YORK TOLL PLAZA

MAINE TURNPIKE AUTHORITY

NOISE ANALYSIS REPORT

September 27, 2016

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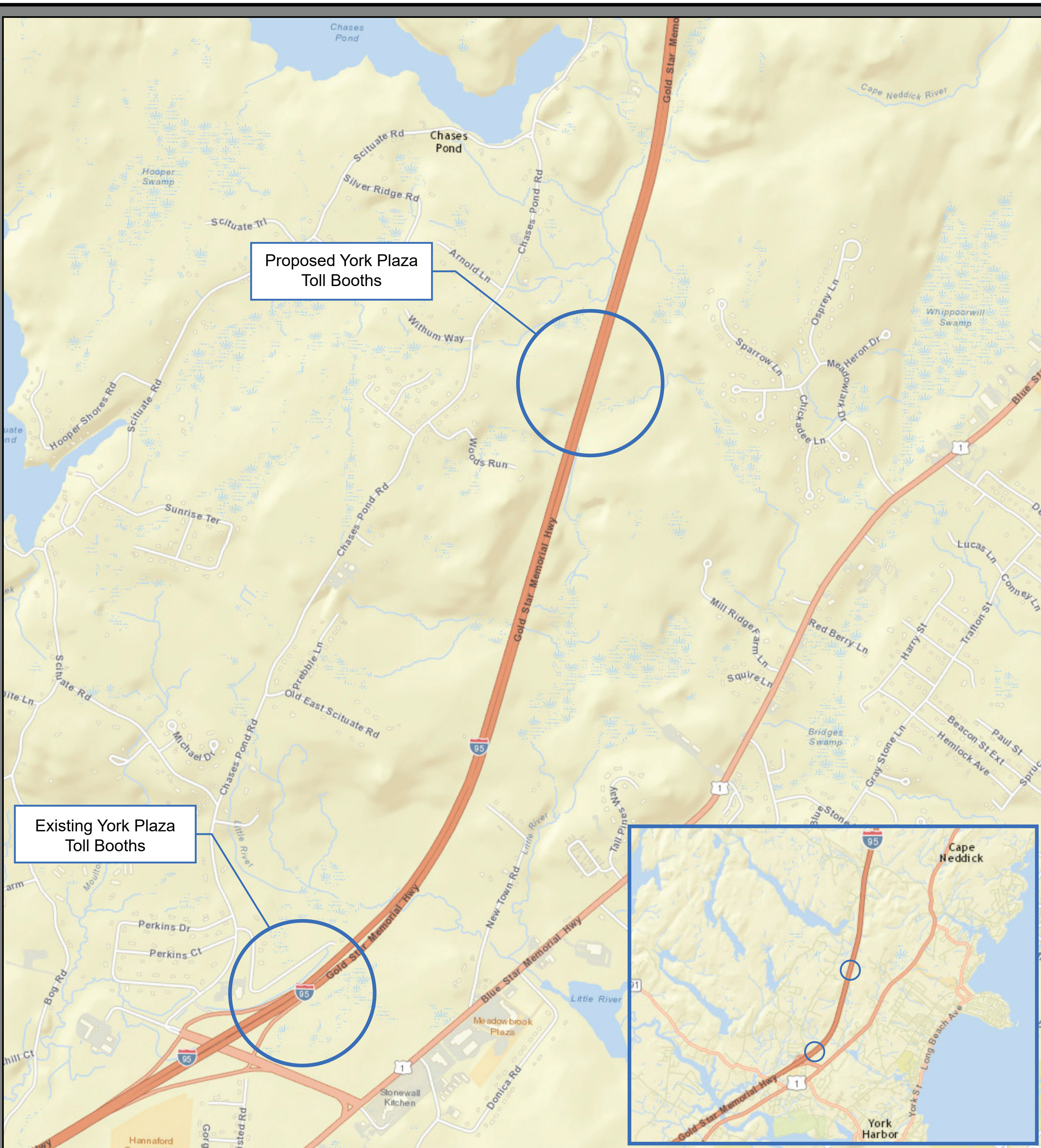
1.0 EXECUTIVE SUMMARY

Although not required for environmental permitting, the Maine Turnpike Authority (MTA) asked Jacobs Engineering Group (Jacobs) to conduct a noise analysis to assess and document potential noise impacts associated with the Interstate 95 (I-95) York Toll Plaza Replacement Project in York, Maine. Although no significant noise impacts were expected, there have been concerns expressed by local residents, so the MTA decided to conduct this noise analysis. The proposed project would construct a new high speed ORT toll plaza at Mile 8.8 in York and demolish the existing barrier toll plaza at Mile 7.3. The study area contains a mix of residential and institutional land uses. A Type I noise analysis has been performed as outlined within the MTA Highway Traffic Noise Policy. A project location map is shown in ***Figure 1***. A detailed display of the modeling sites and project area are shown in ***Figures 2A, 2B, and 2C***. The conclusion of this noise analysis confirms the fact that there will be no perceptible noise impacts due to the relocation of the toll plaza to Mile 8.8.

This report documents predicted Existing Year (2015), Opening Year (2020) Build, Design Year (2043) No Build, and Design Year (2043) Build noise levels associated with the I-95 York Toll Plaza Replacement Project. Aerial photographs of the project corridor were examined to identify any noise sensitive properties adjacent to the project corridor. Noise monitoring was performed at five short-term (20-minute) and two long-term, (24-hour) locations throughout the corridor. These sites were chosen because they were considered representative of the noise characteristics within the monitored area. Noise modeling was performed for 11 sites in order to determine how the proposed improvements will affect noise levels throughout the project corridor. The 11 modeled noise receptors represent ten residences, and one institutional facility (the York District Court). The noise analysis in this document is focused on the Common Noise Environments, referred to as CNEs. All noise sensitive sites within approximately 500 feet of the proposed edge of pavement were evaluated for this study. Additionally, due to questions raised by local residents, sound levels within the Whippoorwill Subdivision were evaluated, specifically along Meadowlark Drive and Sparrow Lane (located approximately 1000 feet east of the proposed toll plaza) along Chases Pond Road near the intersection with Arnold Lane (located approximately 1000 feet west of the proposed toll plaza).

Traffic noise modeling was completed for Existing Year (2015), Opening Year (2020) Build, Design Year (2043) No Build, and Design Year (2043) Build conditions. With the toll plaza at Mile 7.3 under Existing (2015) conditions, the modeling results showed that seven receptors are currently impacted by traffic noise. With the toll plaza in place at Mile 8.8, no additional noise impacts would occur as a result of this project, as all impacts to receptors in the Opening Year Build and Design Year Build are already present in the Existing Year (2015). The ORT toll plaza at Mile 8.8 would not perceptibly worsen any existing noise impacts as the increase in traffic noise would be a maximum of 1 dB(A) under the Opening Year Build, Design Year No Build and Design Year Build scenarios. These noise increases are not considered to be perceptible because they are below 3 dB(A) which is considered by FHWA and NEPA to be the threshold of audible change perceivable by the typical human ear.

No considerable, long-term construction-related noise impacts are anticipated. Any noise impacts that would occur as a result of roadway construction measures are anticipated to be temporary in nature and will cease upon completion of the project construction phase.



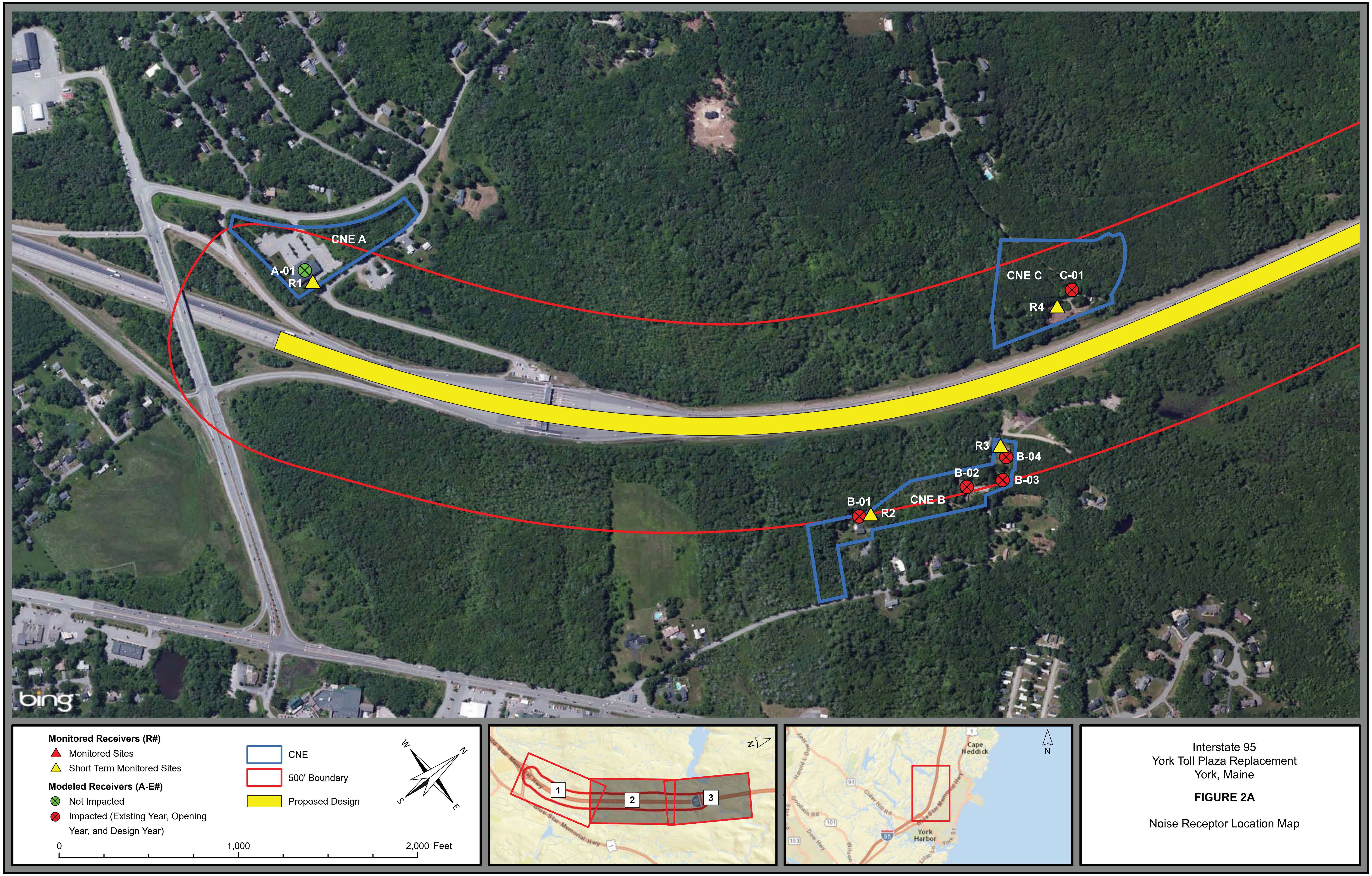
Interstate 95
York Toll Plaza Replacement

Noise Analysis

FIGURE 1
Regional Location Map

Toll Booths

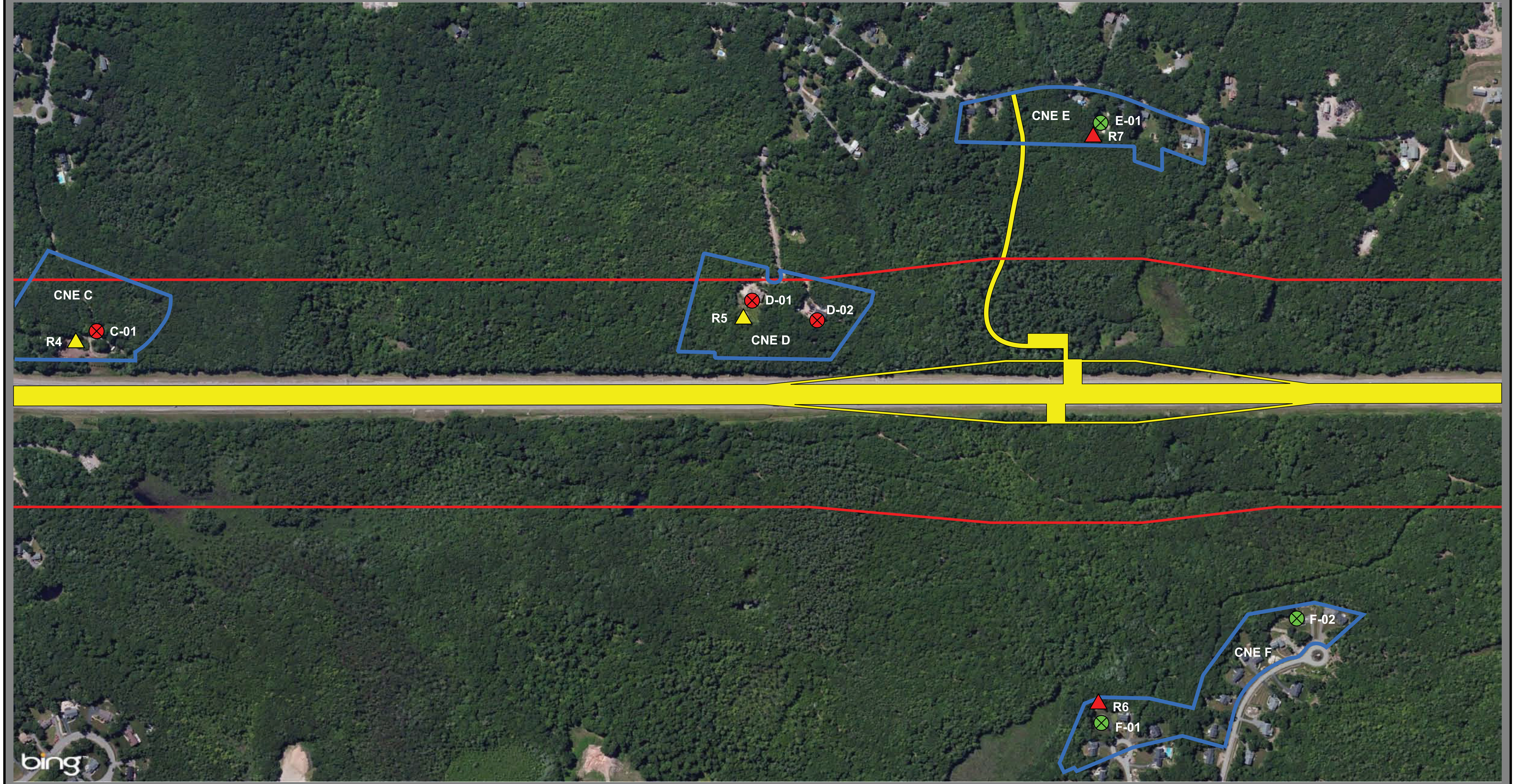
0 0.25 0.5
Miles



Interstate 95
York Toll Plaza Replacement
York, Maine

FIGURE 2A

Noise Receptor Location Map



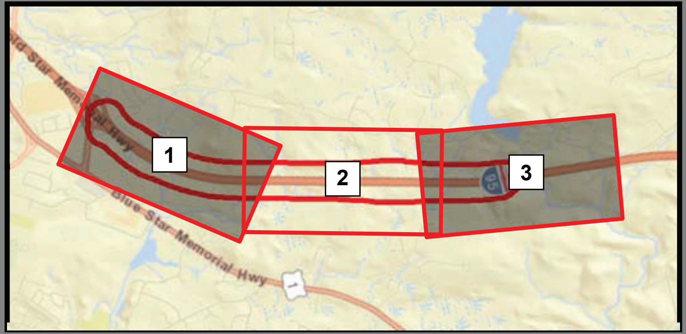
Monitored Receivers (R#)
- Monitored Sites
- Short Term Monitored Sites

Modeled Receivers (A-E#)
- Not Impacted
- Impacted (Existing Year, Opening Year, and Design Year)

- CNE
- 500' Boundary
- Proposed Design

W N S E

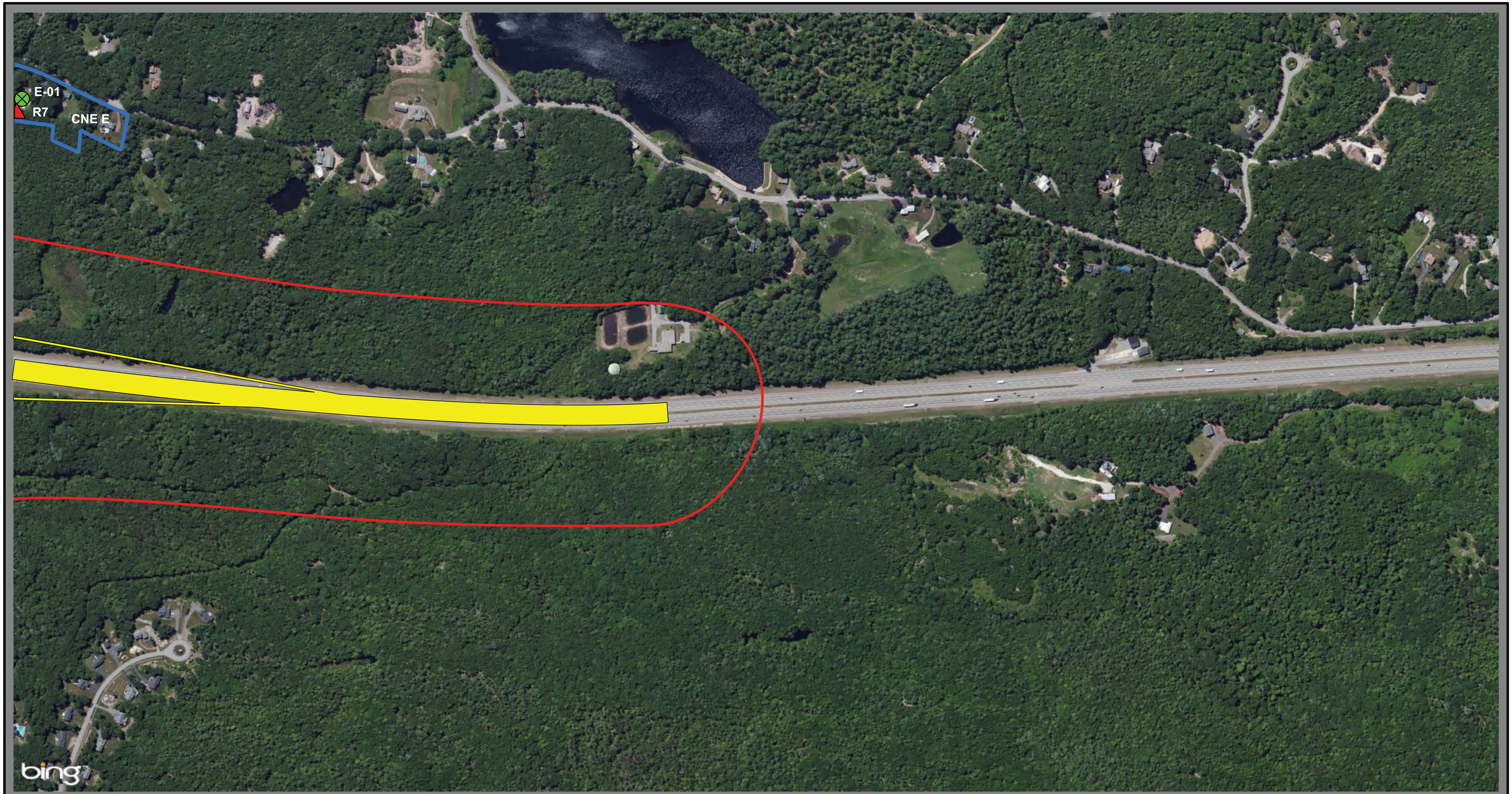
0 1,000 2,000 Feet



Interstate 95
York Toll Plaza Replacement
York, Maine

FIGURE 2B

Noise Receptor Location Map

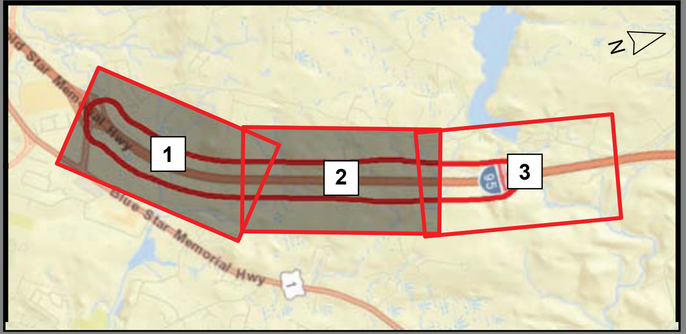


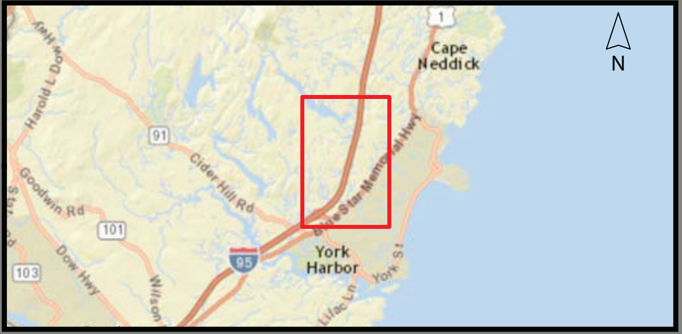
Monitored Receivers (R#)
- Monitored Sites
- Short Term Monitored Sites

Modeled Receivers (A-E#)
- Not Impacted
- Impacted (Existing Year, Opening Year, and Design Year)

- CNE
- 500' Boundary
- Proposed Design

0 1,000 2,000 Feet





Interstate 95
York Toll Plaza Replacement
York, Maine

FIGURE 2C

Noise Receptor Location Map

2.0 INTRODUCTION

Although not required for environmental permitting, questions from local residents caused the Maine Turnpike Authority (MTA) to retain Jacobs Engineering Group (Jacobs) to conduct a noise analysis to assess and document potential noise impacts associated with the Interstate 95 (I-95) York Toll Plaza Replacement Project in York, Maine. The proposed project would construct a new high speed ORT toll plaza at Mile 8.8 and demolish the existing barrier toll plaza at Mile 7.3. The study area contains a mix of residential and institutional land uses. A Type I noise analysis has been performed as outlined within the MTA Highway Traffic Noise Policy. A project location map is shown in ***Figure 1***. A detailed display of the modeling sites and project area are shown in ***Figures 2A, 2B, and 2C***.

The purpose of this report is to document the methods for analysis, traffic noise impacts associated with the proposed toll plaza, and provide detailed analysis on future noise levels in the study area. This includes aerial photograph analysis, noise modeling methodologies and results. All additional relevant information incorporated into this noise analysis is included within Appendices A to E.

3.0 METHODOLOGY

3.1 REGULATORY REQUIREMENTS

The MTA is an independent quasi-state agency receiving no state or federal funds for its construction and maintenance, and as such, the MTA is not subject to regulation by the Maine Department of Transportation (MEDOT) or the Federal Highway Administration (FHWA). However, the MTA and MEDOT work closely with each other to provide consistent regulation of roadways. As a result, the MTA and MEDOT have developed a uniform noise policy that benefits users and abutters along their principle roadways and provides consistent and well defined action as it relates to highway traffic noise. This policy mirrors federal and state noise policies, which are advisory for the MTA.

Title 23, Part 772 of the U.S. Code of Federal Regulations (23 CFR 772), the FHWA Highway Traffic Noise Analysis and Abatement Guidance, June 2010 (Revised January 2011), or the most recent version, and the noise related requirements of NEPA were used as guidelines to implement the MTA Noise Policy. The current MTA Noise Policy became effective on January 22, 2015. This policy is applicable to Type I highway projects and was used to guide this analysis. The only portion of the project that fits the definition of a Type I highway project is the construction of the proposed ORT toll plaza at Mile 8.8 and thus noise measurements and analyses were conducted in the vicinity of Mile 8.8. Additional measurements and analyses were conducted in the vicinity of the existing barrier toll plaza at Mile 7.3 to document the resulting changes in the noise environment at that location as well.

3.2 SOUND LEVEL METRICS

Noise is generally defined as unwanted or annoying sound. Airborne sound occurs by a rapid fluctuation of air pressure above and below atmospheric pressure. Sound pressure levels are usually measured and expressed in decibels (dB). The decibel scale is logarithmic and expresses the ratio of the sound pressure unit being measured to a standard reference level.

Most sounds occurring in the environment do not consist of a single frequency, but rather a broad band of differing frequencies. The intensities of each frequency add to generate sound. Because the human ear does not respond to all frequencies equally, the method commonly used to quantify environmental noise consists of evaluating all of the frequencies of a sound according to a weighting system. It has been found that the A-weighted filter on a sound level meter, which includes circuits to differentially measure selected audible frequencies, best approximates the frequency response of the human ear.

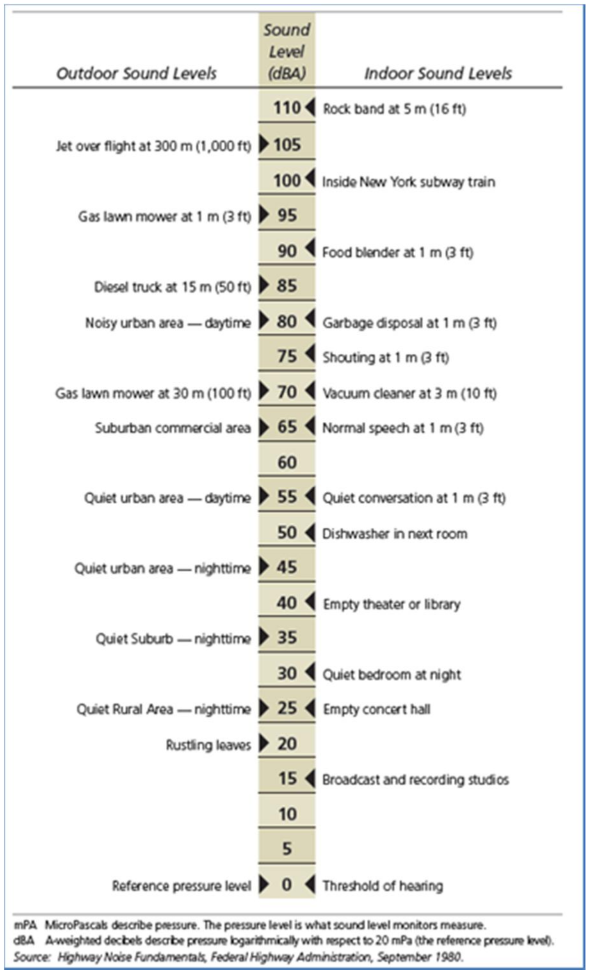
Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources, creating a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of traffic noise, a statistical noise descriptor called the equivalent hourly sound level, or Leq (h), is commonly used. Leq (h) describes a noise sensitive receptor's cumulative exposure from all noise-producing events over a one-hour period.

Because decibels are logarithmic units, sound levels cannot be added by ordinary arithmetic means. The following general relationships provide a basic understanding of sound generation and propagation:

- An increase, or decrease, of 10 dB(A) will be perceived by a receptor to be a doubling, or halving, of the sound level.
- Doubling the distance between a highway and receptor will produce a 3 dB(A) sound level decrease.
- A 3 dB(A) change in sound levels is considered by FHWA and NEPA to be the threshold of audible change perceivable by the typical human ear.

Contained in ***Figure 3*** below are examples of common noise sources and their associated noise levels.

FIGURE 3: SOUND LEVEL EXAMPLES



3.3 NOISE ABATEMENT CRITERIA

The MTA Noise Policy has adopted the Noise Abatement Criteria (NAC) that have been established by FHWA (23 CFR 772) for determining traffic noise impacts for a variety of land uses. The NAC, listed in ***Table 1*** for various activities, represent the upper limit of acceptable traffic noise conditions and also a balancing of that which may be desirable with that which may be achievable. The NAC apply to areas having regular human use and where lowered noise levels are desired. They do not apply to the entire tract of land on which the activity is based, but only to that portion where the activity takes place. The NAC is given in terms of the hourly, A-weighted, equivalent sound level in decibels (dB(A)). The noise impact assessment is made using the guidelines listed in ***Table 1***. Noise-sensitive sites potentially affected by this project are classified as Category B and Category D.

TABLE 1: FHWA NOISE ABATEMENT CRITERIA

Hourly A-Weighted Sound Level Decibels (dB(A))			
Activity Category	**Activity Leq(h)**	**Evaluation Location**	**Description Of Activity Category**
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B*	67	Exterior	Residential
C*	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E*	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	---	Exterior	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.
*: Includes undeveloped lands permitted for this activity category			

Source: 23 CFR Part 772

3.4 DEFINITION OF NOISE IMPACT

Traffic noise impacts occur if either of the following two conditions is met:

- The predicted traffic noise levels approach or exceed the NAC, shown in ***Table 1***. The MTA Noise Policy defines an approach level to be used when determining a traffic noise impact. The "approach" level has been defined by MTA as 1 dB(A) less than the NAC for Activity Categories A to E. For example, for a category B receptor, 66 dB(A) would be approaching 67 dB(A) and would be considered an impact. If design year noise levels "approach or exceed" the NAC, then the activity is impacted and a series of abatement measures would be considered.
- The predicted traffic noise levels are substantially higher than the existing noise levels. (Please note that this condition does not apply to the currently proposed York Toll Plaza Replacement Project.) The MTA Noise Policy defines a substantial noise increase as when predicted highway traffic noise levels exceed existing noise levels by 15 dB(A) or more. For example, if a receptor's existing noise level is 50 dB(A), and if the future noise level is 65 dB(A), then it would be considered an impact. The noise levels of the substantial increase impact do not have to exceed the appropriate NAC. Receptors that satisfy this condition warrant consideration of highway traffic noise abatement.

If traffic noise impacts are identified within the project corridor, then the MTA Noise Policy requires consideration of noise abatement measures. Noise abatement depends upon the feasibility of the design and overall cost weighted against the environmental benefit. Abatement analyses have not been performed as part of this analysis.

3.5 HIGHWAY NOISE COMPUTATION MODEL

Existing Year, Opening Year Build, Design Year No Build, and Design Year Build traffic noise calculations have been performed using the Federal Highway Administration's Traffic Noise Model (FHWA TNM®) Version 2.5, which is the latest approved version. The FHWA TNM® was developed and sponsored by the U. S. Department of Transportation and John A. Volpe National Transportation Systems Center, Acoustics facility. The TNM estimates vehicle noise emissions and resulting noise levels based on reference energy mean emission levels. The existing and proposed alignments (horizontal and vertical) are input into the model, along with the receptor locations, traffic volumes of cars, medium trucks (vehicles with 2 axles and 6 tires,) heavy trucks, average vehicle speeds, pavement type, and any traffic control devices. The TNM uses its acoustic algorithms to predict noise levels at the selected receptor locations by taking into account sound propagation variables such as, atmospheric absorption, divergence, intervening ground, barriers, building rows, and heavy vegetation. Due to the intermittent and irregular nature of noise generated by compression release engine brakes, or "Jake" brakes which are often installed on diesel engines and used at the operator's discretion, FHWA has no provision for its inclusion in the TNM computations. However, the facts that 85 percent of trucks now use E-Z Pass, and that the new ORT plaza is located on the crest of the hill which will to aid in the slowing down of the 15 percent of trucks that pay cash, allow for the general observation that use of Jake brakes should be virtually eliminated.

3.6 NOISE MONITORING AND MODEL VALIDATION

Data gathered from short-term noise monitoring was used to validate sound levels calculated from the TNM. These data, as well as roadway and terrain geometries were used to develop a model of the area in TNM. The resulting modeled traffic noise levels were compared with the monitored traffic noise levels. This was done to ensure that changes between future and existing noise levels were due solely to changes in project conditions and do not erroneously reflect discrepancies due to modeling and monitoring techniques. Per FHWA guidance, the difference between the monitored and modeled traffic noise levels should be within 3 dB(A).

Short term noise monitoring is performed for 20 minutes at each location. Data collected by the noise meter included time, average noise level (Leq), maximum noise level (Lmax), and instantaneous peak noise level (Lpk) for each interval. Hourly average noise levels were derived at each location from the 20-minute Leq values. During short term monitoring, traffic data was collected for roadways which contributed to the overall noise level, documenting the vehicle volume, composition, and speed. Traffic was grouped into one of three categories: cars, medium trucks, and heavy trucks. The traffic data applied to each monitoring event was obtained from MTA toll plaza traffic counts. This data was converted to one hour traffic data for validation of the noise model.

Long-term, 24-hour noise monitoring was performed at the Whippoorwill Subdivision and along Chases Pond Road near the intersection with Arnold Lane to quantify background, non-highway noise levels that cannot be accounted for by the TNM due to their distance away from I-95. To account for all potential noise sources in those communities, all future sound levels predicted in this study for residences in the Whippoorwill

Subdivision and along Chases Pond Road also include background noise contribution from the loudest ambient noise hour identified during 24-hour noise monitoring.

3.7 ANALYSIS PROCEDURE

To characterize the Existing Year, Opening Year Build, Design Year No Build, and Design Year Build noise levels at all noise-sensitive land uses in the study area, 11 noise prediction receivers (also called “receptors” and “sites”) were added to the validated noise model.

Noise modeling was then performed for Existing conditions using 2015 traffic data supplied by the project traffic engineers. This modeling step is performed to evaluate existing “worst-case” conditions associated with Existing Year worst-case free flow traffic volumes and composition. Next, No Build modeling was performed to evaluate “worst-case” conditions associated with Design Year traffic volumes without the proposed project in place. The model was then revised to reflect the addition of the York Toll Plaza Replacement Project as well as any associated changes to adjacent terrain or with existing roadways. This model was used to predict the Opening Year (2020) Build, and Design Year (2043) Build noise levels.

Additional analysis assumptions include the following:

- Noise levels were assessed for noise receptor locations up to approximately 500 feet from the proposed limits of construction.
  - Noise levels were also assessed within the Whippoorwill Subdivision specifically along Meadowlark Drive (located approximately 1000 feet east of the proposed toll plaza).
  - Noise levels were also assessed along Chases Pond Road near the intersection with Arnold Lane (located approximately 1000 feet west of the proposed toll plaza).
- Existing Year, Opening Year Build, Design Year No Build, and Design Year Build worst-case free flow traffic volumes and composition were provided by project traffic engineers. These data are used in traffic noise modeling to generate the loudest potential project-related traffic noise that noise-sensitive receptors may be expected to experience in all analysis years. For additional information, please refer to Appendix C – Traffic Data Summary.
- Medium and heavy truck volumes for each noise model were also provided by project traffic engineers. For additional information, please refer to Appendix C – Traffic Data Summary.

3.8 DATA SOURCES

Traffic count data was provided by MTA. Aerial photography was obtained from ESRI, Google Maps, and Bing Maps.

4.0 EXISTING NOISE ENVIRONMENT

4.1 COMMON NOISE ENVIRONMENTS

For reporting purposes, the project area was divided into areas of Common Noise Environments (CNEs). CNEs are defined as a group of receptors that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. In accordance with MTA guidance, noise-sensitive land uses within 500 feet of edge of design and project termini were identified. Existing Year (2015), Opening Year

(2020) Build, Design Year (2043) No Build, and Design Year (2043) Build noise levels were evaluated at these locations. Additionally, sound levels at noise sensitive sites within the Whippoorwill Subdivision were evaluated, specifically along Meadowlark Drive and Sparrow Lane (located approximately 1000 feet east of the proposed toll plaza) and noise sensitive sites along Chases Pond Road near the intersection with Arnold Lane (located approximately 1000 feet west of the proposed toll plaza). Base mapping, aerial photography, and site visits were used to identify noise-sensitive land uses within the study corridor. Six CNEs cover these identified land uses. The CNEs are shown in ***Figures 2A, 2B, and 2C***. The following is a brief description of each CNE.

- CNE A is located west of the existing barrier toll plaza and east of Chases Pond Road near Mile 7.3. The receptor within CNE A represents the York District Court. The York District Court does not have any outdoor uses, and is therefore classified as NAC D which utilizes interior noise levels. In order to predict interior noise levels, the exterior noise levels monitored were first calibrated against predicted noise levels from the noise model for exterior conditions and existing traffic volume levels (See Table 3). After calibration of the existing exterior values and the noise model was run again for no build, opening year and build traffic volume levels for exterior values and then assigned the appropriate noise reduction factor of 25 dB(A) as based on FHWA’s Highway Traffic Noise Analysis and Abatement Policy and Guidance (FHWA-HEP-10-025). The values in Tables 4-8 represent noise levels for interior conditions based on modelling the actual exterior location and then applying the appropriate adjustment factor to represent interior conditions.

- CNE B is located east of the existing barrier toll plaza and west of New Town Road near Mile 7.3. Receptors within CNE B represent four residences and are classified as NAC B.

- CNE C is located west of the existing barrier toll plaza and north and south of Old East Scituate Road near Mile 7.3. The receptor within CNE C represents one residence and is classified as NAC B.

- CNE D is located west of the proposed ORT plaza and east of Woods Run near Mile 8.8. Receptors within CNE D represent two residences and are classified as NAC B.

- CNE E is located west of the proposed ORT plaza along Chases Pond Road located approximately 1000 feet from I-95 near Mile 8.8. The receptor within CNE E represents one residence and is classified as NAC B.

- CNE F is located east of the proposed ORT plaza along Meadowlark Drive and Sparrow Lane within the Whippoorwill Subdivision located approximately 1000 feet from I-95 near Mile 8.8. The receptors within CNE F represent two residences and are classified as NAC B.

4.2 NOISE MONITORING

Prior to noise monitoring, aerial mapping was reviewed to identify noise sensitive land uses and any significant sources of acoustical shielding. Five representative locations for short term and two representative locations for long term, 24- hour noise monitoring were identified; their locations are shown on ***Figures 2A, 2B, and 2C.*** Noise monitoring was performed at 20-minute intervals at each of the short term monitoring locations. Noise measurements were collected under meteorologically acceptable conditions when the pavement was dry and winds were calm or light. Measurements were conducted using Bruel & Kjaer SLM Type 2236 and 2237 ANSI Type 1 noise meters based on best practice procedures on the collection of existing noise level readings (Federal Highway Administration, Volpe National Transportation Systems Center, 1996). The sound level meters were calibrated before and after each measurement with a Bruel & Kjaer Type 4231 calibrator. The calibration records are included in ***Appendix A***.

Noise monitoring was conducted by Jacobs' noise staff on April 19th and 20th, 2016 during leafless season in a heavily vegetated area, although pockets of non-deciduous trees which retain leaves year-round were present throughout the project area. Per FHWA guidance, a traffic noise model may only account for noise attenuation from large, contiguous, and non-deciduous tree zones in order for the noise model to predict the loudest traffic noise that receptors would experience year-round. The presence of non-deciduous pockets throughout the project area was accounted for and credited in both the validation and prediction noise models through the use of leafless aerial imagery during model development, as well as field inspection during noise monitoring. The model does not account for any noise attenuation from deciduous trees.

The monitored Leq ranged from 51.2 dB(A) to 67.4 dB(A). At each short term monitoring location, the noise environment was dominated by nearby I-95, while at long term monitoring sites located farther away from I-95 (greater than 1000 feet), a traffic "drone" was perceptible. A summary of the monitoring results is presented in ***Table 2*** and the field data sheets and results are presented in ***Appendix B***.

TABLE 2: SUMMARY OF NOISE MONITORING DATA

Site	CNE	Location	Land Use Description	Land Use / Activity Category	Leq (dB(A))
R1	A	Near Miles 7.3	York District Court	Institutional / D	63.3
R2	B	Near Mile 7.3	Houses along Newtown Road	Residential / B	58.2
R3	B	Near Mile 7.3	Houses along Newtown Road	Residential / B	63.3
R4	C	Near Mile 7.3	Houses along Brown Lane	Residential / B	67.4
R5	D	Near Mile 8.8	Houses east of Woods Run	Residential / B	60.8
R6	F	Near Mile 8.8	Houses within Whippoorwill Subdivision	Residential / B	51.2
R7	E	Near Mile 8.8	House along Chases Pond Road	Residential / B	54.0

Source: Jacobs, 2016

4.3 NOISE MODEL VALIDATION

The validation of the traffic model was accomplished by comparing the monitored noise levels with the noise levels generated by the computer model using traffic volumes and speeds that were encountered during the monitoring process. Validation ensures that reported changes between Existing and Build conditions are due to changes in traffic, and not discrepancies between monitoring and modeling techniques. A difference of ±3 dB(A) or less between the monitored and modeled levels is considered acceptable, since this is the threshold of audible change perceivable by the typical human ear. A summary of the model validation is provided in ***Table 3***.

TABLE 3: NOISE MODEL VALIDATION

Site	Location	Monitored Noise Level (dB(A))	Predicted Noise Level (dB(A))	Difference (Predicted - Monitored dB(A))
R1	Near Miles 7.3	63.3	63.9	0.6
R2	Near Mile 7.3	58.2	58.8	0.6
R3	Near Mile 7.3	63.3	63.6	0.3
R4	Near Mile 7.3	67.4	67.5	0.1
R5	Near Mile 8.8	60.8	61.2	0.4

Source: Jacobs, 2016

As the validation sites have less than a 1 dB(A) difference between the monitored and modeled noise levels, the model is validated as an accurate representation of the project noise environment. Model validation was not performed at R6 and R7 as TNM does not account for non-highway noise sources, such as traffic traveling on Chases Pond Road.

4.4 UNDEVELOPED LANDS AND PERMITTED DEVELOPMENTS

In accordance with the MTA Noise Policy, highway traffic noise analyses will be performed for developed lands. MTA noise policy does not provide for noise mitigation for any undeveloped land that is permitted or constructed subsequent to this date.

Coordination with MTA and Jacobs' staff resulted in the determination that there were no permitted undeveloped properties within the project area.

4.5 MODELED EXISTING ENVIRONMENT

To characterize existing and future noise levels at all noise-sensitive land uses in the study area, 11 noise prediction receptors (also called "receivers" and "sites") were added in the TNM. These receptors represent 10 exterior land uses and one interior use area. The receptors are shown on ***Figures 2A, 2B, and 2C***. Existing traffic data was then entered into the TNM to predict existing sound levels at each receptor. The traffic data used for the analysis is included in ***Appendix C***. (Please note that the predicted noise levels shown in Table 4 for existing 2015 conditions represent modeled values and should not be compared to monitored values, shown in Table 3, that were recorded under different volume conditions and locations.)

With the toll plaza at Mile 7.3 under Existing (2015) conditions, the modeling results showed that seven receptors are currently classified as "impacted" by traffic noise, as five residences in CNE B and C near Mile 7.3 and two residences in CNE D near Mile 8.8 would approach or exceed the NAC defined limit of 67 dB(A) for residential land uses. ***Table 4*** summarizes the Existing results by CNE.

TABLE 4: RANGE OF PREDICTED EXISTING NOISE LEVELS BY CNE

CNE	Location	Existing Year (2015) dB(A)	Receptors approaching or exceeding 67 db(A)
A	Near Miles 7.3	45	None
B	Near Mile 7.3	68 to 70	Four receptors representing four residences.
C	Near Mile 7.3	73	One receptor representing one residence
D	Near Mile 8.8	66 to 72	Two receptors representing two residences
E	Near Mile 8.8	59	None
F	Near Mile 8.8	58 to 63	None

Source: Jacobs, 2016

5.0 FUTURE NOISE ENVIRONMENT

5.1 MODELED FUTURE ENVIRONMENT

To characterize the No Build condition, the TNM was revised to reflect the Design Year (2043) No Build traffic volumes. The traffic data used for this analysis is included in ***Appendix C.***

With the toll plaza at Mile 7.3 under Design Year (2043) No Build conditions, the modeling results showed that seven receptors would experience noise increases of 1 dB(A), as five residences in CNE B and C near Mile 7.3 and two residences in CNE D near Mile 8.8 would approach or exceed the noise levels adopted by MTA in their Traffic Noise Policy. ***Table 5*** summarizes the Design Year No Build results by CNE.

Analysis of the results in ***Tables 4 and 5*** shows that there are no additional receptors experiencing noise level increases in the Design Year No Build when compared to the Existing Year.

TABLE 5: RANGE OF PREDICTED DESIGN YEAR NO BUILD NOISE LEVELS BY CNE

CNE	Location	Design Year (2043) No Build dB(A)	Receptors approaching or exceeding 67 db(A)
A	Near Miles 7.3	46	None
B	Near Mile 7.3	69 to 71	Four receptors representing four residences
C	Near Mile 7.3	74	One receptor representing one residence
D	Near Mile 8.8	67 to 73	Two receptors representing two residences
E	Near Mile 8.8	60	None
F	Near Mile 8.8	59 to 64	None

Source: Jacobs, 2016

To characterize the Opening Year (2020) Build and Design Year (2043) Build conditions, the TNM was revised to reflect the Build Design as well as Opening Year and Design Year traffic volumes. The traffic data used for this analysis is included in ***Appendix C.***

With the toll plaza at Mile 8.8 under Opening Year (2020) Build and Design Year (2043) Build conditions, the modeling results showed that seven receptors would experience small noise increases, as five residences in CNE B and C near Mile 7.3 and two residences in CNE D near Mile 8.8 would approach or exceed the NAC. ***Tables 6 and 7*** summarize the Opening Year Build and Design Year Build results by CNE. None of the residences at the Whippoorwill subdivision would experience any perceptible noise impacts from the project.

Analysis of the results in ***Tables 4, 6 and 7*** shows that there are no additional receptors experiencing noise level increases in the Opening Year Build or the Design Year Build when compared to the Existing Year.

TABLE 6: RANGE OF PREDICTED OPENING YEAR BUILD NOISE LEVELS BY CNE

CNE	Location	Opening Year (2020) Build dB(A)	Impacted Receptors
A	Near Miles 7.3	45	None
B	Near Mile 7.3	69 to 70	Four receptors representing four residences
C	Near Mile 7.3	73	One receptor representing one residence
D	Near Mile 8.8	66 to 72	Two receptors representing two residences
E	Near Mile 8.8	59	None
F	Near Mile 8.8	59 to 64	None

Source: Jacobs, 2016

TABLE 7: RANGE OF PREDICTED DESIGN YEAR BUILD NOISE LEVELS BY CNE

CNE	Location	Design Year (2043) Build dB(A)	Impacted Receptors
A	Near Miles 7.3	46	None
B	Near Mile 7.3	70 to 71	Four receptors representing four residences
C	Near Mile 7.3	74	One receptor representing one residence
D	Near Mile 8.8	67 to 73	Two receptors representing two residences
E	Near Mile 8.8	61	None
F	Near Mile 8.8	59 to 65	None

Source: Jacobs, 2016

5.2 NOISE IMPACT SUMMARY

In order to make a determination that a noise impact exists, one of the following conditions must be met:

- Predicted noise levels either approach or exceed the NAC defined in ***Table 1***;
- A substantial noise increase, defined by MTA as a 15 dB(A) increase above existing noise levels for all noise-sensitive exterior activity categories. (Note: This project will note cause such noise increases)

Table 8 shows the Existing Year, Design Year No Build, and Design Year Build sound levels for each of the modeled receptors. The same seven sites in CNE B, CNE C and CNE D are currently classified under existing conditions as “impacted” by traffic noise because they approach or exceed the NAC defined limit of 67 dB(A) for residential land uses. All seven sites would experience an increase of 1dB(A) due to increases in no build traffic volumes and only four sites an additional 1 dB(A) increase due to construction of the project. This increase would not result in a perceptible difference in noise levels as it is below 3 dB(A) which is defined by FHWA and NEPA as the threshold of audible change perceivable by the typical human ear.

TABLE 8: MODELING RESULTS SUMMARY 1

Receptor	Location	NAC	Residences	Existing Year (2015)	Design Year No Build (2043)	Design Year Build (2043)	Noise Increase due to Traffic Growth (No Build - Existing (dB(A))	Noise Increase due to Plaza Relocation (Build - No Build (dB(A))
A-01	Near Miles 7.3	D*	1	45	46	46	1	0
B-01	Near Mile 7.3	B	1	68	69	70	1	1
B-02		B	1	69	70	70	1	0
B-03		B	1	68	69	70	1	1
B-04		B	1	70	71	71	1	0
C-01	Near Mile 7.3	B	1	73	74	74	1	0
D-01	Near Mile 8.8	B	1	66	67	67	1	0
D-02		B	1	72	73	73	1	0
E-01	Near Mile 8.8	B	1	59	60	61	1	1
F-01	Near Mile 8.8	B	1	58	59	59	1	0
F-02		B	1	63	64	65	1	1

**Represents interior noise levels (-25 dB(A) from exterior noise levels)*
Note: Noise levels calculated in CNE E and CNE F include non-highway background noise contributions of 51.2 dB(A) and 54 dB(A), respectively, as established by long-term twenty-four hour monitoring.

No perceptible noise impacts are anticipated from the proposed ORT toll plaza at Mile 8.8, as all impacts to receptors in either the Design Year No Build or Design Year Build were already present in the Existing Year. With the toll plaza remaining at Mile 7.3, an increase of 1 dB(A) is anticipated to occur at all receptors as a result of natural traffic growth between the Existing Year (2015) and the Design Year (2043) No Build.

Under the Design Year (2043) Build scenario, the toll plaza relocation to Mile 8.8 would not increase traffic noise at any location more than 1 dB(A). At receptors B-01 and B-03 near Mile 7.3, traffic noise would increase slightly by 1 dB(A) due to higher travel speed resulting from the removal of the existing toll plaza at Mile 7.3. In the vicinity of Mile 8.8, the roadway facility would be expanded to be slightly closer to receptors E-01 and F-02, as well as introduce new traffic that would be accelerating at full-throttle away from the relocated toll plaza. These actions would introduce a slight traffic noise increase of 1 dB(A) in CNE E and CNE F.

The overall effect of the toll plaza relocation on traffic noise in the project area would be minimal for the following reasons:

- The relocation would not affect travel demand for the Turnpike, therefore there is no increase between No Build and Build traffic volumes.

- The distance between the roadway noise and receptors is not significantly decreased.
- The new toll plaza would not introduce a significant amount of vehicles accelerating at full-throttle from Mile 8.8 as the majority of vehicles would remain at free-flow "cruise" speed through the ORT lanes.

While slight noise level increases would occur in CNE B, CNE E, and CNE F, the maximum increase in noise levels as a direct result of the toll plaza relocation is predicted to be 1 dB(A).

Table 9 shows the change in sound levels between Existing Year (2015) and Opening Year (2020) Build. With the toll plaza relocated from Mile 7.3 to Mile 8.8, no additional noise impacts would occur, nor would any existing noise impacts be perceptibly worsened by the project as the increase in traffic noise would be a maximum of 1 dB(A) occurring at four receptors in CNE B and CNE F.

TABLE 9: MODELING RESULTS SUMMARY 2

Receptor	Location	NAC	Count	Existing Year (2015)	Opening Year (2020) Build	Noise Increase from Existing to Opening Year
A-01	Near Mile 7.3	D*	1	45	45	0
B-01	Near Mile 7.3	B	1	68	69	1
B-02		B	1	69	69	0
B-03		B	1	68	69	1
B-04		B	1	70	70	0
C-01	Near Mile 7.3	B	1	73	73	0
D-01	Near Mile 8.8	B	1	66	66	0
D-02		B	1	72	72	0
E-01	Near Mile 8.8	B	1	59	59	0
F-01	Near Mile 8.8	B	1	58	59	1
F-02		B	1	63	64	1

**Represents interior noise levels (-25 dB(A) from exterior noise levels)*

Note: Noise levels calculated in CNE E and CNE F include non-highway background noise contributions of 51.2 dB(A) and 54 dB(A), respectively, as established by long-term twenty-four hour monitoring.

6.0 CONSTRUCTION NOISE CONSIDERATIONS

MTA is also concerned with noise generated during the construction phase of the proposed project. While the degree of construction noise impact will vary, as it is directly related to the types and number of equipment used and the proximity to the noise-sensitive land uses within the project area. Land uses that are sensitive to traffic noise, are also potentially considered to be sensitive to construction noise. Any construction noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and will cease upon completion of the project construction phase.

However, during the design phase of the proposed project, MTA will work with local public officials and community members to limit, minimize, or eliminate adverse construction noise related impacts to the community, as practicable. Construction noise control measures will be incorporated in the plans and specifications in accordance with MTA policy.

Appendix A
Noise Meter and Acoustical Calibrator Calibration Certificates

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®

NVLAP Lab Code: 200625-0

Calibration Certificate No.31855

Instrument:	**Sound Level Meter**	*Date Calibrated:* **7/29/2014**	*Cal Due:*
Model:	**2236**	*Status:*	
Manufacturer:	**Brüel and Kjær**		
Serial number:	**2100601**		
Tested with:	**Microphone 4188 s/n 2057666**		
	Preamplifier ZC0027		
Type (class):	**1**		
Customer:	**Jacobs Engineering**		
Tel/Fax:	**973-568-6796, -267-0555 / -267-3555**		

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

Contains non-accredited tests: __**Yes** **X** **No**

Calibration service: __ **Basic** **X** **Standard**

Address: **299 Madison Ave., Morristown NJ 07962-1936**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 21, 2014	Scantek, Inc./ NVLAP	Jul 21, 2015
DS-360-SRS	Function Generator	88077	Aug 30, 2012	ACR Env./ A2LA	Aug 30, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 3, 2013	ACR Env./ A2LA	Sep 3, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1019 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.0 °C	99.85 kPa	50.7 %RH

Calibrated by:	Mariana Buzduga	**Authorized signatory:**	Valentin Buzduga
Signature	Cul	Signature	
Date	7/29/2014	Date	7/29/2014

Document stored Z:\Calibration Lab\SLM-61-2014\BNK2236_2100601_M1.doc

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

CLAUSES [1] FROM IEC/ANSI STANDARDS REFERENCED IN PROCEDURES:	RESULT[2,3]	EXPANDED UNCERTAINTY (coverage factor 2) [dB]
INDICATION AT THE CALIBRATION CHECK FREQUENCY - ANSI S1.4 CLAUSE 3.2	Passed	0.2
INPUT AMPLIFIER TEST: GAIN TEST / ATTENUATOR SETTING - ANSI S1.4-1983 CLAUSE 5.3	Passed	0.25
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10	Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1	Passed	0.25
OVERLOAD DETECTOR TEST: A-NETWORK - ANSI S1.4-1983 CLAUSE 8.3.1	Passed	0.25
F/S/I/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4 1983 CLAUSE 6.4	Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4 1983 CLAUSE 8.4.1	Passed	0.25
SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
IMPULSE TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.3	Passed	0.25
IMPULSE TEST: SINGLE SINE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.1 & 8.4.3	Passed	0.25
PEAK DETECTOR TEST, SINGLE SQUARE WAVE BURST - ANSI S1.4 1983 CLAUSE 8.4.4	Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2	Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.2	Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3	Passed	0.25
FILTER TEST: OCTAVE FILTER - IEC60225 CLAUSE 6.2 AND 6.3	Passed	0.25
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING ACTUATOR	Passed	0.2-0.5

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

2 Parameters are certified at actual environmental conditions.

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

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

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

Tests made with the following attachments to the instrument:

Microphone:	Brüel & Kjær 4188 s/n 2057666 for acoustical test
Preamplifier:	Brüel & Kjær ZC0027 s/n n/a for all tests
Other: line adaptor ADP005 (18pF) for electrical tests	
Accompanying acoustical calibrator:	Brüel and Kjær 4231 s/n 2085219
Windscreen:	none

Measured Data: in Test Report # 31855 of 12+1 pages.

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

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

Scantek, Inc.
CALIBRATION LABORATORY

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

NVLAP®

NVLAP Lab Code: 200625-0

Calibration Certificate No.31856

Instrument:	**Microphone**	*Date Calibrated:* **7/29/2014** *Cal Due:*		
Model:	**4188**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel & Kjær**	*In tolerance:*	X	X
Serial number:	**2057666**	*Out of tolerance:*		
Composed of:		*See comments:*		

Contains non-accredited tests: __Yes _X_ No

Customer: **Jacobs Engineering**
Tel/Fax: **973-568-6796, -267-0555/-267-3555**

Address: **299 Madison Ave., Morristown NJ 07962-1936**

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

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

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 21, 2014	Scantek, Inc./ NVLAP	Jul 21, 2015
DS-360-SRS	Function Generator	88077	Aug 30, 2012	ACR Env./ A2LA	Aug 30, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 3, 2013	ACR Env./ A2LA	Sep 3, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2014
PC Program 1017 Norsonic	Calibration software	v.5.2	Validated Mar 2011	Scantek, Inc.	-
1253-Norsonic	Calibrator	22909	Nov 8, 2013	Scantek, Inc./ NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	92271	Oct 24, 2013	Scantek, Inc./ NVLAP	Oct 24, 2014
4180-Brüel&Kjær	Microphone	2246115	Oct 15, 2013	NPL-UK / UKAS	Oct 15, 2015

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

Calibrated by:	Mariana Buzduga	**Authorized signatory:**	Valentin Buzduga
Signature		Signature	
Date	7/29/2014	Date	7/29/2014

Document stored as: Z:\Calibration Lab\Mic 2014\B&K4188_2057666_M1.doc

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

CLAUSES / METHODS[1] FROM PROCEDURES		MET[2,3]	NOT MET	NOT TESTED	MEASUREMENT EXPANDED UNCERTAINTY (coverage factor 2)
Open circuit sensitivity (insert voltage method, 250 Hz)		X			See below
Frequency response	Actuator response	X			63 – 200Hz: 0.3 dB 200 – 8000 Hz: 0.2 dB 8 – 10 kHz: 0.5 dB 10 – 20 kHz: 0.7 dB 20 – 50 kHz: 0.9 dB 50 – 100 kHz: 1.2 dB
	FF/Diffuse field responses	X			63 – 200Hz: 0.3 dB 200 – 4000 Hz: 0.2 dB 4 – 10 kHz: 0.6 dB 10 – 20 kHz: 0.9 dB 20 – 50 kHz: 2.2 dB 50 – 100 kHz: 4.4 dB
	Scantek, Inc. acoustical method			X	31.5 – 125 Hz: 0.16 dB 250, 1000 Hz: 0.12 dB 2 – 8 kHz: 0.8 dB 12.5 – 16 kHz: 2.4 dB

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

2 Results are normalized to the reference conditions.

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

Note: The free field/diffuse field characteristics were calculated based on the measured actuator response and adjustment coefficients as provided by the manufacturer. The uncertainties reported for these characteristics may include assumed uncertainty components for the adjustment coefficients.

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

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.0 ± 1.0	99.85 ± 0.001	50.7 ± 2.0

Main measured parameters:

Tone frequency (Hz)	Measured[4] /Acceptable Open circuit sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)
250	-30.07 ± 0.12/ -30.0 ±2	31.37

4 The reported expanded uncertainty is calculated with a coverage factor k=2.00

Tests made with following attachments to instrument and auxiliary devices:

Protection grid mounted for sensitivity measurements
Actuator type: G.R.A.S. RA0014

Measured Data: Found on Microphone Test Report # 31856 of one page.

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

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

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

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.31857

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **7/29/2014** *Cal Due:*			
Model:	**4231**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X	X
Serial number:	**2085219**	*Out of tolerance:*		
Class (IEC 60942):	**1**	*See comments:*		
Barometer type:		*Contains non-accredited tests:* __Yes _X_ No		
Barometer s/n:				

Customer: **Jacobs Engineering**
Tel/Fax: **973-568-6796, -267-0555 /-267-3555**
Address: **299 Madison Ave., Morristown NJ 07962-1936**

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31061	Jul 21, 2014	Scantek, Inc./ NVLAP	Jul 21, 2015
DS-360-SRS	Function Generator	88077	Aug 30, 2012	ACR Env./ A2LA	Aug 30, 2014
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Sep 3, 2013	ACR Env./ A2LA	Sep 3, 2014
HM30-Thommen	Meteo Station	1040170/39633	Sep 30, 2013	ACR Env./ A2LA	Sep 30, 2014
140-Norsonic	Real Time Analyzer	1403978	Mar 21, 2014	Scantek, Inc. / NVLAP	Mar21, 2015
PC Program 1018 Norsonic	Calibration software	v.5.2	Validated March 2011	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	950698	Nov 8, 2013	Scantek, Inc. / NVLAP	Nov 8, 2014
1203-Norsonic	Preamplifier	92271	Oct 24, 2013	Scantek, Inc./ NVLAP	Oct 24, 2014

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

Calibrated by:	Mariana Buzduga	**Authorized signatory:**	Valentin Buzduga
Signature		Signature	
Date	7/29/2014	Date	7/29/2014

Document stored as: Z:\Calibration Lab\Cal 2014\BNK4231_2085219_M2.doc

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

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

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

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

Main measured parameters [3]:

Measured[4]/Acceptable[5] Tone frequency (Hz):	Measured[4]/Acceptable[5] Total Harmonic Distortion (%):	Measured [4]/Acceptable Level[5] (dB):
999.81 ± 1.0/1000.0 ± 10.0	0.2 ± 0.1/ < 3	94.02 ± 0.12/94.0 ± 0.4
999.81 ± 1.0/1000.0 ± 10.0	0.3 ± 0.1/ < 3	114.04 ± 0.12/114.0 ± 0.4

3 The stated level is valid at reference conditions.

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

5 Acceptable parameters values are from the current standards

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.7 ± 1.2	99.86 ± 0.001	49.6 ± 2.7

Tests made with following attachments to instrument:

Calibrator ½" Adaptor Type: UC0210	
Other:	

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

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

Measured Data: in Acoustical Calibrator Test Report # 31857 of two pages.

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

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

Appendix B
Noise Monitoring Data Forms

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Short-Term Monitoring

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Interstate 95 York Toll Plaza Replacement

Site # R1
Done By: MC
Meter: B&K 2237

Description : Courthouse

	Start	End
Date	4/19/2016	4/19/2016
Time	10:44 AM	11:04 AM

Traffic	NB/EB	SB/WB
Cars	428	337
MT	15	10
HT	72	72
Buses	1	2
Motorcycles	0	0
Total	**516**	**421**

Notes:

NB faster, accel away from booth (car 40+, truck 30+)

SB slower, decel into booth, airbrake all 30

Site at grade, direct LOS, ramp lightly used

20:12 / LEQ 63.3, 97.3, 53.9, 77.2

Wind Speed (mph)	0-5	Temp. (°F)	44	Humidity (%)	75

North

Jacobs Engineering Group, Inc.

Interstate 95 York Toll Plaza Replacement

Site # R2
Done By: MC
Meter: B&K 2237

Description : 14 Newtown Road

	Start	End
Date	4/19/2016	4/19/2016
Time	8:51 AM	9:13 AM

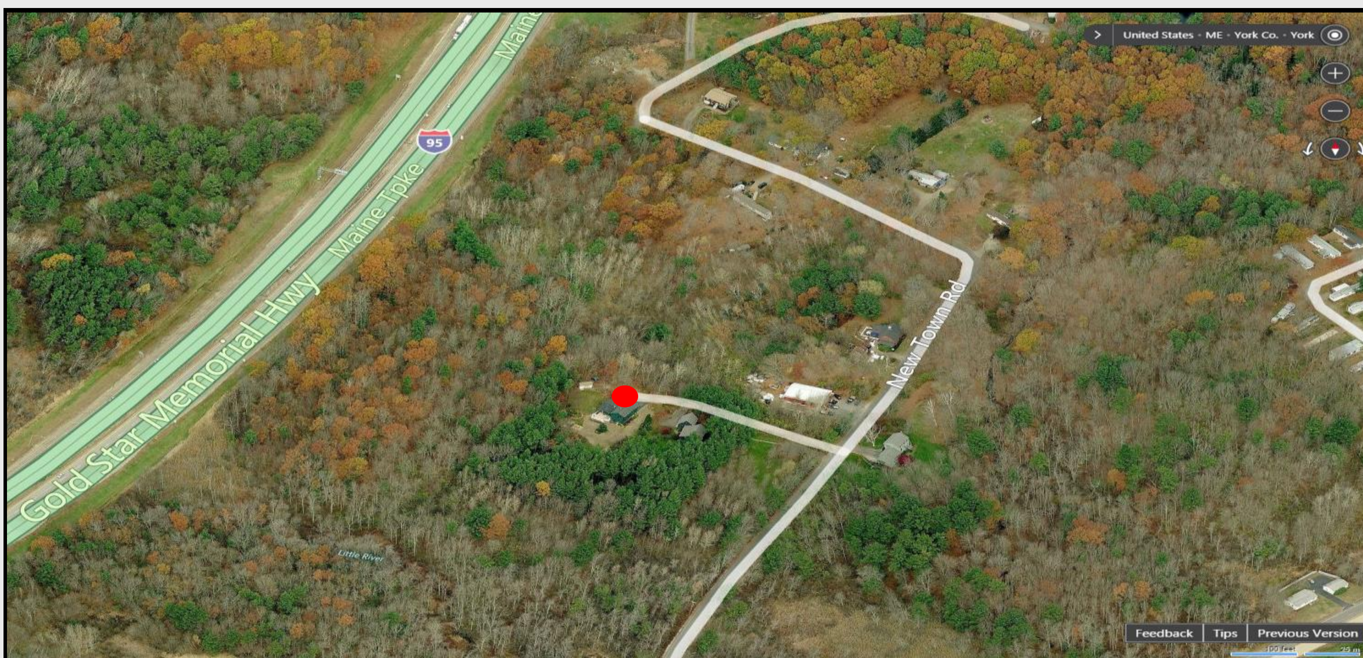
Traffic	**NB/EB**	**SB/WB**
Cars	338	541
MT	22	18
HT	83	58
Buses	0	0
Motorcycles	0	0
Total	**443**	**617**

Count data from Toll Plaza

Notes:

Loud "drone" can be heard, environment unremarkable.
Tree buffer does not appear to block much noise. Ground wet from morning light rain. Soil may be harder
21:00 LEQ 58.2, MaxP 91, MinL 53

Wind Speed (mph) 0-5 **Temp. (°F)** 44 **Humidity (%)** 76



North

Interstate 95 York Toll Plaza Replacement

Site # R3
Done By: MC
Meter: B&K 2237

Description : 39 Newtown Road

	Start	End
Date	4/19/2016	4/19/2016
Time	8:51 AM	9:13 AM

Traffic	**NB/EB**	**SB/WB**
Cars	290	487
MT	5	10
HT	67	48
Buses	2	0
Motorcycles	0	0
Total	**364**	**545**

Notes:

NB trucks accel. Loud from nearby booths. SB trucks decel, sometimes air braking, only 1 during run. Cars at leas 60 mph. NB trucks accel 50+, SB trucks fast.

Clear LOS, ground slightly wet; quieter than expected. Ground slightly elevated, some Z fluctuations.

leq: 63.3

Wind Speed (mph) 0-5 **Temp. (°F)** 44 **Humidity (%)** 72

North

Jacobs Engineering Group, Inc.

Interstate 95 York Toll Plaza Replacement

Site #	**R4**
Done By:	**MC**
Meter:	**B&K 2237**

Description : Brown's Freehold

	Start	**End**
Date	4/19/2016	4/19/2016
Time	11:35 AM	11:56 AM

Traffic	**NB/EB**	**SB/WB**
Cars	413	385
MT	11	13
HT	84	73
Buses	0	0
Motorcycles	0	0
Total	**508**	**471**

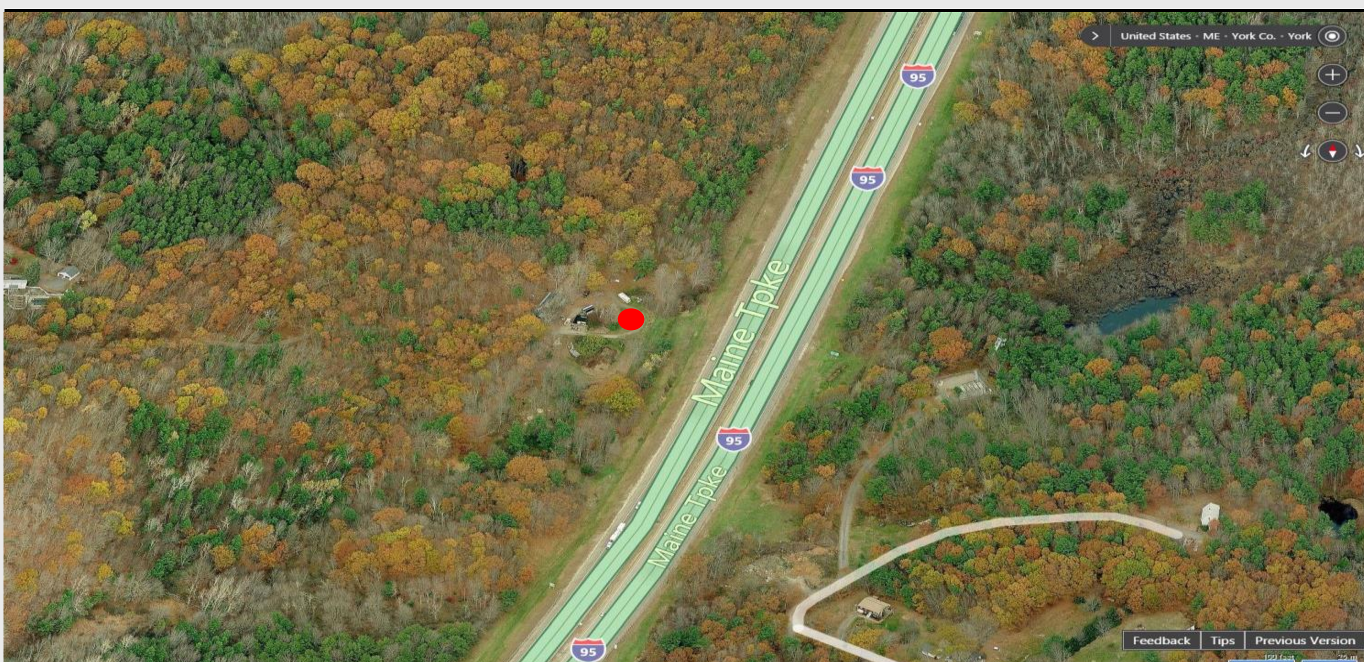
Notes:

SB much slower ~45mph cars, trucks 30-45mph.

NB all 60 mph, trucks similar. Site is abandoned, demolished home. Future home to be in vicinity possibly.

20:05 LEQ 67.4, 99.7, 54.4, 83. 4

Wind Speed (mph)	**0**	**Temp. (°F)**	**45**	**Humidity (%)**	**70**



North

Interstate 95 York Toll Plaza Replacement

Site # R5
Done By: MC
Meter: B&K 2237

Description : 3 Elizabeth Lane

	Start	End
Date	4/19/2016	4/19/2016
Time	12:23 PM	12:43 PM

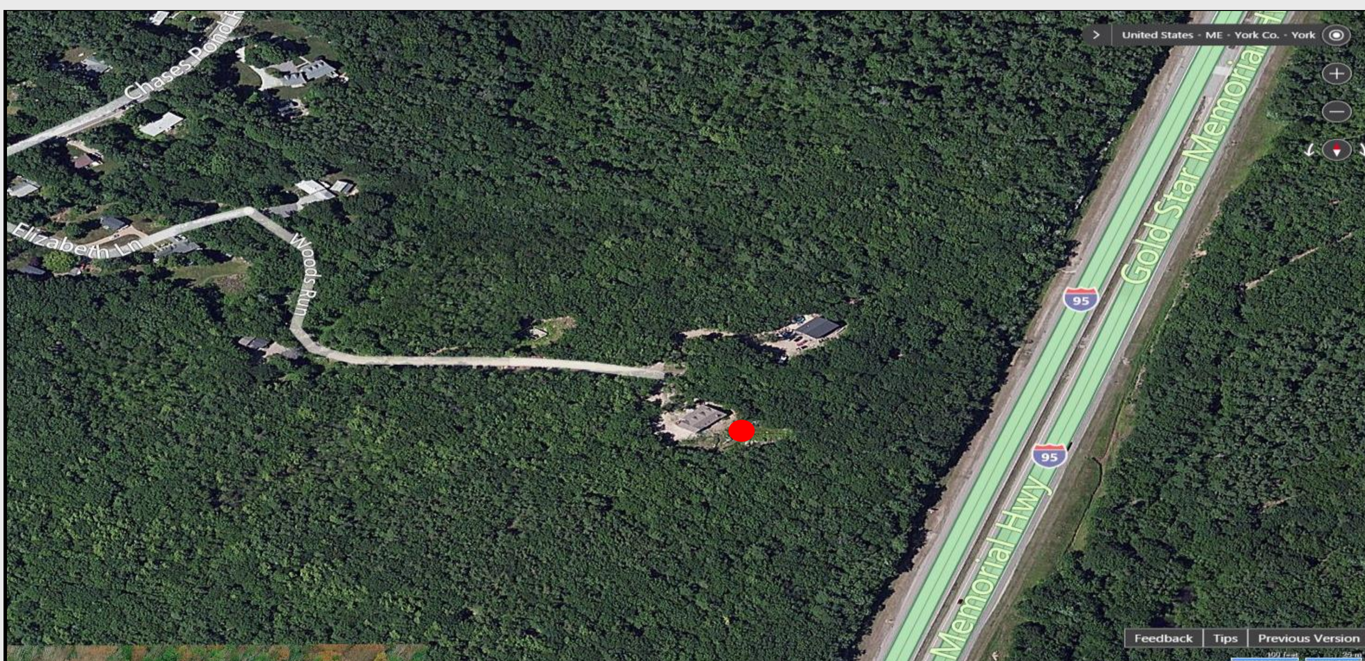
Traffic	**NB/EB**	**SB/WB**
Cars	451	441
MT	19	8
HT	75	81
Buses	0	0
Motorcycles	0	0
Total	**545**	**530**

Count data from Toll Plaza

Notes:

Loud, but barely visible due to leafless trees, elevation,
cliffs prominent, site at least +10.
20:20 Leq 60.8, 92.9, 53.3, 72.4

Wind Speed (mph) 0 **Temp. (°F)** 45 **Humidity (%)** 70



North

Jacobs Engineering Group, Inc.

Long-Term, Twenty-Four Hour Monitoring

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Long-Term, Twenty-Four Hour Monitoring Location Results				
Site	**Hour**	**Average of Leq**	**Average of L10**	**Average of L90**
R6	0	48.4	50.3	45
	1	46.2	47.8	43.3
	2	46.6	48.5	43.2
	3	48	49.7	44.4
	4	47.6	49.1	44.9
	5	50.5	51.9	48
	6	51	52.4	48.6
	7	50.6	52.1	48
	8	45.8	47	43.8
	9	42.2	42.9	41.1
	10	41	41.9	40.4
	11	41.6	44.7	40.5
	12	43.1	43.2	
	13	43.6	45.3	40.8
	14	42.7	44.6	40.7
	15	48.5	47.3	47.8
	16	44.1	45.3	40.7
	17	45.3	46.1	43.5
	18	43.1	43.9	41.3
	19	49.5	50.8	47.4
	20	54	54.6	52.8
	21	52.2	53.2	50.5
	22	52	53.8	48.7
	23	50.3	52.1	47.3
R7	0	42.9	43.6	41.8
	1	42.8	43.7	41.8
	2	44.2	46.2	42
	3	46	48.2	43.2
	4	45.3	48.1	41.5
	5	49	51.6	44.5
	6	49.7	52.4	44.3
	7	48.9	52.6	41.8
	8	48.1	51.7	41.2
	9	45.8	49.2	41
	10	46.8	50.1	42.1
	11	48	50.5	44
	12	47.6	50.5	41.9
	13	46.8	50	41.9
	14	49.9	52.4	45.8
	15	51.2	53.6	47.5
	16	50.4	52.9	46.1
	17	50	52.5	45.9
	18	48.9	51.3	44.8
	19	48.3	50.4	44.9

Long-Term, Twenty-Four Hour Monitoring Location Results				
Site	Hour	Average of Leq	Average of L10	Average of L90
	20	48.1	50.1	45
	21	46.9	49.1	43.6
	22	44.7	46.1	42.2
	23	44.1	45.8	41.8

Appendix C
Traffic Data Summary

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Traffic Data for Noise Study		Northbound									
		Light Vehicles			Medium Trucks			Heavy Trucks			MP 7.3
		Total	Cash	EZ-Pass	Total	Cash	EZ-Pass	Total	Cash	EZ-Pass	On-Ramp
Existing Year	2015	3,436	911	2,525	42	11	31	152	41	111	320
Opening Year	2021	3,583	950	2,633	44	12	32	158	42	116	334
No Build	2,043	4,140	989	3,151	62	10	52	223	37	186	473
Design Year	2043	4,140	989	3,151	62	10	52	223	37	186	473

Traffic Data for Noise Study		Southbound									
		Light Vehicles			Medium Trucks			Heavy Trucks			MP 7.3
		Total	Cash	EZ-Pass	Total	Cash	EZ-Pass	Total	Cash	EZ-Pass	Off-Ramp
Existing Year	2015	3,710	1,449	2,260	57	21	36	207	77	130	440
Opening Year	2021	3,868	1,511	2,357	60	22	38	216	80	136	459
No Build	2043	4053	1393	2660	100	26	74	356	92	264	649
Design Year	2043	4,053	1,393	2,660	100	26	74	356	92	264	649

Appendix D
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