 3**):

1. Direct Path: The noise follows a straight path from the source to the receptor.
2. Diffracted Path: The noise follows a path from the source to the top of a barrier and then is bent down toward the receptor.
3. Reflected path: The noise is bounced off of a barrier and concerns only the receptor on the opposite side of the roadway from the barrier.
4. Transmitted Path: The noise is transmitted directly through the barrier.

Thus, a wall, building, earth berm, hill, or other type of solid structure or terrain feature, if large enough, can serve as a partial sound barrier, and can provide some reduction at receptors in the "shadow zone" created by the barrier. For maximum effect, the barrier must break the line of sight between the noise source and the receptor.

Figure 3 - Different Paths Followed by Noise

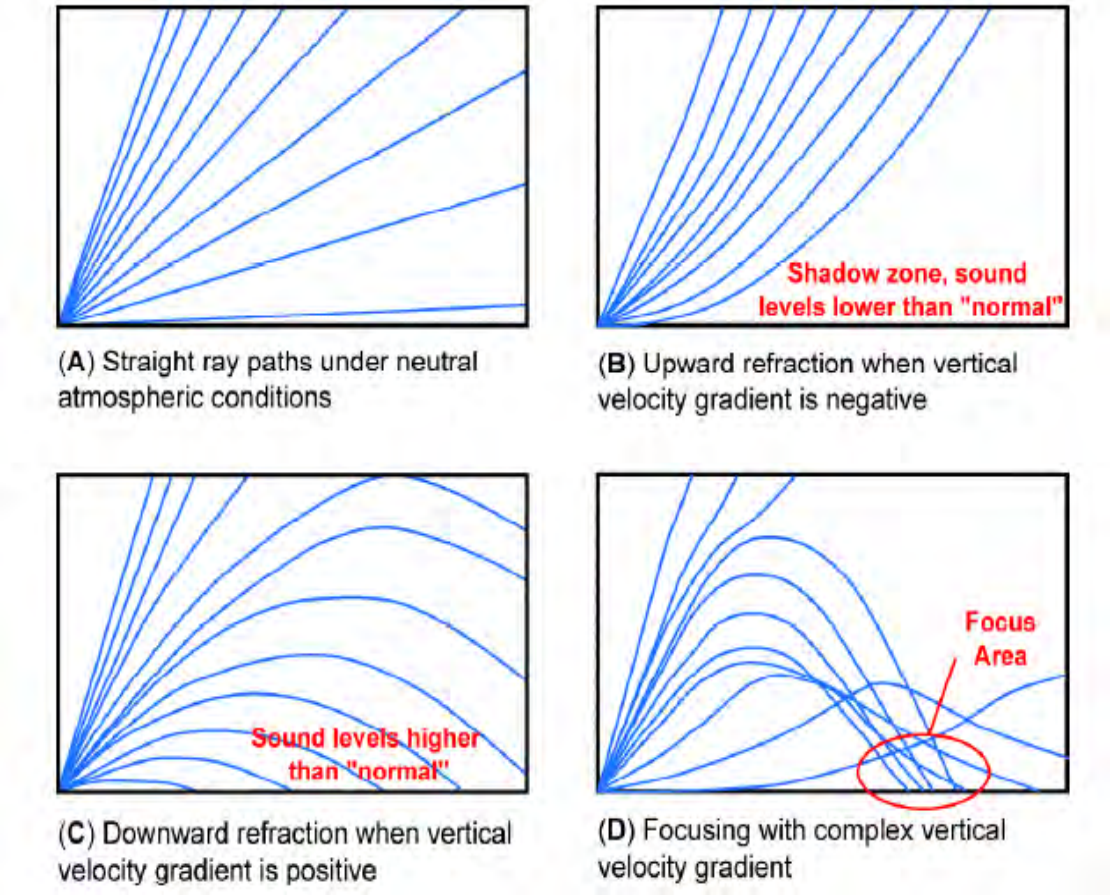


In some cases, refracted traffic noise transmission can be more annoying than direct transmission because of the occurrence are generally inconsistent and introduce exposure to sounds that are disparately different than customary. This refraction is typically caused by wind

and temperature gradients. Four patterns can be categorized by the sound propagation character as shown in **Figure 4.**

A. Uniform geometric spreading without any excess attenuation or amplification from refraction effects.
B. Upward refraction creating an acoustic shadow zone with lower than normal sound levels. Sound levels with this condition will often be about 5 dB lower than for condition (A).
C. Downward refraction creating an enhanced sound field and higher than normal sound levels. Sound levels with this condition can be 5 to 10 dB higher than for condition (A).
D. Sound focusing in localized regions. Depending on the amount of focusing, sound levels for this condition could be 15 to 20 dB higher than for condition (A) and more than 20 dB higher than for condition (B).

Figure 4 - Sound Ray Paths for Different Patterns for Sound Velocity Gradients



Source: Atmospheric Effects Associated with Highway Noise Propagation, October 2005 Arizona Department of Transportation

Causes of Traffic Noise

The level of highway traffic noise depends on three things:

1. the volume of the traffic,
2. the speed of the traffic, and

3. the number of trucks in the flow of traffic.

Figure 5 - Effect of Traffic Volume, Speed and Trucks on Noise

2000 vehicles per hour sounds twice as loud as

200 vehicles per hour

How Speed Affects Traffic Noise

Traffic at 65 miles per hour sounds twice as loud as

traffic at 30 miles per hour

How Trucks Affect Traffic Noise

One truck at 55 miles per hour sounds as loud as

12 cars at 55 miles per hour

Source: FHWA

Highway traffic noise is never constant. The noise level is always changing with the number, type, speed, and type of the vehicles which produce the noise as well as the driving habits of the vehicle operator. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater numbers of trucks. Vehicle noise is a combination of the noises produced by the engine, exhaust, and tires. The loudness of traffic noise can also be increased by defective mufflers or other faulty equipment on vehicles. Any condition (such as a steep

incline) that causes heavy laboring of motor vehicle engines will also increase traffic noise levels. In addition, there are other more complicated factors that affect the loudness of traffic noise. For example, as a person moves away from a highway, traffic noise levels are reduced by distance, terrain and vegetation, as well as natural and manmade obstacles. **Figure 5** shows the effect of traffic volume, speed and trucks on noise.

5.0 NOISE ABATEMENT CRITERIA

To determine if highway noise levels are compatible with various land uses, the Federal Highway Administration (FHWA) has developed noise abatement criteria and procedures to be used in the planning and design of highways. These abatement criteria and procedures are in accordance with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise. A summary of the TDOT Noise Abatement Criteria (NAC) for various land uses is presented in **Table 2**.

Table 2 - Noise Abatement Criteria Hourly A-Weighted Sound Level – decibels (dB(A))

Activity Category	Activity Leq(h)*	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[1]	67	Exterior	Residential
C[1]	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, recreational 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[1]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	NA	NA	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing.
G	NA	NA	Undeveloped lands that are not permitted for development.

[1] Includes undeveloped lands permitted for this activity category.
* Hourly A-weighted sound level in dB(A), reflecting a 1-dB(A) approach value below 23CFR772 values

Source: TDOT PHTNA

A receptor is defined as a discrete or representative location of a noise sensitive area(s), for any of the land uses listed in **Table 2**. Receptors are impacted if noise levels increase over the Noise Abatement Criteria as defined by TDOT. Impacted receptors would benefit from noise mitigation measures that lower noise levels at the location.

In addition to the NAC criteria, TDOT uses a substantial increase criterion to define noise increase using an existing level. Based on TDOT noise policy, a 10 dB(A) to 15 dB(A) increase of

future predicted noise levels above existing noise levels is considered a "substantial increase". **Table 3** presents the TDOT criteria used to define substantial noise increase.

Table 3 - TDOT Substantial Increase Criteria

Existing Noise Levels (L_{eq})	Substantial Increase
≤ 42 dB(A)	≥ 15 dB(A)
43 dB(A)	≥ 14 dB(A)
44 dB(A)	≥13 dB(A)
45 dB(A)	≥12 dB(A)
46 dB(A)	≥11 dB(A)
≥ 47 dB(A)	≥ 10 dB(A)

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area. For the areas where impacts are identified, methods of noise abatement are evaluated to determine the feasibility and reasonableness of their implementation. The evaluation is based on many factors, some of which include constructability, cost, height of wall, amount of land use, and whether changes in existing land use are expected.

6.0 EXISTING AND PROPOSED LAND USES WITHIN THE PROJECT LIMITS

In order to identify noise sensitive receptors within the study area, a review of aerial photography and field reconnaissance were conducted.

Land uses along the project consist of a combination of both businesses and residential development with the majority of commercial use presently located near the beginning of the project at the intersection of Greenway Drive and Washington Pike. The primary land use along the corridor towards the northern end is residential with few vacant/undeveloped lands in between. Three churches are located within the study area; Oak Grove Church, New Beverly Church, and Nehemiah Church. Based on field observations, frequent human use does exist at New Beverly Church and Nehemiah Church. These churches operate day care centers during weekdays and have Sunday school services.

Based on future land use information from the City, land use along Washington Pike is expected to remain primarily residential with few commercial/retail centers near I-640. Therefore, land uses within the study area can be categorized as B, C, E, and G for the Noise Abatement Criteria.

7.0 AMBIENT NOISE LEVELS

The initial step in a noise analysis involves measuring ambient noise levels at various locations throughout the project area. Noise from natural and mechanical sources and human activity typically constitute the ambient noise in an area. The purpose of the ambient noise level information is to quantify the existing acoustic environment and provide a baseline for assessing the impact of future noise levels on the receptors in the vicinity of the proposed action resulting from increased traffic and the new roadway alignment. Field measurements will also assist in evaluating the level of noise reduction that may be provided by existing elements such as fences and scattered vegetation that cannot be precisely modeled by the computer. This information

will be an important consideration in the determination of noise impacts and the evaluation of any associated noise abatement measures for the project. No interior noise level measurements were performed.

Noise receptor sites were identified at 10 locations within the project study area. The monitoring locations were selected so that validated TNM models could be created or in absence of existing traffic noise sources, existing ambient noise environment cold be effectively quantified.

Outdoor field measurements were taken using calibrated Type II SoundPro DL-2 sound level meter between June 29, 2012 and July 2nd, 2012. The noise meter was placed 5 feet above the ground level. Test periods were chosen to be 20 minutes at each location and the equivalent steady-state sound level (L_{eq}) was collected for each location. Vehicle counts with classification were obtained at Setup locations 6-10. Special observations were made of any unusual events affecting the noise level at each location as shown in **Table 4**.

Based on field data, a minimum existing ambient hourly equivalent noise level threshold of 48 dB(A) was established for residential receptors not in the vicinity of other identifiable noise sources traffic or otherwise.

Figure 6 shows field setup locations and the equivalent steady-state sound levels L_{eq}. Data collection was performed under calm, dry, and sunny conditions between June 29, 2012 and July 2nd, 2012. Field noise level outputs are included in **Appendix A.**

Table 4: Field Noise Levels

Site	Date	Time of Measurement	Land Use Category	Field Measured Noise Level (L_{eq})	Comments
1	6-29-2012	11:52 AM – 12:12 PM	B	49.8 dBA	Ambient
2	6-29-2012	12:31 PM – 12:51 PM	B	53.5 dBA	Ambient
3	6-29-2012	12:58 PM – 1:18 PM	B	53 dBA	Ambient
4	6-29-2012	1:28 PM – 1:48 PM	B	51.2 dBA	Ambient
5	6-29-2012	1:55 PM – 2:15 PM	B	47.5 dBA	Ambient
6	7-2-2012	7:06 AM – 7:26 AM	E	66.7 dBA	I-640 background noise
7	7-2-2012	7:35 AM – 7:55 AM	C	64.3 dBA	-
8	7-2-2012	8:00 AM– 8:20 AM	E	71.2 dBA	-
9	7-2-2012	8:30 AM – 8:50 AM	C	69.4 dBA	Measured near ROW line
10	7-2-2012	4:10 PM– 4:30 PM	B	68.1 dBA	-

WASHINGTON PIKE ROADWAY PROJECT
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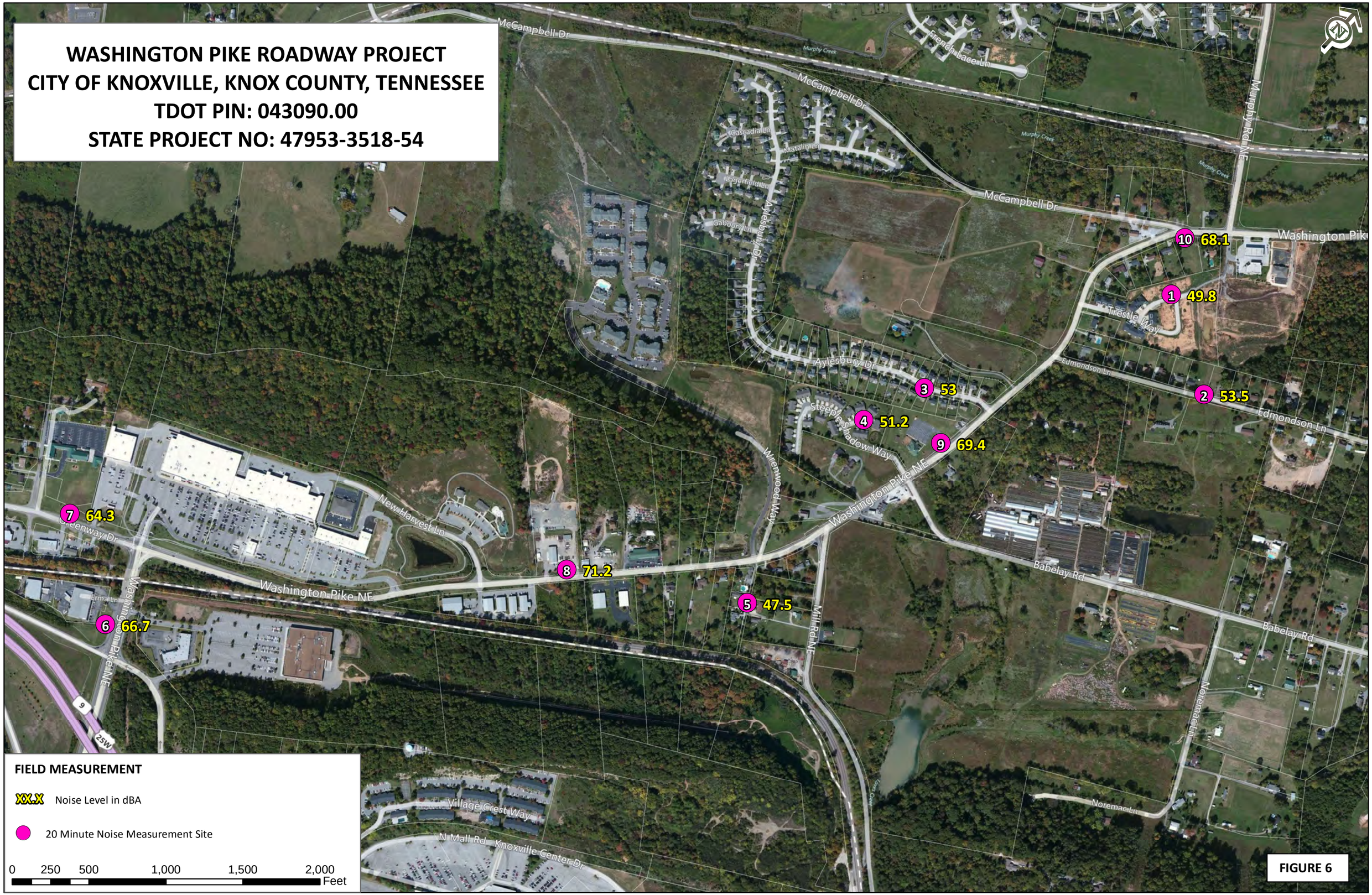


FIELD MEASUREMENT

XX.X Noise Level in dBA

20 Minute Noise Measurement Site

0 250 500 1,000 1,500 2,000 Feet

FIGURE 6

8.0 NOISE ANALYSIS PROCEDURE

8.1 Noise Modeling Software

FHWA's Traffic Noise Model version 2.5 (TNM 2.5) traffic noise prediction and analysis software is capable of predicting highway traffic noise. Released in April 2004, TNM 2.5 is the latest version currently available and is the required noise analysis software on all Federal-aid highway projects. TNM predicts noise levels at receptor location based on vehicle volume, speed, fleet mix, distance to receiver, and area terrain.

8.2 Scenarios Evaluated

The traffic noise scenarios evaluated in this analysis include the following:

- Existing loudest hour noise levels (2012),
- Design year (2033) No Build loudest hour noise levels, and
- Design year (2033) Build loudest hour noise levels

8.3 Noise Model Validation

In order to validate the computer noise model, Traffic Noise Model (TNM) noise level projections were made for Sites 6-10. The actual locations of roadways and receptors were input using the coordinate geometry system. Using the field-counted traffic data at each Site, the TNM predicted traffic noise levels were compared to the noise monitoring data obtained. **Table 5** lists each measurement site along with the field measured noise level and the corresponding computer generated (TNM) noise level.

Table 5: Field Measurement vs. TNM Prediction

Site	Field Measured Noise Level (L_{eq})	TNM Predicted Noise Level (L_{eq})	Validation Delta (Pred-Measured)
6	66.7	65.4 dB(A)	- 1.3 dB(A)
7	64.3	61.3 dB(A)	- 3.0 dB(A)
8	71.2	68.3 dB(A)	- 2.9 dB(A)
9	69.4	67.8 dB(A)	-1.6 dB(A)
10	68.1	68.9 dB(A)	+0.8 dB(A)
Hourly equivalent noise levels a L_{eqh} are expressed to the nearest one-tenth decibels to ensure that predicted noise levels validate within +/- 3 dB(A) of measured noise levels without the benefits of rounding.			

8.4 Predicted Noise Levels

Based on design data and traffic forecasts prepared by CDM Smith, the 2012 Average Daily Traffic volumes (ADT) is assumed to be 33,000 vehicles per day. A peak-hour factor (K) of 10 percent and 50%/50% directional split was used along the project corridor for all three scenarios (i.e., existing conditions, No Build, and Build) to calculate the hourly traffic volumes from the Annual Average Daily Traffic (AADT). Medium and heavy truck percentages range were assumed to be one (1) percent each. The design speed of 40 mph was used for the proposed facility.

AADT for the existing year and design year for Greenway Drive, Washington Pike, Mills Road, Murphy road, Babaley Road, and McCambell Drive are provided in Appendix B.

Noise levels were predicted for existing (2012) and design year (2033) loudest hour traffic volumes at hundred and fifty three (153) receptor locations that represented existing land uses. They are numbered in numeric order beginning with R1. The number and types of predicted traffic noise impacts in each scenario and impact type are shown in **Table 6.** The magnitude of the predicted noise levels and their increase over existing levels determines if a noise impact occurs and the type of impact such as receptors exceeding FHWA NAC criteria or substantial noise level criteria.

Table 6: Traffic Noise Impact Summary[1]

SCENARIO	APPROXIMATE # OF IMPACTED RECEPTORS APPROACHING OR EXCEEDING FHWA NAC							SUBSTANTIAL NOISE LEVEL INCREASE[2]	IMPACTS DUE TO BOTH CRITERIA[3]	TOTAL IMPACTS PER 23 CFR 772[4]
	A	B	C	D	E	F	G			
Existing	0	2	0	0	0	0	-	N/A	N/A	2
No-Build	0	19	0	0	0	0	-	0	0	19
Build	0	13	0	0	0	0	-	0	0	13

1. This table presents the summary of number traffic noise impacts for the Existing, No Build and the Build scenario.
2. Predicted TDOT "substantial increase" traffic noise level impact
3. Predicted traffic noise level impact due to exceeding NAC *and* "substantial increase" in build noise levels.
4. The total number of predicted impacts is not duplicated if receptors are predicted to be impacted by more than one criterion.

Predicted noise levels for the Build scenario were calculated and compared to the No-Build Alternative and to the existing conditions noise levels at 153 noise sensitive receptors with the study area. Based on the TNM predictions in the 2033 Build scenario, 13 NAC Category B receptors are expected to be impacted within the study area. A summary of the 2012 existing, 2033 No Build, and 2033 Build predicted noise levels are shown in **Figures 7-9**. TNM output is included in **Appendix C**.

Sound level changes in the 2033 Build year range between -2 and +8 dB with an average increase of 3 dBA at the modeled receptors within the study area. These receptors are not predicted to be impacted by a substantial increase in sound level in the design year. Between the 2033 No Build scenario and 2033 Build scenario, the horizontal shift in the alignment from sensitive land uses near Wrenwood Way, Aylesbury Dr, and Edmondson Lane resulted in a drop in the total number of impacted receptors.

8.5 Acceptable Noise Abatement Measures

The TDOT noise policy discusses various measures that can be considered as a means for reducing or eliminating traffic noise impacts. The following is a discussion of measures considered for the proposed project for the 13 impacted receptors in the 2033 Build scenario.

1. Traffic System Management Measures	2. Highway Alignment	3. Property acqusition for construction of Noise Barriers	4. Noise Insulation for Category D land uses
•Traffic management measures which limit vehicle type, speed, volume, and time of operations can be effective traffic noise abatament measures. •The design speed for this project is 40 mph with a posted speed limit of 35 mph. Any further reduction in the speed limit or other traffic management measures are not considered appropriate for noise abatement due to their effect on the capacity and level–of-service of the proposed project.	•Highway alignment selection involves positioning the horizontal or vertical orientation of the proposed improvements in such a way as to minimize impacts and costs. The selection of alternative alignments for noise abatement purposes must consider the balance between noise impacts and other engineering and environmental parameters. •Modifications were made to the presently proposed alignment for the reduction of traffic noise levels and traffic noise impacts near Aylesbury Dr, Steeple Shadow Way, and Trestle Way.	•The evaluation of the feasibility and reasonableness of noise wall construction is based on many factors. Feasibility is based on constructability, and reasonableness is based on cost, height, predicted noise level reduction, number of receptors benefited, residents' views, land use type, and whether land use changes are expected. •Noise barriers were assessed for the benefit of all 13 predicted traffic noise impacts on this project. •Construction of noise barriers is not feasible for this project.	•Noise insulation measures include installation of new windows, sealing window cracks, and installation of air-conditioning. Post installation maintenance and coperational cost are not eligible for federal funding. •Category D land uses are not impacted within the study area.

Washington Pike is not a limited access roadway. The 13 impacted receptors have driveways along the existing Washington Pike and are expected to remain the same with the proposed improvements. The openings for driveways would prevent the construction of a continuous and acoustically effective noise barrier and would negatively affect property access and possible maintenance requirements. Therefore, construction of noise barriers is not feasible for the 13 impacted receptors.

WASHINGTON PIKE ROADWAY PROJECT
CITY OF KNOXVILLE, KNOX COUNTY, TENNESSEE
TDOT PIN: 043090.00
STATE PROJECT NO: 47953-3518-54

2012 Existing Noise Levels

Impacted Receptor based on NAC Criteria

Non Impacted Receptor

0 250 500 1,000 1,500 2,000 Feet

FIGURE 7

WASHINGTON PIKE ROADWAY PROJECT
CITY OF KNOXVILLE, KNOX COUNTY, TENNESSEE
TDOT PIN: 043090.00
STATE PROJECT NO: 47953-3518-54

2033 No Build Noise Levels

- Impacted Receptor based on NAC Criteria
- Non Impacted Receptor

0 250 500 1,000 1,500 2,000 Feet

FIGURE 8

WASHINGTON PIKE ROADWAY PROJECT
CITY OF KNOXVILLE, KNOX COUNTY, TENNESSEE
TDOT PIN: 043090.00
STATE PROJECT NO: 47953-3518-54

2033 Build Noise Levels

- Impacted Receptor based on NAC Criteria
- Non Impacted Receptor
- Proposed Project
- Slopestake Line

0 250 500 1,000 1,500 2,000 Feet

FIGURE 9

9.0 COORDINATION WITH LOCAL OFFICIALS

Local communities and private developers are strongly encouraged to practice noise compatible land use planning to avoid future noise impacts.

TDOT and the FHWA believe that highway traffic noise should be reduced through a program of shared responsibility. Local governments should use their power to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway or that the developments are planned, designed and constructed in such a way that noise impacts are minimized.

Federal participation in noise abatement measures will not be considered for lands that are not permitted by the date of public knowledge of the project and TDOT will not analyze or provide noise abatement for these lands. After the date of public knowledge, provision of noise abatement becomes the responsibility of local communities or private developers.

Two guidance documents on noise compatible land use planning are available from FHWA and are included in the reference section.

Data from the model output were used to determine sound level contours (the distance from a roadway inside which noise impacts are expected to occur.) This information is useful both to determine existing structures which are expected to be impacted, and to help local officials prevent or minimize future development within the contour distance.

Noise Contours for land use NAC categories B, C, and E were generated using TNM for the 2035 Build scenario. Noise contours represent activity categories B, C, and E at 66 dB(A), and 71 dB(A) respectively from the edge of the outer travel lane in both direction of the proposed project. The noise contours represent approximate noise levels generated from the proposed Washington Pike improvement project. The distances do not take into consideration traffic noise sources from the entire road network in the project area or other sources. The contour distances also do not represent any shielding of traffic noise any terrain features or buildings between the receptor and the roadway. Any NAC Category B/C, and E receptor development located within these contours will be considered impacted due to traffic noise from the proposed project as shown in **Table 7**.

Table 7: Projected Noise Contour Distance*

Distance to NAC Category (ft)	
B, C 66dB(A)	**E 71dB(A)**
83	36

*Note-Contour distances are perpendicular from the edge of pavement on either side of the proposed alignment.

Table 7 presents future predicted equivalent sound levels at representative distances between 100 feet and 800 feet from the proposed Washington Pike roadway for the year 2033 design hour. These values may vary due to location and terrain.

Table 8: Noise Levels in Undeveloped Areas*

Distance (ft)	L_{eq} (dBA)
100	64.9
200	60.8
400	55.7
800	48.0

*Note- Distances are perpendicular from the edge of pavement on either side of the proposed alignment.

Local planning officials should use the information from this NTR for preliminary identification of noise sensitive receptors and to determine suitable future development and zoning.

TDOT currently has an active Type II Noise Barrier Program to facilitate the construction of "retrofit" noise barriers along existing highways. To be eligible for a Type II noise barrier, an area must meet the following criteria:

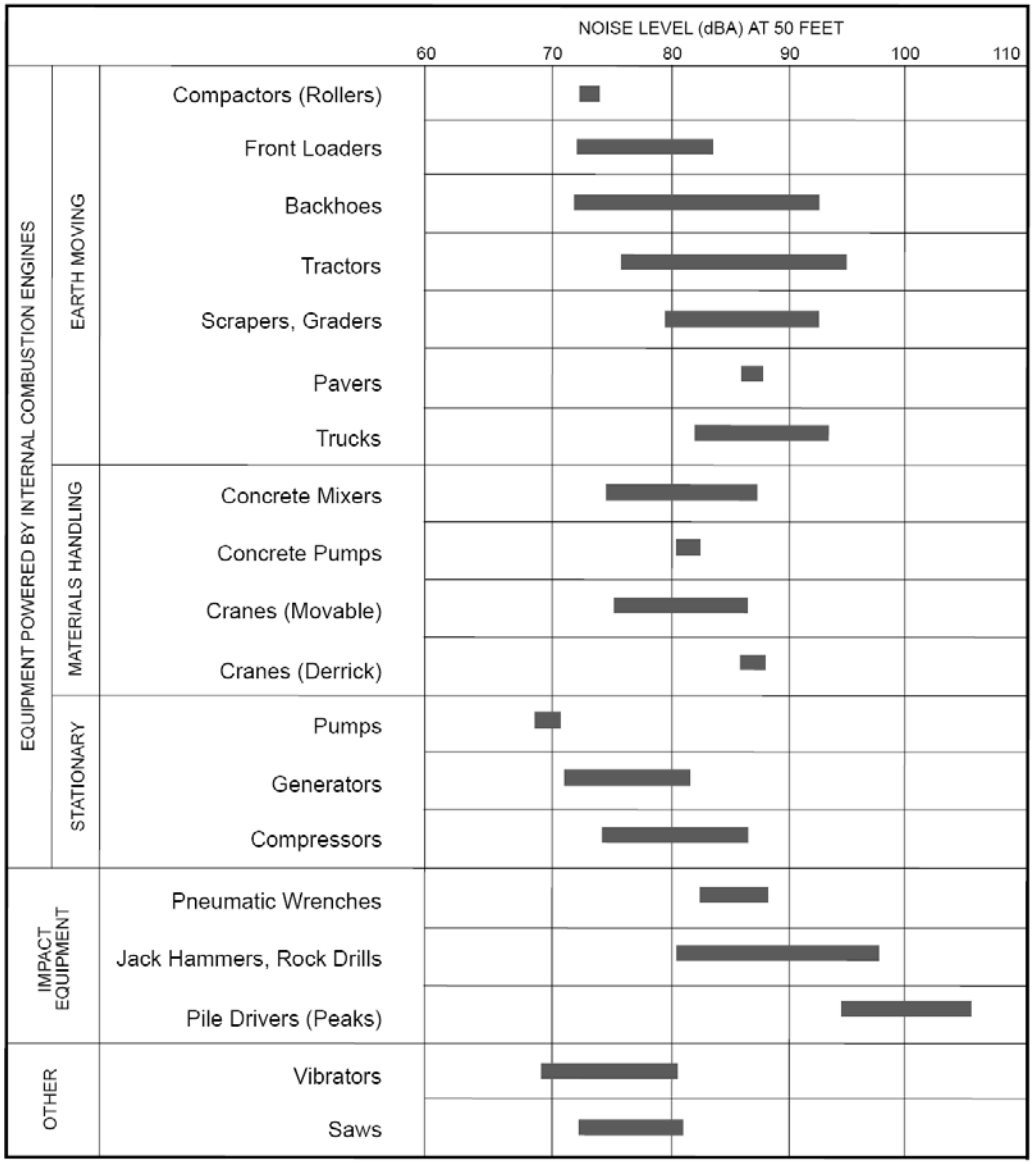
- The neighborhood must be located along a limited-access roadway;
- The neighborhood must be primarily residential;
- The majority (more than 50%) of residences in the neighborhood near the highway pre-dated the initial highway construction;
- A noise barrier for the neighborhood must not have been previously determined to be not reasonable or not feasible as part of a new highway construction or through-lane widening study (Type I project);
- Existing noise levels measured in the neighborhood must be above the Noise Abatement Criteria (NAC) of 66 dBA;
- A barrier must be feasible to construct and will provide substantial noise reduction; and
- A barrier must be reasonable (barrier cost per benefitted residence) in accordance with TDOT's noise policy. A residence is considered "benefitted" if the noise barrier will reduce the traffic noise by at least 5 dB.

10.0 CONSTRUCTION NOISE

The major construction activities for this project are expected to be earth removal, hauling grading, and paving. Temporary and localized construction noise impacts will likely occur as a result of these activities. Temporary speech interference for passersby and individuals living or working near the project can be expected. Noise levels in the project area will be increased during construction. The sound levels resulting from construction activities at nearby noise-sensitive receivers will be a function of the types of equipment utilized, the duration of the activities, and the distances between construction activities and nearby land uses. However, the noise increases will be temporary and will not constitute a noise impact as defined by the FHWA Noise Standards and TDOT's Noise Policy. Typical sound levels from construction equipment are shown in **Figure 10**.

Generally, low-cost and easily implemented construction noise control measures should be incorporated into the project plans and specifications to the extent possible. These measures include, but are not limited to, work-hour limits, equipment exhaust muffler requirements, haul-road locations, elimination of "tail gate banging", ambient-sensitive backup alarms, construction noise complaint mechanisms, and consistent and transparent community communication.

Figure 10: Typical Sound Levels for Construction Equipment



Note: Based on limited available data samples.

SOURCE: United States Environmental Protection Agency, 1971, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," NTID 300-1.

Construction noise impacts can be minimized by using TDOT's Standard Specifications for road and Bridge Construction as amended by the most recent applicable supplements. The contractor will be bound by Section 107.01 of the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic shall be routed during construction so as to cause the least practicable noise impact upon noise-sensitive areas.

11.0 SUMMARY

This NTR documents the evaluation of existing ambient noise levels at 10 noise monitoring receptor locations, and the assessment of predicted loudest-hour equivalent existing, No-Build, and Build condition traffic noise levels and traffic noise impacts at 153 noise sensitive receptor locations in the vicinity of the project. In accordance with TDOT Traffic Noise Abatement Policy, abatement measures were considered for the benefit of all 13 predicted Design Year 2033 build-condition traffic noise impacts.

Washington Pike is not a limited access roadway. Most of the impacted receptors have driveways along the existing Washington Pike and are expected to remain the same with the proposed improvements. The openings would prevent the construction of a continuous and acoustically effective noise barrier and would negatively affect property access and possible maintenance requirements. Therefore, construction of noise barriers is not feasible for this project.

A copy of this traffic noise analysis will be provided to local officials to ensure, to the maximum extent possible, future developments are planned, designed and programmed in a manner that will avoid traffic noise impacts.

Construction noise impacts – some of them potentially extreme – will occur due to the close proximity of numerous noise-sensitive receptors to project construction activities. It is the recommendation of this NTR that all reasonable efforts should be made to minimize exposure of noise-sensitive areas to construction noise impacts. The contractor shall follow TDOT's Standard Specifications for road and Bridge Construction.

12.0 REFERENCES

1. *"Procedures for Abatement of Highway Traffic Noise and Construction Noise"*, FHWA Regulation 23 CFR 772. Available URL - http://edocket.access.gpo.gov/2010/2010-15848.htm
2. Policy on Highway Traffic Noise Abatement, Tennessee Department of Transportation, July 13, 2011.
3. U.S. Environmental Protection Agency. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*. Washington, D.C. 1971.
4. Federal Highway Administration. February 2000. *FHWA Highway Noise Barrier Design Handbook*, Gregg G. Fleming, Harvey S. Knauer, Cynthia S.Y. Lee, and Soren Pedersen. Available URL - http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/index.cfm
5. Tennessee Environmental Procedures Manual, Spring 2011.
6. *The Audible Landscape: A Manual for Highway Noise and Land Use*, FHWA, November, 1974. http://www.fhwa.dot.gov/environment/audible/index.htm
7. *Entering the Quiet Zone: Noise Compatibility Land Use Planning*, FHWA, May, 2002. http://www.fhwa.dot.gov/environment/noise/quietzon

Appendix A

Field Data

Noise Monitor Data

Environmental Specialist Will Carroll DATE 6-29-12

Monitor Site # 1 (Pullman Way / Trestle Way) Grid # _____

travel lanes 2 Direction of Lanes East / West

Speed limit 35 mph Surface Conditions Weeds, clay soil, Dry

Grade 0-5% Wind Speed ≤ 5 mph Weather Conditions Sunny, Hot 93°

Surrounding Land uses Residential

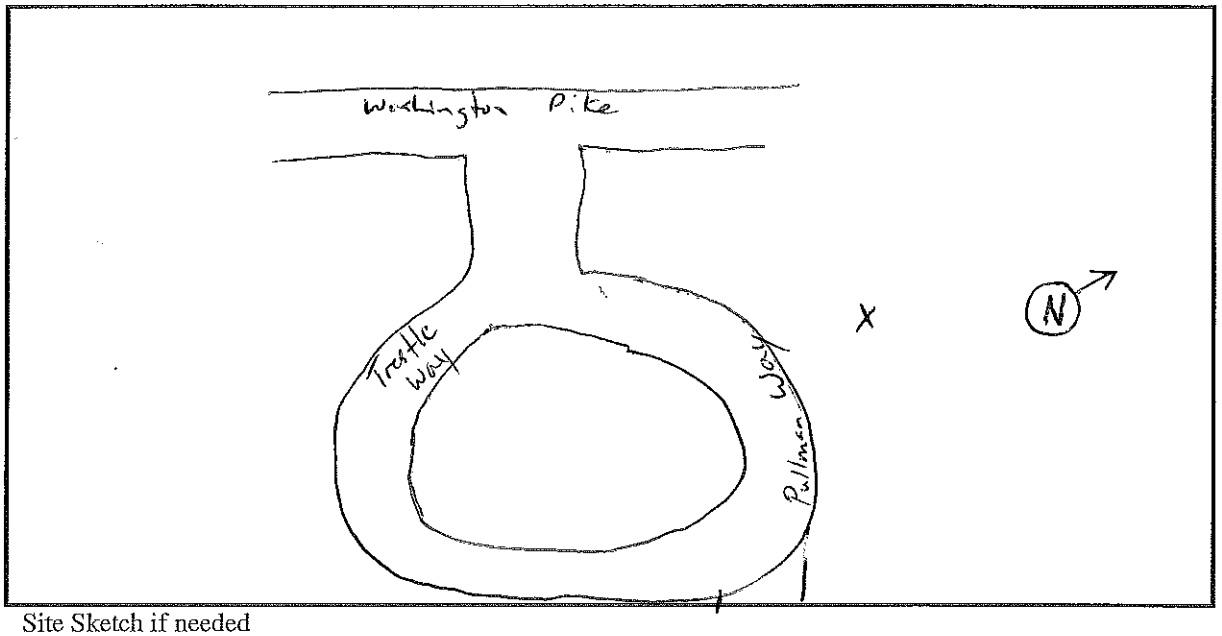
Time monitoring began 11:52 Time monitoring ended 12:12

Traffic # (15 min)	E Lane			W Lane		
Heavy Truck	____	# ____	VPH	____	# ____	VPH
Medium Truck	____	# ____	VPH	____	# ____	VPH
Cars	____	# ____	VPH	1	# 4	VPH
Total	____	# ____	VPH	1	# 4	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 49.8 dB Distance from Travel Lane 33 ft

Height above roadway 6 ft Height above Ground 4 ft



Site Sketch if needed

Background Noise Birds, Traffic from Washington Pike

Major Noise Source " " " " "

Unusual Events _____

Comments _____

Noise Monitor Data

Environmental Specialist Will Carroll DATE 6-29-12

Monitor Site # 2 (Edmondson Ln.) Grid # _____

travel lanes 2 Direction of Lanes East / West

Speed limit 25 mph Surface Conditions Grass, Dry

Grade ~~5~~ % Wind Speed 0-5 mph Weather Conditions Sunny, hot, 95°

Surrounding Land uses Residential

Time monitoring began 12:31 Time monitoring ended 12:51

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck	____	# ____	VPH	____	# ____	VPH
Medium Truck	1	# 4	VPH	____	# ____	VPH
Cars	5	# 20	VPH	2	# 8	VPH
Total	6	# 24	VPH	2	# 8	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 53.5 dB Distance from Travel Lane 25 ft

Height above roadway 4 ft Height above Ground 4 ft

Site Sketch if needed

Background Noise Birds, traffic from Wash. Pike, airplane

Major Noise Source Traffic

Unusual Events _____

Comments _____

Noise Monitor Data

Environmental Specialist W. C. DATE 6-29-12

Monitor Site # 3 (Aylesbury Dr.) Grid #

travel lanes 2 Direction of Lanes E / W

Speed limit 25 mph Surface Conditions Grass, Dry

Grade ~5% Wind Speed 0-5 mph Weather Conditions Sunny 94

Surrounding Land uses Residential

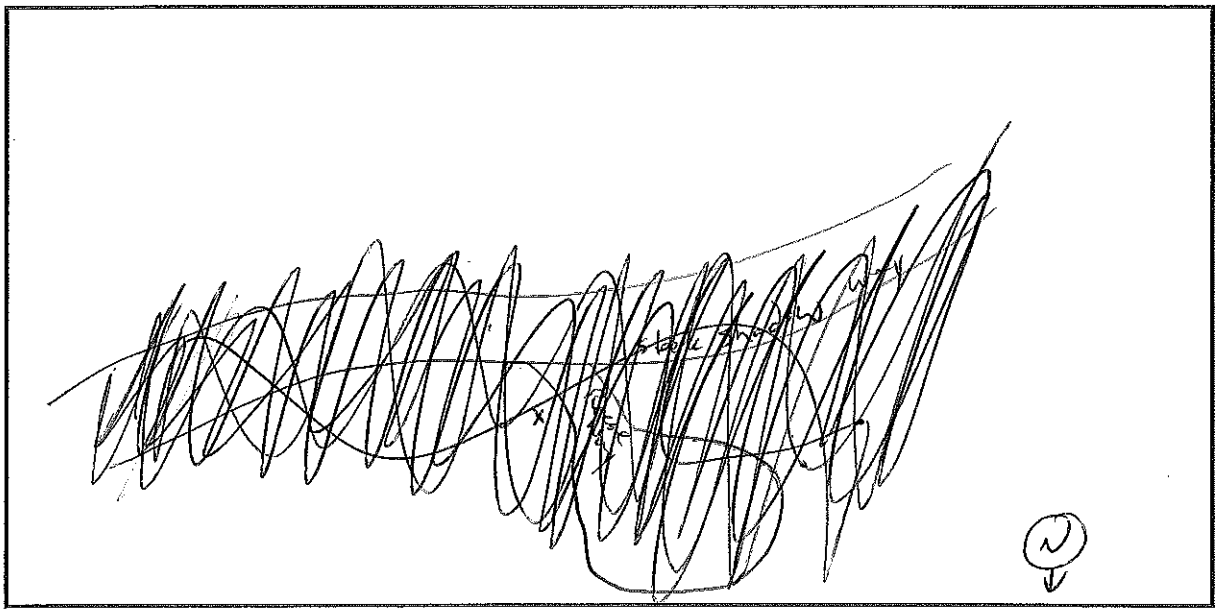
Time monitoring began 12:58 Time monitoring ended 1:18 p.m.

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck		#	VPH		#	VPH
Medium Truck	1	# 4	VPH	1	# 4	VPH
Cars	11	# 44	VPH	9	# 36	VPH
Total	12	# 48	VPH	10	# 40	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 53 dB Distance from Travel Lane 8 ft

Height above roadway 6 ft Height above Ground 4 ft



Site Sketch if needed

Background Noise Traffic from Wash. Pike

Major Noise Source " " " "

Unusual Events

Comments

Noise Monitor Data

Environmental Specialist W.C. DATE 6-29-12

Monitor Site # 4 (Steeple Shadow/Reese Way) Grid #

travel lanes 2 Direction of Lanes ~~N/S~~ E/W on steeple shadow Way

Speed limit 25 mph Surface Conditions Grass

Grade level Wind Speed 0-5 mph Weather Conditions Sunny 99°

Surrounding Land uses Residential

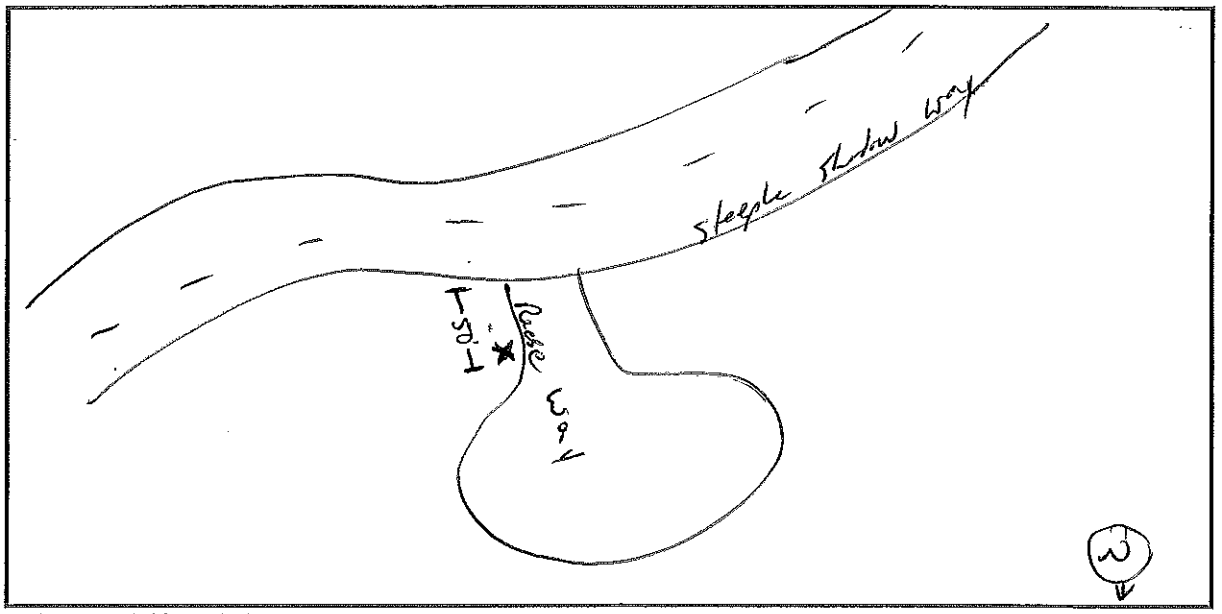
Time monitoring began 1:28 Time monitoring ended 1:48

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck		#	VPH		#	VPH
Medium Truck		#	VPH		#	VPH
Cars	1 ~~8~~	# 4	VPH	4	# 16	VPH
Total	1	# 4	VPH	4	# 16	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 51.2 dB Distance from Travel Lane 50 ft

Height above roadway 4 ft Height above Ground 4 ft



Site Sketch if needed

Background Noise Air Conditioner Return Units, traffic from Wash. Pike

Major Noise Source " " " "

Unusual Events Engine Rev, loud talking for 5 seconds, car door slams

Comments ~~Loud~~ Several Residential occurrances in tight space

Noise Monitor Data

Environmental Specialist WC DATE 6-29-12

Monitor Site # 5 (private drive) Grid #

travel lanes 1 Direction of Lanes N / E

Speed limit * mph Surface Conditions Grass

Grade 2% Wind Speed 3-5 mph Weather Conditions Sunny 100°

Surrounding Land uses Residential

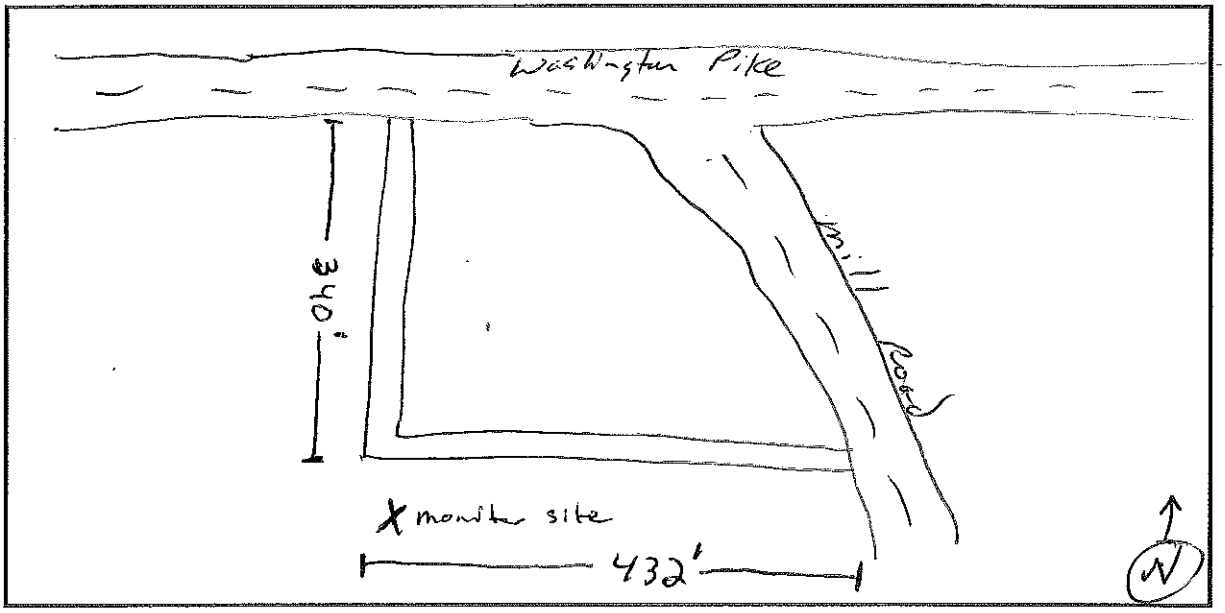
Time monitoring began 1:55 Time monitoring ended 2:15

Traffic # (15 min)	North Lane			East Lane		
Heavy Truck		#	VPH		#	VPH
Medium Truck		#	VPH		#	VPH
Cars		#	VPH		#	VPH
Total	0	#	VPH	0	#	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 47.5 dB Distance from Travel Lane 10 ft

Height above roadway 4 ft Height above Ground 4 ft



Site Sketch if needed

Background Noise Dogs Barking occasionally, traffic from Wash. Pike

Major Noise Source Traffic from Wash. Pike

Unusual Events

* Comments Drive is a one lane road, no speed limit posted

Noise Monitor Data

Environmental Specialist Will Carroll DATE 7-2-12

Monitor Site # 6 (Washington Pike NE) Grid # _____

travel lanes 4 w/ median w/ turn lane Direction of Lanes N / S

Speed limit 40 mph Surface Conditions A little wet

Grade 0-2 % Wind Speed 5 mph Weather Conditions Cloudy 65°

Surrounding Land uses Commercial, I-640

Time monitoring began 7:06 a.m Time monitoring ended 7:26 am

Traffic # (15 min)	North Lane			South Lane		
Heavy Truck	2	# 8	VPH	3	# 12	VPH
Medium Truck	4	# 16	VPH	2	# 8	VPH
Cars	72	# 288	VPH	321	# 1,284	VPH
Total	78	# 312	VPH	326	# 1,304	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 66.7 dB Distance from Travel Lane 24 ft

Height above roadway 4 ft Height above Ground 4 ft

Site Sketch if needed

Background Noise I-640 traffic.

Major Noise Source " " "

Unusual Events _____

Comments _____

Noise Monitor Data

Environmental Specialist Will Carroll DATE 7-2-

Monitor Site # 7 (Greenway Dr.) Grid #

travel lanes 2 Direction of Lanes East / West

Speed limit 40 mph Surface Conditions slightly wet

Grade 3% Wind Speed 0-5 mph Weather Conditions Sunny partly cloudy 65°

Surrounding Land uses church, businesses

Time monitoring began 7:35 am Time monitoring ended 7:55 am

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck		#	VPH	1	# 4	VPH
Medium Truck	1	# 4	VPH		#	VPH
Cars	83	# 332	VPH	42	# 168	VPH
Total	84	# 336	VPH	43	# 172	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 64.3 dB Distance from Travel Lane 30 ft

Height above roadway 7 ft Height above Ground 4 ft

Site Sketch if needed

Background Noise Interstate

Major Noise Source vehicles

Unusual Events

Comments

Noise Monitor Data

Environmental Specialist Will Carroll DATE 7-2-12

Monitor Site # 8 (Washington Pike) Grid #

travel lanes 2 Direction of Lanes East / West

Speed limit 40 mph Surface Conditions mostly Dry

Grade 2 % Wind Speed 0-5 mph Weather Conditions Partly Cloudy, 85°

Surrounding Land uses Commercial

Time monitoring began 8 am Time monitoring ended 8:20 a.m

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck		#	VPH		#	VPH
Medium Truck		#	VPH	2	# 8	VPH
Cars	70	# 280	VPH	220	# 880	VPH
Total	70	# 280	VPH	222	# 888	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 71.2 dB Distance from Travel Lane 25 ft

Height above roadway 8 ft Height above Ground 4 ft

Site Sketch if needed

Background Noise I-640 traffic

Major Noise Source " "

Unusual Events Mowers were started up @ adjacent landscapers

Comments

Noise Monitor Data

Environmental Specialist Will Carroll DATE 7-2-12

Monitor Site # 9 (Washington Pike) Grid #

travel lanes 2 Direction of Lanes East / West

Speed limit 40 mph Surface Conditions Dry

Grade 2% Wind Speed 0-5 mph Weather Conditions Partly Cloudy 73°

Surrounding Land uses Church, residential

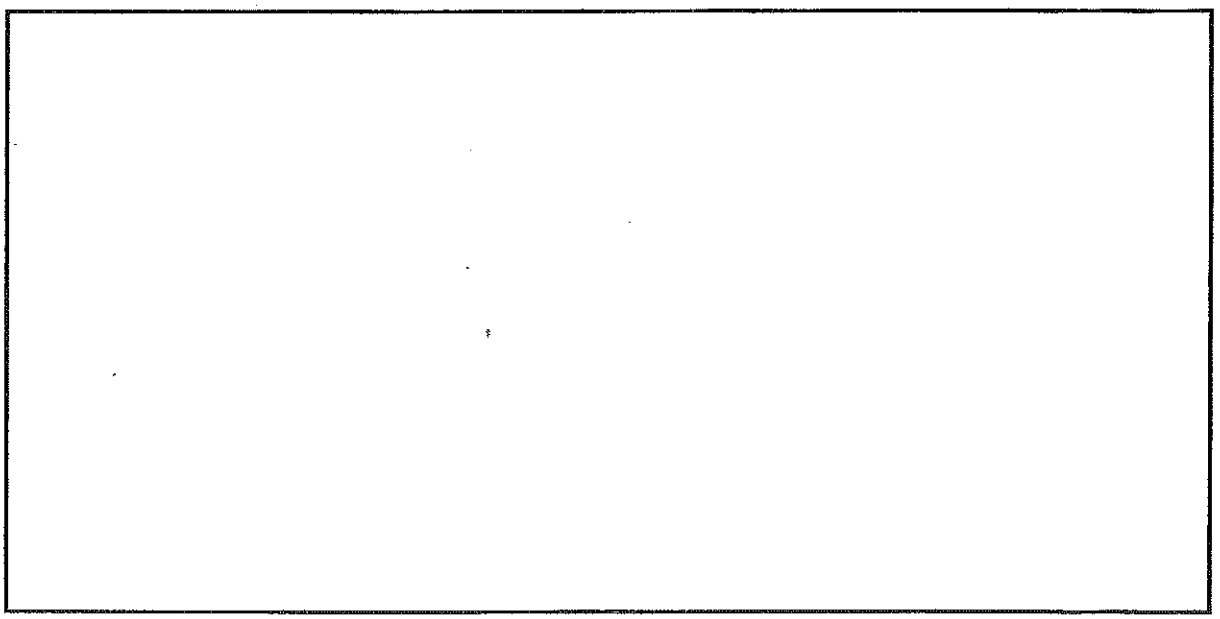
Time monitoring began 8:30 am Time monitoring ended 8:50 am

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck		#	VPH		#	VPH
Medium Truck	1	# 4	VPH	1	# 4	VPH
Cars	54	# 216	VPH	247	# 988	VPH
Total	55	# 220	VPH	248	# 992	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 69.4 dB Distance from Travel Lane 30 ft

Height above roadway ~20 ft Height above Ground 4 ft



Site Sketch if needed

Background Noise Birds

Major Noise Source Traffic

Unusual Events Helicopter flew over

Comments

Noise Monitor Data

Environmental Specialist Will Carroll DATE 7-2-12

Monitor Site # 10 (Washington Pike) Grid # _____

travel lanes 2 w/ turn lane Direction of Lanes East / West

Speed limit 40 mph Surface Conditions Dry,

Grade 2% Wind Speed 0-5 mph Weather Conditions Hot, Sunny 95°

Surrounding Land uses Residential, commercial

Time monitoring began 4:10 pm Time monitoring ended 4:30 pm

Traffic # (15 min)	East Lane			West Lane		
Heavy Truck	____	# ____	VPH	____	# ____	VPH
Medium Truck	3	# 12	VPH	3	# 12	VPH
Cars	163	# 652	VPH	284	# 1,136	VPH
Total	166	# 664	VPH	287	# 1,148	VPH

VPH (volume per hour) Multiply by 4 to get hourly volumes

Leq Noise Level L(avg) 68.1 dB Distance from Travel Lane 30 ft

Height above roadway 6 ft Height above Ground 4 ft

Site Sketch if needed

Background Noise _____

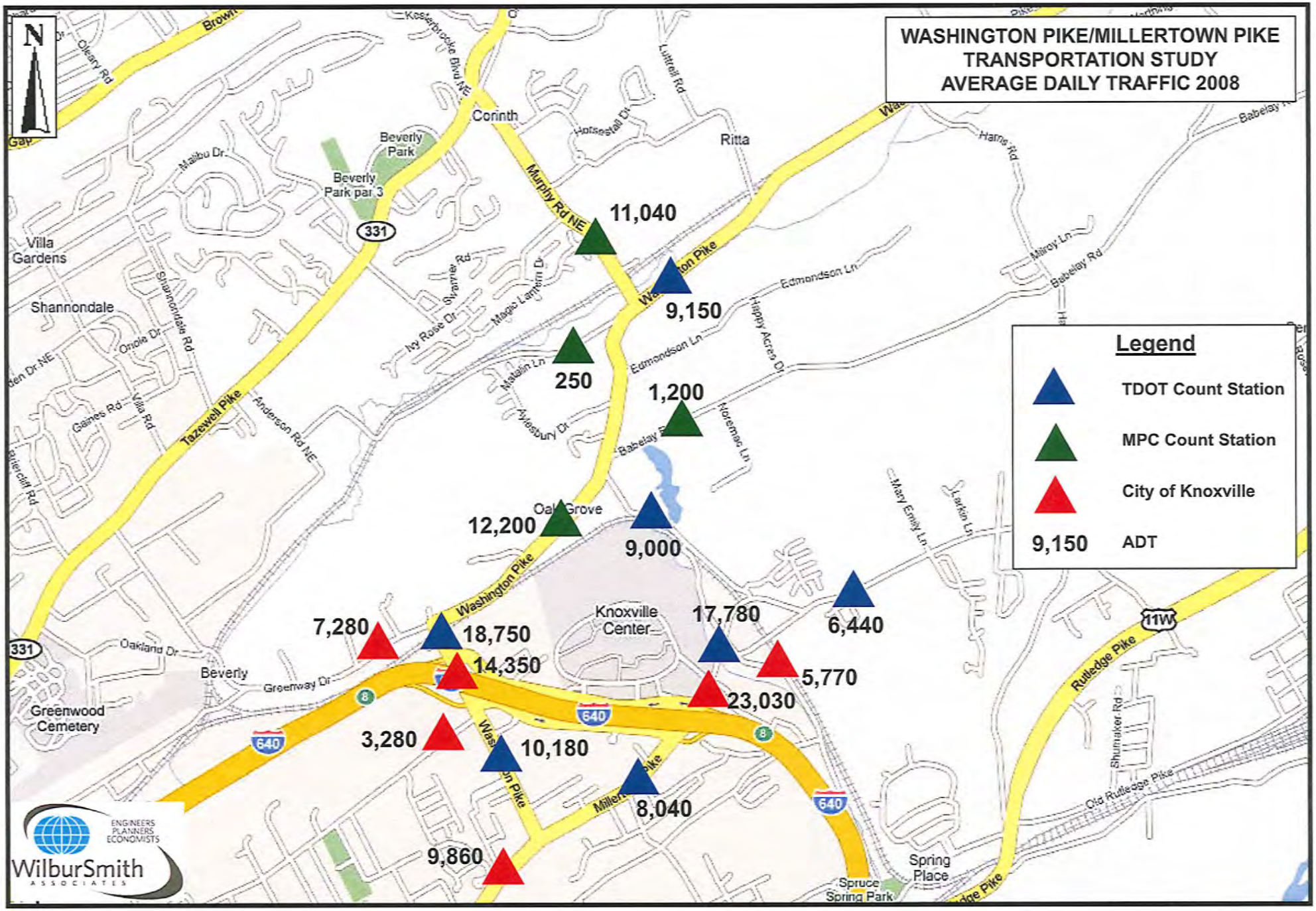
Major Noise Source Traffic

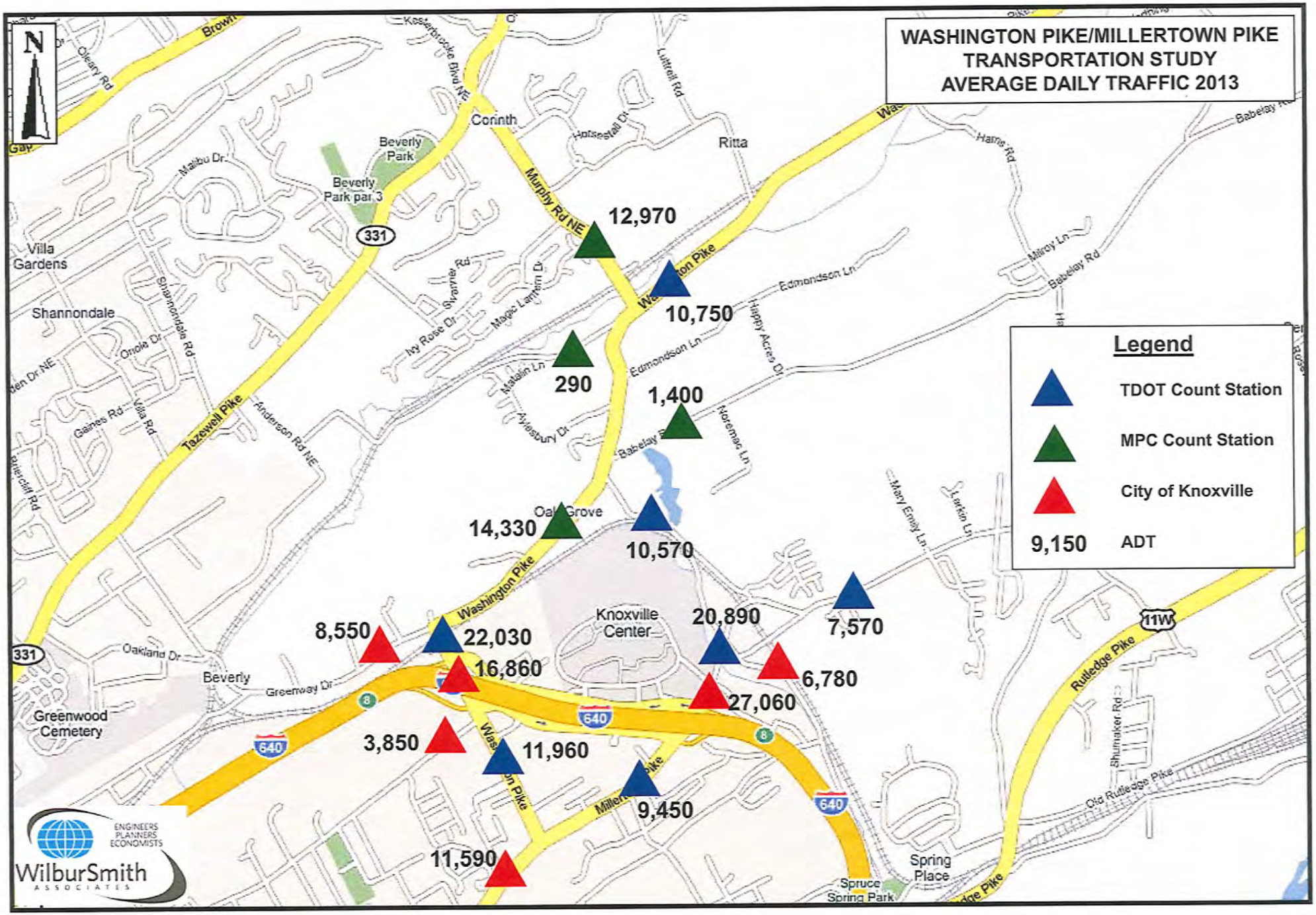
Unusual Events _____

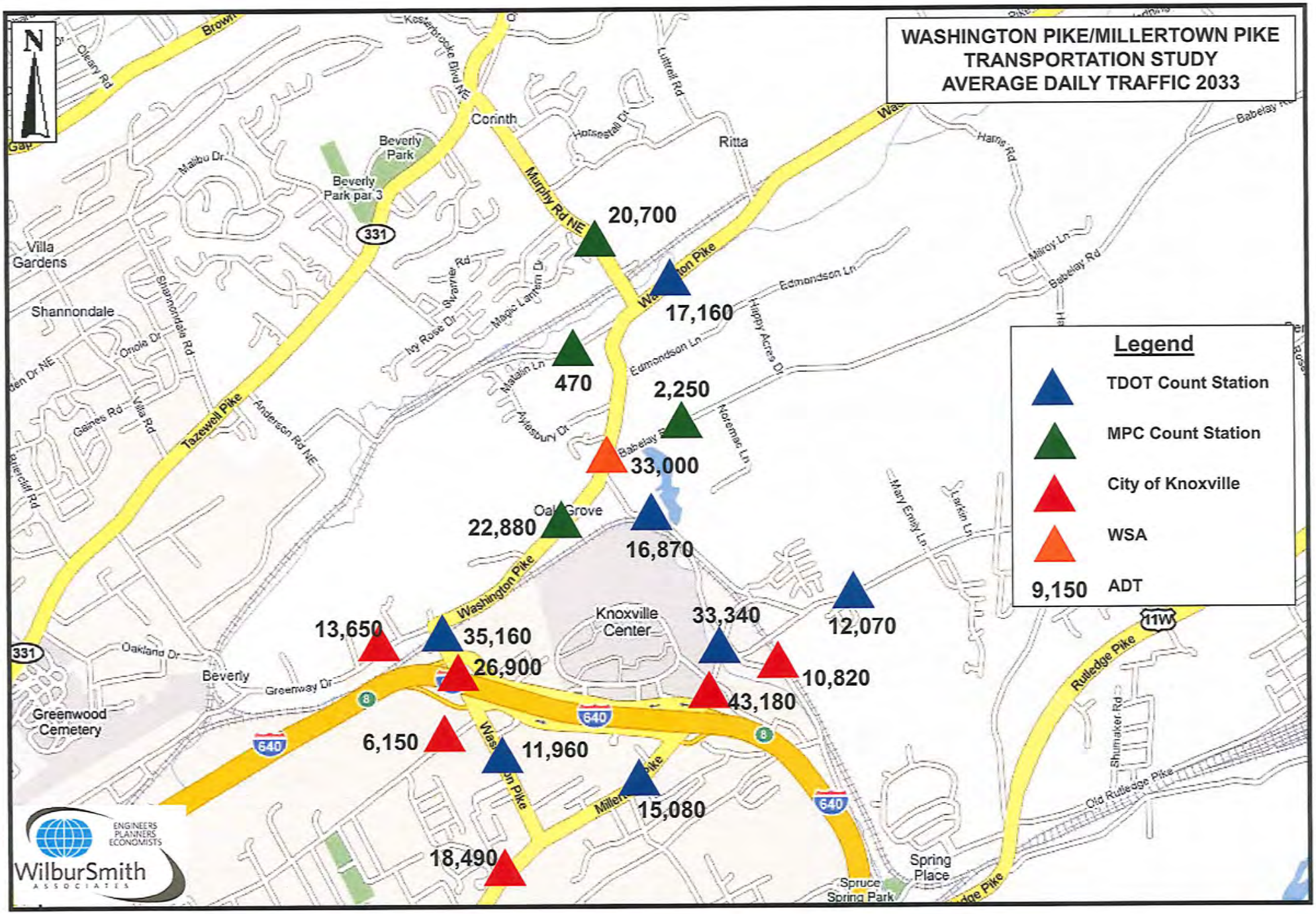
Comments _____

Appendix B

Project Traffic Data


WASHINGTON PIKE/MILLERTOWN PIKE
TRANSPORTATION STUDY
AVERAGE DAILY TRAFFIC 2008
Legend
TDOT Count Station
MPC Count Station
City of Knoxville
9,150 ADT
11,040
9,150
250
1,200
12,200
9,000
7,280
18,750
14,350
17,780
6,440
5,770
23,030
3,280
10,180
8,040
9,860
Murphy Rd NE
Washington Pike
Tazewell Pike
Anderson Rd NE
Corinth
Ritta
Beverly Park
Beverly Park par 3
Villa Gardens
Shannondale
Knoxville Center
Oak Grove
Beverly
Greenwood Cemetery
Spring Place
Spruce Spring Park
Rutledge Pike
Old Rutledge Pike
Edmondson Ln
Babelay Rd
Oakland Dr
Greenway Dr
Malibu Dr
Oriole Dr
Gaines Rd
Villa Rd
Shannondale Rd
Ivy Rose Dr
Swarner Rd
Maple Lanthrn Dr
Nesbitt Ln
Aylesbury Dr
Happy Acres Dr
Horsestall Dr
Luttrell Rd
Harris Rd
Milroy Ln
Mary Emily Ln
Larkin Ln
Shumaker Rd
Kesterbrooke Blvd NE
Brown
Oleary Rd
Baileycliff Rd
331
640
8
11W
WilburSmith
ENGINEERS
PLANNERS
ECONOMISTS
ASSOCIATES


WASHINGTON PIKE/MILLERTOWN PIKE
TRANSPORTATION STUDY
AVERAGE DAILY TRAFFIC 2013
Legend
TDOT Count Station
MPC Count Station
City of Knoxville
9,150 ADT
12,970
10,750
290
1,400
14,330
10,570
8,550
22,030
16,860
20,890
7,570
6,780
27,060
3,850
11,960
9,450
11,590
Corinth
Ritta
Beverly Park
Beverly Park par 3
Villa Gardens
Shannondale
Oak Grove
Knoxville Center
Beverly
Greenwood Cemetery
Spring Place
Spruce Spring Park
Murphy Rd NE
Washington Pike
Tazewell Pike
Anderson Rd NE
Rutledge Pike
Old Rutledge Pike
Edmondson Ln
Babelay Rd
Oakland Dr
Greenway Dr
Maplin Ln
Aylesbury Dr
Happy Acres Dr
Mary Emily Ln
Larkin Ln
Shumaker Rd
Millertown Pike
331
640
11W
8
ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES


WASHINGTON PIKE/MILLERTOWN PIKE
TRANSPORTATION STUDY
AVERAGE DAILY TRAFFIC 2033
Legend
TDOT Count Station
MPC Count Station
City of Knoxville
WSA
9,150 ADT
20,700
17,160
470
2,250
33,000
22,880
16,870
13,650
35,160
26,900
33,340
12,070
10,820
43,180
6,150
11,960
15,080
18,490
N
Corinth
Ritta
Beverly Park
Beverly Park par 3
Villa Gardens
Shannondale
Knoxville Center
Beverly
Greenwood Cemetery
Spring Place
Spruce Spring Park
Washington Pike
Tazewell Pike
Murphy Rd NE
Edmondson Ln
Babelay Rd
Oakland Dr
Greenway Dr
Rutledge Pike
Old Rutledge Pike
Shumaker Rd
Harris Rd
Mary Emily Ln
Larkin Ln
331
640
11W
WilburSmith
ENGINEERS
PLANNERS
ECONOMISTS
ASSOCIATES

Appendix C

TNM Output

CDM Smith
RR
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Washington Pike PIN:110301.00
RUN: 2012 Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

31 October 2012
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	1	1	0.0	58.6	66	58.6	10	----	58.6	0.0	8	-8.0
R2	2	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
R3	3	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R4	4	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R5	5	1	0.0	49.3	66	49.3	10	----	49.3	0.0	8	-8.0
R6	6	1	0.0	60.0	66	60.0	10	----	60.0	0.0	8	-8.0
R7	7	1	0.0	49.2	66	49.2	10	----	49.2	0.0	8	-8.0
R8	8	1	0.0	54.0	66	54.0	10	----	54.0	0.0	8	-8.0
R9	9	1	0.0	50.0	66	50.0	10	----	50.0	0.0	8	-8.0
R10	10	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R11	11	1	0.0	45.4	66	45.4	10	----	45.4	0.0	8	-8.0
R12	12	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0
R13	13	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
R14	14	1	0.0	52.0	66	52.0	10	----	52.0	0.0	8	-8.0
R15	15	1	0.0	52.7	66	52.7	10	----	52.7	0.0	8	-8.0
R16	16	1	0.0	50.1	66	50.1	10	----	50.1	0.0	8	-8.0
R17	17	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
R18	18	1	0.0	50.0	66	50.0	10	----	50.0	0.0	8	-8.0
R19	19	1	0.0	51.6	66	51.6	10	----	51.6	0.0	8	-8.0
R20	20	1	0.0	66.0	66	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
R21	21	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R22	22	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
R23	23	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0
R24	24	1	0.0	57.4	66	57.4	10	----	57.4	0.0	8	-8.0

R25	25	1	0.0	61.3	66	61.3	10	----	61.3	0.0	8	-8.0
R26	26	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R27	27	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R28	28	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R29	29	1	0.0	46.9	66	46.9	10	----	46.9	0.0	8	-8.0
R30	30	1	0.0	46.1	66	46.1	10	----	46.1	0.0	8	-8.0
R31	31	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R32	32	1	0.0	45.2	66	45.2	10	----	45.2	0.0	8	-8.0
R33	33	1	0.0	45.0	66	45.0	10	----	45.0	0.0	8	-8.0
R34	34	1	0.0	46.2	66	46.2	10	----	46.2	0.0	8	-8.0
R35	35	1	0.0	44.4	66	44.4	10	----	44.4	0.0	8	-8.0
R36	36	1	0.0	46.5	66	46.5	10	----	46.5	0.0	8	-8.0
R37	37	1	0.0	44.0	66	44.0	10	----	44.0	0.0	8	-8.0
R38	38	1	0.0	42.4	66	42.4	10	----	42.4	0.0	8	-8.0
R39	39	1	0.0	42.6	66	42.6	10	----	42.6	0.0	8	-8.0
R40	40	1	0.0	46.4	66	46.4	10	----	46.4	0.0	8	-8.0
R41	41	1	0.0	49.0	66	49.0	10	----	49.0	0.0	8	-8.0
R42	42	1	0.0	42.8	66	42.8	10	----	42.8	0.0	8	-8.0
R43	43	1	0.0	47.0	66	47.0	10	----	47.0	0.0	8	-8.0
R44	44	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R45	45	1	0.0	42.8	66	42.8	10	----	42.8	0.0	8	-8.0
R46	46	1	0.0	41.9	66	41.9	10	----	41.9	0.0	8	-8.0
R47	47	1	0.0	43.0	66	43.0	10	----	43.0	0.0	8	-8.0
R48	48	1	0.0	43.5	66	43.5	10	----	43.5	0.0	8	-8.0
R49	49	1	0.0	42.5	66	42.5	10	----	42.5	0.0	8	-8.0
R50	50	1	0.0	43.7	66	43.7	10	----	43.7	0.0	8	-8.0
R51	51	1	0.0	51.0	66	51.0	10	----	51.0	0.0	8	-8.0
R52	52	1	0.0	43.9	66	43.9	10	----	43.9	0.0	8	-8.0
R53	53	1	0.0	44.2	66	44.2	10	----	44.2	0.0	8	-8.0
R54	54	1	0.0	43.5	66	43.5	10	----	43.5	0.0	8	-8.0
R55	55	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
R56	56	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
R57	57	1	0.0	44.0	66	44.0	10	----	44.0	0.0	8	-8.0
R58	58	1	0.0	44.0	66	44.0	10	----	44.0	0.0	8	-8.0
R59	59	1	0.0	51.6	66	51.6	10	----	51.6	0.0	8	-8.0
R60	60	1	0.0	44.6	66	44.6	10	----	44.6	0.0	8	-8.0
R61	61	1	0.0	44.0	66	44.0	10	----	44.0	0.0	8	-8.0
R62	62	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R63	63	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
R64	64	1	0.0	44.7	66	44.7	10	----	44.7	0.0	8	-8.0
R65	65	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0

R66	66	1	0.0	43.8	66	43.8	10	----	43.8	0.0	8	-8.0
R67	67	1	0.0	43.9	66	43.9	10	----	43.9	0.0	8	-8.0
R68	68	1	0.0	40.8	66	40.8	10	----	40.8	0.0	8	-8.0
R69	69	1	0.0	44.1	66	44.1	10	----	44.1	0.0	8	-8.0
R70	70	1	0.0	57.2	66	57.2	10	----	57.2	0.0	8	-8.0
R71	71	1	0.0	44.4	66	44.4	10	----	44.4	0.0	8	-8.0
R72	72	1	0.0	45.0	66	45.0	10	----	45.0	0.0	8	-8.0
R73	73	1	0.0	46.0	66	46.0	10	----	46.0	0.0	8	-8.0
R74	74	1	0.0	42.3	66	42.3	10	----	42.3	0.0	8	-8.0
R75	75	1	0.0	46.7	66	46.7	10	----	46.7	0.0	8	-8.0
R76	76	1	0.0	42.4	66	42.4	10	----	42.4	0.0	8	-8.0
R77	77	1	0.0	47.7	66	47.7	10	----	47.7	0.0	8	-8.0
R78	79	1	0.0	49.4	66	49.4	10	----	49.4	0.0	8	-8.0
R79	80	1	0.0	43.4	66	43.4	10	----	43.4	0.0	8	-8.0
R80	81	1	0.0	51.8	66	51.8	10	----	51.8	0.0	8	-8.0
R81	82	1	0.0	43.8	66	43.8	10	----	43.8	0.0	8	-8.0
R82	83	1	0.0	54.4	66	54.4	10	----	54.4	0.0	8	-8.0
R83	84	1	0.0	44.5	66	44.5	10	----	44.5	0.0	8	-8.0
R84	85	1	0.0	44.7	66	44.7	10	----	44.7	0.0	8	-8.0
R85	86	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R86	87	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R87	88	1	0.0	59.5	66	59.5	10	----	59.5	0.0	8	-8.0
R88	89	1	0.0	46.7	66	46.7	10	----	46.7	0.0	8	-8.0
R89	90	1	0.0	47.1	66	47.1	10	----	47.1	0.0	8	-8.0
R90	91	1	0.0	63.6	66	63.6	10	----	63.6	0.0	8	-8.0
R91	92	1	0.0	48.1	66	48.1	10	----	48.1	0.0	8	-8.0
R92	93	1	0.0	48.8	66	48.8	10	----	48.8	0.0	8	-8.0
R93	94	1	0.0	50.0	66	50.0	10	----	50.0	0.0	8	-8.0
R94	95	1	0.0	57.1	66	57.1	10	----	57.1	0.0	8	-8.0
R95	96	1	0.0	48.1	66	48.1	10	----	48.1	0.0	8	-8.0
R96	97	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
R97	98	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
R98	99	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
R99	100	1	0.0	48.5	66	48.5	10	----	48.5	0.0	8	-8.0
R100	101	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R101	102	1	0.0	63.4	66	63.4	10	----	63.4	0.0	8	-8.0
R102	103	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R103	104	1	0.0	50.2	66	50.2	10	----	50.2	0.0	8	-8.0
R104	105	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
R105	107	1	0.0	49.0	66	49.0	10	----	49.0	0.0	8	-8.0
R106	108	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0

R107	109	1	0.0	64.8	66	64.8	10	----	64.8	0.0	8	-8.0
R108	110	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
R109	112	1	0.0	46.0	66	46.0	10	----	46.0	0.0	8	-8.0
R110	113	1	0.0	54.7	66	54.7	10	----	54.7	0.0	8	-8.0
R111	114	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0
R112	115	1	0.0	51.8	66	51.8	10	----	51.8	0.0	8	-8.0
R113	116	1	0.0	49.9	66	49.9	10	----	49.9	0.0	8	-8.0
R114	117	1	0.0	57.6	66	57.6	10	----	57.6	0.0	8	-8.0
R115	118	1	0.0	48.3	66	48.3	10	----	48.3	0.0	8	-8.0
R116	119	1	0.0	55.8	66	55.8	10	----	55.8	0.0	8	-8.0
R117	120	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R118	121	1	0.0	54.4	66	54.4	10	----	54.4	0.0	8	-8.0
R119	122	1	0.0	49.4	66	49.4	10	----	49.4	0.0	8	-8.0
R120	123	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R121	124	1	0.0	45.0	66	45.0	10	----	45.0	0.0	8	-8.0
R122	125	1	0.0	54.8	66	54.8	10	----	54.8	0.0	8	-8.0
R123	126	1	0.0	50.3	66	50.3	10	----	50.3	0.0	8	-8.0
R124	127	1	0.0	55.4	66	55.4	10	----	55.4	0.0	8	-8.0
R125	128	1	0.0	44.6	66	44.6	10	----	44.6	0.0	8	-8.0
R126	129	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R127	130	1	0.0	43.9	66	43.9	10	----	43.9	0.0	8	-8.0
R128	131	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
R129	132	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
R130	133	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
R131	134	1	0.0	65.2	66	65.2	10	----	65.2	0.0	8	-8.0
R132	135	1	0.0	54.6	66	54.6	10	----	54.6	0.0	8	-8.0
R133	136	1	0.0	58.2	66	58.2	10	----	58.2	0.0	8	-8.0
R134	137	1	0.0	62.6	66	62.6	10	----	62.6	0.0	8	-8.0
R135	138	1	0.0	62.7	66	62.7	10	----	62.7	0.0	8	-8.0
R136	139	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
R137	140	1	0.0	57.5	66	57.5	10	----	57.5	0.0	8	-8.0
R138	141	1	0.0	45.6	66	45.6	10	----	45.6	0.0	8	-8.0
R139	142	1	0.0	64.1	66	64.1	10	----	64.1	0.0	8	-8.0
R140	143	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
R141	144	1	0.0	61.1	66	61.1	10	----	61.1	0.0	8	-8.0
R142	145	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R143	146	1	0.0	56.2	66	56.2	10	----	56.2	0.0	8	-8.0
R144	147	1	0.0	51.4	66	51.4	10	----	51.4	0.0	8	-8.0
R145	148	1	0.0	44.5	66	44.5	10	----	44.5	0.0	8	-8.0
R146	149	1	0.0	40.0	66	40.0	10	----	40.0	0.0	8	-8.0
R147	150	1	0.0	39.1	66	39.1	10	----	39.1	0.0	8	-8.0

R148	151	1	0.0	52.0	66	52.0	10	----	52.0	0.0	8	-8.0
R149	152	1	0.0	56.9	66	56.9	10	----	56.9	0.0	8	-8.0
R150	153	1	0.0	46.9	66	46.9	10	----	46.9	0.0	8	-8.0
R151	154	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
R152	155	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
R153	214	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	153	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

CDM Smith
RR
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Washington Pike PIN:110301.00
RUN: 2033 No Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

31 October 2012
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	1	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
R2	2	1	0.0	55.7	66	55.7	10	----	55.7	0.0	8	-8.0
R3	3	1	0.0	58.8	66	58.8	10	----	58.8	0.0	8	-8.0
R4	4	1	0.0	60.1	66	60.1	10	----	60.1	0.0	8	-8.0
R5	5	1	0.0	51.5	66	51.5	10	----	51.5	0.0	8	-8.0
R6	6	1	0.0	63.5	66	63.5	10	----	63.5	0.0	8	-8.0
R7	7	1	0.0	51.3	66	51.3	10	----	51.3	0.0	8	-8.0
R8	8	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R9	9	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
R10	10	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R11	11	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R12	12	1	0.0	66.4	66	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
R13	13	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0
R14	14	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R15	15	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
R16	16	1	0.0	53.5	66	53.5	10	----	53.5	0.0	8	-8.0
R17	17	1	0.0	56.5	66	56.5	10	----	56.5	0.0	8	-8.0
R18	18	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
R19	19	1	0.0	54.8	66	54.8	10	----	54.8	0.0	8	-8.0
R20	20	1	0.0	69.6	66	69.6	10	Snd Lvl	69.6	0.0	8	-8.0
R21	21	1	0.0	68.0	66	68.0	10	Snd Lvl	68.0	0.0	8	-8.0
R22	22	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
R23	23	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R24	24	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0

R25	25	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R26	26	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R27	27	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
R28	28	1	0.0	51.0	66	51.0	10	----	51.0	0.0	8	-8.0
R29	29	1	0.0	50.3	66	50.3	10	----	50.3	0.0	8	-8.0
R30	30	1	0.0	49.4	66	49.4	10	----	49.4	0.0	8	-8.0
R31	31	1	0.0	49.1	66	49.1	10	----	49.1	0.0	8	-8.0
R32	32	1	0.0	48.6	66	48.6	10	----	48.6	0.0	8	-8.0
R33	33	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
R34	34	1	0.0	49.6	66	49.6	10	----	49.6	0.0	8	-8.0
R35	35	1	0.0	47.8	66	47.8	10	----	47.8	0.0	8	-8.0
R36	36	1	0.0	49.8	66	49.8	10	----	49.8	0.0	8	-8.0
R37	37	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0
R38	38	1	0.0	45.9	66	45.9	10	----	45.9	0.0	8	-8.0
R39	39	1	0.0	46.0	66	46.0	10	----	46.0	0.0	8	-8.0
R40	40	1	0.0	49.7	66	49.7	10	----	49.7	0.0	8	-8.0
R41	41	1	0.0	52.1	66	52.1	10	----	52.1	0.0	8	-8.0
R42	42	1	0.0	46.2	66	46.2	10	----	46.2	0.0	8	-8.0
R43	43	1	0.0	50.2	66	50.2	10	----	50.2	0.0	8	-8.0
R44	44	1	0.0	50.8	66	50.8	10	----	50.8	0.0	8	-8.0
R45	45	1	0.0	46.2	66	46.2	10	----	46.2	0.0	8	-8.0
R46	46	1	0.0	45.3	66	45.3	10	----	45.3	0.0	8	-8.0
R47	47	1	0.0	46.4	66	46.4	10	----	46.4	0.0	8	-8.0
R48	48	1	0.0	46.9	66	46.9	10	----	46.9	0.0	8	-8.0
R49	49	1	0.0	45.9	66	45.9	10	----	45.9	0.0	8	-8.0
R50	50	1	0.0	47.0	66	47.0	10	----	47.0	0.0	8	-8.0
R51	51	1	0.0	54.3	66	54.3	10	----	54.3	0.0	8	-8.0
R52	52	1	0.0	47.3	66	47.3	10	----	47.3	0.0	8	-8.0
R53	53	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R54	54	1	0.0	46.9	66	46.9	10	----	46.9	0.0	8	-8.0
R55	55	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R56	56	1	0.0	55.7	66	55.7	10	----	55.7	0.0	8	-8.0
R57	57	1	0.0	47.3	66	47.3	10	----	47.3	0.0	8	-8.0
R58	58	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0
R59	59	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
R60	60	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R61	61	1	0.0	47.3	66	47.3	10	----	47.3	0.0	8	-8.0
R62	62	1	0.0	51.0	66	51.0	10	----	51.0	0.0	8	-8.0
R63	63	1	0.0	65.9	66	65.9	10	----	65.9	0.0	8	-8.0
R64	64	1	0.0	48.1	66	48.1	10	----	48.1	0.0	8	-8.0
R65	65	1	0.0	49.3	66	49.3	10	----	49.3	0.0	8	-8.0

R66	66	1	0.0	47.1	66	47.1	10	----	47.1	0.0	8	-8.0
R67	67	1	0.0	47.2	66	47.2	10	----	47.2	0.0	8	-8.0
R68	68	1	0.0	44.2	66	44.2	10	----	44.2	0.0	8	-8.0
R69	69	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0
R70	70	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
R71	71	1	0.0	47.7	66	47.7	10	----	47.7	0.0	8	-8.0
R72	72	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
R73	73	1	0.0	49.5	66	49.5	10	----	49.5	0.0	8	-8.0
R74	74	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R75	75	1	0.0	50.2	66	50.2	10	----	50.2	0.0	8	-8.0
R76	76	1	0.0	45.8	66	45.8	10	----	45.8	0.0	8	-8.0
R77	77	1	0.0	51.2	66	51.2	10	----	51.2	0.0	8	-8.0
R78	79	1	0.0	52.9	66	52.9	10	----	52.9	0.0	8	-8.0
R79	80	1	0.0	46.8	66	46.8	10	----	46.8	0.0	8	-8.0
R80	81	1	0.0	55.3	66	55.3	10	----	55.3	0.0	8	-8.0
R81	82	1	0.0	47.2	66	47.2	10	----	47.2	0.0	8	-8.0
R82	83	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R83	84	1	0.0	47.9	66	47.9	10	----	47.9	0.0	8	-8.0
R84	85	1	0.0	48.2	66	48.2	10	----	48.2	0.0	8	-8.0
R85	86	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0
R86	87	1	0.0	49.2	66	49.2	10	----	49.2	0.0	8	-8.0
R87	88	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
R88	89	1	0.0	50.2	66	50.2	10	----	50.2	0.0	8	-8.0
R89	90	1	0.0	50.7	66	50.7	10	----	50.7	0.0	8	-8.0
R90	91	1	0.0	67.2	66	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
R91	92	1	0.0	51.6	66	51.6	10	----	51.6	0.0	8	-8.0
R92	93	1	0.0	52.4	66	52.4	10	----	52.4	0.0	8	-8.0
R93	94	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
R94	95	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
R95	96	1	0.0	51.5	66	51.5	10	----	51.5	0.0	8	-8.0
R96	97	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0
R97	98	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R98	99	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
R99	100	1	0.0	51.9	66	51.9	10	----	51.9	0.0	8	-8.0
R100	101	1	0.0	55.9	66	55.9	10	----	55.9	0.0	8	-8.0
R101	102	1	0.0	66.9	66	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
R102	103	1	0.0	56.5	66	56.5	10	----	56.5	0.0	8	-8.0
R103	104	1	0.0	53.8	66	53.8	10	----	53.8	0.0	8	-8.0
R104	105	1	0.0	67.8	66	67.8	10	Snd Lvl	67.8	0.0	8	-8.0
R105	107	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R106	108	1	0.0	50.9	66	50.9	10	----	50.9	0.0	8	-8.0

R107	109	1	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0
R108	110	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R109	112	1	0.0	49.4	66	49.4	10	----	49.4	0.0	8	-8.0
R110	113	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0
R111	114	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R112	115	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R113	116	1	0.0	53.5	66	53.5	10	----	53.5	0.0	8	-8.0
R114	117	1	0.0	61.2	66	61.2	10	----	61.2	0.0	8	-8.0
R115	118	1	0.0	51.8	66	51.8	10	----	51.8	0.0	8	-8.0
R116	119	1	0.0	59.4	66	59.4	10	----	59.4	0.0	8	-8.0
R117	120	1	0.0	48.9	66	48.9	10	----	48.9	0.0	8	-8.0
R118	121	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R119	122	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
R120	123	1	0.0	68.4	66	68.4	10	Snd Lvl	68.4	0.0	8	-8.0
R121	124	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R122	125	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0
R123	126	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
R124	127	1	0.0	59.0	66	59.0	10	----	59.0	0.0	8	-8.0
R125	128	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R126	129	1	0.0	67.9	66	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
R127	130	1	0.0	46.8	66	46.8	10	----	46.8	0.0	8	-8.0
R128	131	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0
R129	132	1	0.0	68.1	66	68.1	10	Snd Lvl	68.1	0.0	8	-8.0
R130	133	1	0.0	69.4	66	69.4	10	Snd Lvl	69.4	0.0	8	-8.0
R131	134	1	0.0	68.8	66	68.8	10	Snd Lvl	68.8	0.0	8	-8.0
R132	135	1	0.0	57.8	66	57.8	10	----	57.8	0.0	8	-8.0
R133	136	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R134	137	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
R135	138	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
R136	139	1	0.0	66.3	66	66.3	10	Snd Lvl	66.3	0.0	8	-8.0
R137	140	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0
R138	141	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
R139	142	1	0.0	67.7	66	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
R140	143	1	0.0	67.8	66	67.8	10	Snd Lvl	67.8	0.0	8	-8.0
R141	144	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
R142	145	1	0.0	67.9	66	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
R143	146	1	0.0	59.8	66	59.8	10	----	59.8	0.0	8	-8.0
R144	147	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
R145	148	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R146	149	1	0.0	43.3	66	43.3	10	----	43.3	0.0	8	-8.0
R147	150	1	0.0	42.5	66	42.5	10	----	42.5	0.0	8	-8.0

R148	151	1	0.0	55.3	66	55.3	10	----	55.3	0.0	8	-8.0
R149	152	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0
R150	153	1	0.0	50.1	66	50.1	10	----	50.1	0.0	8	-8.0
R151	154	1	0.0	57.2	66	57.2	10	----	57.2	0.0	8	-8.0
R152	155	1	0.0	67.3	66	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
R153	214	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	153	0.0	0.0	0.0
All Impacted	18	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

CDM Smith
RR
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Washington Pike PIN: 110301.00
RUN: 2033 Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

31 October 2012
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	1	1	0.0	61.6	66	61.6	10	----	61.6	0.0	8	-8.0
R2	2	1	0.0	57.5	66	57.5	10	----	57.5	0.0	8	-8.0
R3	3	1	0.0	60.4	66	60.4	10	----	60.4	0.0	8	-8.0
R4	4	1	0.0	61.4	66	61.4	10	----	61.4	0.0	8	-8.0
R5	5	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
R6	6	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
R7	7	1	0.0	51.6	66	51.6	10	----	51.6	0.0	8	-8.0
R8	8	1	0.0	56.9	66	56.9	10	----	56.9	0.0	8	-8.0
R9	9	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
R10	10	1	0.0	56.0	66	56.0	10	----	56.0	0.0	8	-8.0
R11	11	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R12	12	1	0.0	66.0	66	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
R13	13	1	0.0	63.5	66	63.5	10	----	63.5	0.0	8	-8.0
R14	14	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
R15	15	1	0.0	59.8	66	59.8	10	----	59.8	0.0	8	-8.0
R16	16	1	0.0	55.6	66	55.6	10	----	55.6	0.0	8	-8.0
R17	17	1	0.0	58.8	66	58.8	10	----	58.8	0.0	8	-8.0
R18	18	1	0.0	54.8	66	54.8	10	----	54.8	0.0	8	-8.0
R19	19	1	0.0	56.4	66	56.4	10	----	56.4	0.0	8	-8.0
R20	20	1	0.0	68.9	66	68.9	10	Snd Lvl	68.9	0.0	8	-8.0
R21	21	1	0.0	69.9	66	69.9	10	Snd Lvl	69.9	0.0	8	-8.0
R22	22	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
R23	23	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
R24	24	1	0.0	60.1	66	60.1	10	----	60.1	0.0	8	-8.0

R25	25	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R26	26	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R27	27	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
R28	28	1	0.0	51.9	66	51.9	10	----	51.9	0.0	8	-8.0
R29	29	1	0.0	51.3	66	51.3	10	----	51.3	0.0	8	-8.0
R30	30	1	0.0	50.1	66	50.1	10	----	50.1	0.0	8	-8.0
R31	31	1	0.0	49.7	66	49.7	10	----	49.7	0.0	8	-8.0
R32	32	1	0.0	49.2	66	49.2	10	----	49.2	0.0	8	-8.0
R33	33	1	0.0	48.9	66	48.9	10	----	48.9	0.0	8	-8.0
R34	34	1	0.0	50.0	66	50.0	10	----	50.0	0.0	8	-8.0
R35	35	1	0.0	48.4	66	48.4	10	----	48.4	0.0	8	-8.0
R36	36	1	0.0	50.4	66	50.4	10	----	50.4	0.0	8	-8.0
R37	37	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R38	38	1	0.0	46.0	66	46.0	10	----	46.0	0.0	8	-8.0
R39	39	1	0.0	46.3	66	46.3	10	----	46.3	0.0	8	-8.0
R40	40	1	0.0	50.3	66	50.3	10	----	50.3	0.0	8	-8.0
R41	41	1	0.0	52.6	66	52.6	10	----	52.6	0.0	8	-8.0
R42	42	1	0.0	46.5	66	46.5	10	----	46.5	0.0	8	-8.0
R43	43	1	0.0	50.7	66	50.7	10	----	50.7	0.0	8	-8.0
R44	44	1	0.0	51.5	66	51.5	10	----	51.5	0.0	8	-8.0
R45	45	1	0.0	46.5	66	46.5	10	----	46.5	0.0	8	-8.0
R46	46	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R47	47	1	0.0	46.8	66	46.8	10	----	46.8	0.0	8	-8.0
R48	48	1	0.0	47.2	66	47.2	10	----	47.2	0.0	8	-8.0
R49	49	1	0.0	46.3	66	46.3	10	----	46.3	0.0	8	-8.0
R50	50	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0
R51	51	1	0.0	55.1	66	55.1	10	----	55.1	0.0	8	-8.0
R52	52	1	0.0	47.7	66	47.7	10	----	47.7	0.0	8	-8.0
R53	53	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R54	54	1	0.0	47.2	66	47.2	10	----	47.2	0.0	8	-8.0
R55	55	1	0.0	56.3	66	56.3	10	----	56.3	0.0	8	-8.0
R56	56	1	0.0	56.4	66	56.4	10	----	56.4	0.0	8	-8.0
R57	57	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R58	58	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R59	59	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R60	60	1	0.0	48.6	66	48.6	10	----	48.6	0.0	8	-8.0
R61	61	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R62	62	1	0.0	51.3	66	51.3	10	----	51.3	0.0	8	-8.0
R63	63	1	0.0	66.9	66	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
R64	64	1	0.0	49.2	66	49.2	10	----	49.2	0.0	8	-8.0
R65	65	1	0.0	49.5	66	49.5	10	----	49.5	0.0	8	-8.0

R66	66	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R67	67	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R68	68	1	0.0	44.3	66	44.3	10	----	44.3	0.0	8	-8.0
R69	69	1	0.0	47.5	66	47.5	10	----	47.5	0.0	8	-8.0
R70	70	1	0.0	59.4	66	59.4	10	----	59.4	0.0	8	-8.0
R71	71	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R72	72	1	0.0	48.5	66	48.5	10	----	48.5	0.0	8	-8.0
R73	73	1	0.0	49.5	66	49.5	10	----	49.5	0.0	8	-8.0
R74	74	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R75	75	1	0.0	50.3	66	50.3	10	----	50.3	0.0	8	-8.0
R76	76	1	0.0	45.7	66	45.7	10	----	45.7	0.0	8	-8.0
R77	77	1	0.0	52.0	66	52.0	10	----	52.0	0.0	8	-8.0
R78	79	1	0.0	53.7	66	53.7	10	----	53.7	0.0	8	-8.0
R79	80	1	0.0	46.7	66	46.7	10	----	46.7	0.0	8	-8.0
R80	81	1	0.0	55.8	66	55.8	10	----	55.8	0.0	8	-8.0
R81	82	1	0.0	47.2	66	47.2	10	----	47.2	0.0	8	-8.0
R82	83	1	0.0	57.8	66	57.8	10	----	57.8	0.0	8	-8.0
R83	84	1	0.0	47.9	66	47.9	10	----	47.9	0.0	8	-8.0
R84	85	1	0.0	48.3	66	48.3	10	----	48.3	0.0	8	-8.0
R85	86	1	0.0	59.6	66	59.6	10	----	59.6	0.0	8	-8.0
R86	87	1	0.0	49.6	66	49.6	10	----	49.6	0.0	8	-8.0
R87	88	1	0.0	61.5	66	61.5	10	----	61.5	0.0	8	-8.0
R88	89	1	0.0	50.7	66	50.7	10	----	50.7	0.0	8	-8.0
R89	90	1	0.0	51.3	66	51.3	10	----	51.3	0.0	8	-8.0
R90	91	1	0.0	65.0	66	65.0	10	----	65.0	0.0	8	-8.0
R91	92	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R92	93	1	0.0	53.2	66	53.2	10	----	53.2	0.0	8	-8.0
R93	94	1	0.0	54.1	66	54.1	10	----	54.1	0.0	8	-8.0
R94	95	1	0.0	60.1	66	60.1	10	----	60.1	0.0	8	-8.0
R95	96	1	0.0	52.0	66	52.0	10	----	52.0	0.0	8	-8.0
R96	97	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
R97	98	1	0.0	57.9	66	57.9	10	----	57.9	0.0	8	-8.0
R98	99	1	0.0	61.1	66	61.1	10	----	61.1	0.0	8	-8.0
R99	100	1	0.0	51.6	66	51.6	10	----	51.6	0.0	8	-8.0
R100	101	1	0.0	56.4	66	56.4	10	----	56.4	0.0	8	-8.0
R101	102	1	0.0	61.2	66	61.2	10	----	61.2	0.0	8	-8.0
R102	103	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
R103	104	1	0.0	53.0	66	53.0	10	----	53.0	0.0	8	-8.0
R104	105	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
R105	107	1	0.0	52.3	66	52.3	10	----	52.3	0.0	8	-8.0
R106	108	1	0.0	50.8	66	50.8	10	----	50.8	0.0	8	-8.0

R107	109	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R108	110	1	0.0	62.6	66	62.6	10	----	62.6	0.0	8	-8.0
R109	112	1	0.0	49.5	66	49.5	10	----	49.5	0.0	8	-8.0
R110	113	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R111	114	1	0.0	61.1	66	61.1	10	----	61.1	0.0	8	-8.0
R112	115	1	0.0	54.4	66	54.4	10	----	54.4	0.0	8	-8.0
R113	116	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R114	117	1	0.0	60.0	66	60.0	10	----	60.0	0.0	8	-8.0
R115	118	1	0.0	51.2	66	51.2	10	----	51.2	0.0	8	-8.0
R116	119	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0
R117	120	1	0.0	48.9	66	48.9	10	----	48.9	0.0	8	-8.0
R118	121	1	0.0	57.3	66	57.3	10	----	57.3	0.0	8	-8.0
R119	122	1	0.0	52.8	66	52.8	10	----	52.8	0.0	8	-8.0
R120	123	1	0.0	67.3	66	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
R121	124	1	0.0	47.9	66	47.9	10	----	47.9	0.0	8	-8.0
R122	125	1	0.0	57.3	66	57.3	10	----	57.3	0.0	8	-8.0
R123	126	1	0.0	53.7	66	53.7	10	----	53.7	0.0	8	-8.0
R124	127	1	0.0	57.7	66	57.7	10	----	57.7	0.0	8	-8.0
R125	128	1	0.0	47.4	66	47.4	10	----	47.4	0.0	8	-8.0
R126	129	1	0.0	67.5	66	67.5	10	Snd Lvl	67.5	0.0	8	-8.0
R127	130	1	0.0	46.7	66	46.7	10	----	46.7	0.0	8	-8.0
R128	131	1	0.0	58.3	66	58.3	10	----	58.3	0.0	8	-8.0
R129	132	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
R130	133	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
R131	134	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
R132	135	1	0.0	58.7	66	58.7	10	----	58.7	0.0	8	-8.0
R133	136	1	0.0	61.9	66	61.9	10	----	61.9	0.0	8	-8.0
R134	137	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
R135	138	1	0.0	63.0	66	63.0	10	----	63.0	0.0	8	-8.0
R136	139	1	0.0	67.9	66	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
R137	140	1	0.0	57.1	66	57.1	10	----	57.1	0.0	8	-8.0
R138	141	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0
R139	142	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
R140	143	1	0.0	67.6	66	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
R141	144	1	0.0	69.4	66	69.4	10	Snd Lvl	69.4	0.0	8	-8.0
R142	145	1	0.0	69.0	66	69.0	10	Snd Lvl	69.0	0.0	8	-8.0
R143	146	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0
R144	147	1	0.0	56.9	66	56.9	10	----	56.9	0.0	8	-8.0
R145	148	1	0.0	47.6	66	47.6	10	----	47.6	0.0	8	-8.0
R146	149	1	0.0	43.5	66	43.5	10	----	43.5	0.0	8	-8.0
R147	150	1	0.0	42.7	66	42.7	10	----	42.7	0.0	8	-8.0

R148	151	1	0.0	56.2	66	56.2	10	----	56.2	0.0	8	-8.0
R149	152	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0
R150	153	1	0.0	50.6	66	50.6	10	----	50.6	0.0	8	-8.0
R151	154	1	0.0	56.2	66	56.2	10	----	56.2	0.0	8	-8.0
R152	155	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
R153	214	1	0.0	57.8	66	57.8	10	----	57.8	0.0	8	-8.0
RC100	215	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
RC200	216	1	0.0	60.8	66	60.8	10	----	60.8	0.0	8	-8.0
RC400	217	1	0.0	55.7	66	55.7	10	----	55.7	0.0	8	-8.0
RC800	218	1	0.0	48.0	66	48.0	10	----	48.0	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	157	0.0	0.0	0.0
All Impacted	14	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0