4.4.18 Noise Analysis Policy and Procedures

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4.4.18.1 Introduction

Noise is defined as unwanted or excessive sound, and can interfere with sleep, work, relaxation, and/or recreation. The extent to which noise interferes with daily activities is based on noise duration, loudness, noise frequency, time of day, and personal preferences. Overall, noise can affect the quality of life.

Highway traffic is a dominant source of noise in urban and rural environments, and has been identified as an environmental issue of concern by local, state, and federal officials. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher travel speeds, and greater numbers of trucks. 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 contrast, terrain, vegetation,\(^1\) and natural/manmade obstacles can reduce traffic noise levels.

In response to the issues associated with highway traffic noise, the Federal Highway Administration (FHWA) developed a highway noise regulation as required by the Federal-Aid Highway Act of 1970 (Public Law 91-605, 84 Stat. 1713). The noise regulation, “Procedures for Abatement of Highway Traffic Noise and Construction Noise” (23 CFR 772), requires highway agencies, such as the New York State Department of Transportation (NYSDOT), to investigate traffic noise impacts in areas adjacent to all Federal or Federal-aid highway projects authorized under Title 23, and consider abatement if the agency identifies impacts. The noise regulation also requires highway agencies to maintain written statewide noise policies. Noise policies specify how each highway agency will implement the noise regulation, and must be approved by FHWA.

On July 13, 2010, FHWA issued a final rule to amend their noise regulation. The 2010 final rule required highway agencies to revise their current noise policies to demonstrate compliance with the amended noise regulation, obtain FHWA approval of the revised noise policies, and implement the policies by July 13, 2011. NYSDOT’s noise policy meets the requirements of the final rulemaking and has received FHWA approval.

This section is applicable to the following NYSDOT Regions:

<table>
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<tr>
<th>NYSDOT Region</th>
<th>All</th>
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4.4.18.2 Section Objectives

The purpose of this noise section is to establish NYSDOT’s policy and procedures for analyzing traffic noise impacts and considering abatement measures for NYSDOT projects. The Department’s noise policy was developed to be consistent with FHWA’s noise regulation.

\(^1\) According to FHWA “Highway Traffic Noise: Analysis and Abatement Guidance,” “A 200-foot width of dense vegetation can reduce noise by 10 decibels. It is usually impossible, however, to plant enough vegetation along a road to achieve such reductions.”
4.4.18.3 DOT Policy
It is NYSDOT policy to address traffic noise concerns resulting from transportation projects by complying with FHWA regulations for Federal-aid projects and by also applying the policy and procedures to State-funded projects. In accordance with 23 CFR 772.7(b), this Environmental Manual Section (Section 4.4.18) constitutes NYSDOT noise policy. This policy and accompanying procedures shall be reviewed every three years. Appropriate revisions shall be considered and adopted.

4.4.18.4 Legal Basis
The National Environmental Policy Act (NEPA) (as prescribed in 23 CFR 771) and the State Environmental Quality Review Act (SEQRA) (17 NYCRR 15) are the “umbrella” environmental regulations. Both require the consideration of noise impacts. NEPA categorical exclusions and SEQRA Type II actions do not typically require noise analyses.

The Federal-Aid Highway Act of 1970 (23 USC §109(h) and (i)) specifically addresses the abatement of highway traffic noise. This law mandates FHWA to develop highway traffic noise standards. The law also requires promulgation of highway traffic noise level criteria for various land use activities. The law further provides that FHWA not approve the plans and specifications for a Federal-aid highway project unless the project includes feasible and reasonable highway traffic noise abatement measures to implement the appropriate noise level standards.

To comply with the Federal-Aid Highway Act of 1970, FHWA has developed and implemented a regulation for the analysis and mitigation of highway traffic noise in Federal-aid highway projects. The FHWA highway traffic noise regulation is 23 CFR 772. This regulation applies to all Federal or Federal-aid highway projects authorized under Title 23, United States Code. Therefore, this regulation applies to any highway project or multimodal project that:

1. Requires FHWA approval regardless of funding sources, or
2. Is funded with Federal-aid highway funds.

The regulation requires the following during the planning and design of a highway project:
1. Identification of highway traffic noise impacts;
2. Examination of potential abatement measures;
3. Incorporation of feasible and reasonable highway traffic noise abatement measures into the highway project;
4. Coordination with local officials to provide helpful information on compatible land use planning and control (see Subsection 4.4.18.7.2.3); and
5. Identification and incorporation of necessary measures to abate construction noise (see Subsection 4.4.18.5.5).

The regulation contains highway traffic Noise Abatement Criteria (NAC) for different types of land uses and human activities. Highway traffic noise impacts occur when the predicted highway traffic noise levels approach or exceed the NAC, or when the
predicted highway traffic noise levels substantially (by 6 dB(A) or more) exceed the existing highway traffic noise levels. The regulation does not require meeting the abatement criteria in every instance, and does not define the criteria as design standards for highway traffic noise abatement. Rather, the regulation requires that highway agencies requesting FHWA approvals or funding make every feasible and reasonable effort to reduce noise levels when highway traffic noise impacts occur. Compliance with 23 CFR 772 is a prerequisite for granting Federal-aid highway funds for construction or reconstruction of a highway. Local zoning and design requirements, such as height limits on fencing and walls, are not acceptable limitations on the configuration or design of noise abatement.

4.4.18.5 General Methodology Analysis and Evaluation

4.4.18.5.1 Applicability

Section 772.5 of the noise regulation establishes three types of projects. All projects will fall into one of these types:

Type I Project.

(1) The construction of a highway on new location; or,

(2) The physical alteration of an existing highway where there is either:
    i) Substantial Horizontal Alteration. A project that halves the distance between
       the traffic noise source and the closest receptor between the existing
       condition to the future build condition; or,
    ii) Substantial Vertical Alteration. A project that removes shielding
       and therefore exposing the line-of-sight between the receptor and the traffic noise
       source. This is done by either altering the vertical alignment of the highway
       or by altering the topography between the highway traffic noise source and
       the receptor; or,

(3) The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a High Occupancy Vehicle (HOV) lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,

(4) The addition of an auxiliary lane, 2 except for when the auxiliary lane is a turn lane; or,

(5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,

(6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,

(7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

2 "Auxiliary lane" is defined in Chapter 2 of NYSDOT’s “Highway Design Manual.”
If a project is determined to be a **Type I project** per Section 772.5, then the entire project area as defined in the environmental document is a Type I noise project.

**Type II Project.** A project for noise abatement on an existing highway. Note that the development and implementation of **Type II projects** shall not be considered without separate additional funding by the Legislature for this specific purpose.

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**Alert!** NYSDOT has not developed a Type II program in accordance with Section 772.7(e); therefore, no NYSDOT Type II projects are eligible for Federal-aid funding.

Type II noise abatement measures shall be approved only for projects that were approved before November 28, 1995 or are proposed along land where substantial construction predated the existence of any highway. The granting of a building permit must have occurred prior to right-of-way acquisition for the original highway. Further, noise abatement measures shall not be approved at locations where such measures were previously determined not to be reasonable and feasible for a Type I project. It is the responsibility of the respective NYSDOT Regional Offices to be certain that appropriate local officials in their jurisdiction are aware of these requirements.

**Type III Project.** A highway project that does not meet the classifications of a Type I or Type II project. Hypothetical projects may include the construction of bicycle or pedestrian facilities or the resurfacing of existing highway pavement. **Type III projects** do not require a noise analysis or consideration of noise abatement measures under 23 CFR 772.

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**Alert!** The “Type I” and “Type II” project designations under 23 CFR 772 are different from the “Type I” and “Type II” project designations under the State Environmental Quality Review Act (SEQRA).

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**4.4.18.5.2 Analysis**

The traffic noise analysis shall include the steps in Subsections 4.4.18.5.2.1 through 4.4.18.5.2.5 for each alternative under detailed study. The null alternative shall also be analyzed if the noise analysis is being conducted for NEPA (23 CFR 771) and/or SEQRA (17 NYCRR Part 15) purposes.

On projects that do not require analysis under 23 CFR 772, a Region may decide to undertake a noise analysis to assess potential noise impacts in order to meet our obligations as set forth in NEPA or SEQRA. In these cases, measurement and impact analysis should generally follow the methodology outlined in this Section of the Environmental Manual and Environmental Science Bureau (ESB) staff should be consulted.
4.4.18.5.2.1 Existing Activities
The first step in a noise analysis is to identify the areas and associated activities (i.e., land uses) to be potentially affected by highway noise. The areas on both sides of the entire length of the proposed highway project shall be considered. These areas must then be assigned to the Activity Categories listed in Table 1 of this policy.

In general, the potentially affected areas should be assigned on an area basis rather than site by site. For example, if a small office were located within a large recreational park, the entire park area should typically be assigned to one Activity Category. The office should not be assigned a different Activity Category than the rest of the park unless unique circumstances exist. However, for mixed use areas, assigning land use on a site-by-site basis would be appropriate. For example, if a residence were located directly adjacent to a restaurant, the residence should be assigned to Activity Category B, while the restaurant should be assigned to Activity Category E.

Undeveloped lands adjacent to highways that have been granted a building permit prior to the date of public knowledge (or Design Approval for projects without FHWA involvement) for the project shall be considered as developed, and shall be assigned an Activity Category consistent with the approved development.
### TABLE 1: 23 CFR, PART 772, NOISE ABATEMENT CRITERIA (NAC)

[Hourly A-Weighted Sound Level decibels (dBA)]

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Activity Criteria</th>
<th>Evaluation Location</th>
<th>Activity Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Leq(h)</td>
<td>L10(h)</td>
<td>Exterior</td>
</tr>
<tr>
<td>B\3\</td>
<td>67</td>
<td>70</td>
<td>Exterior</td>
</tr>
<tr>
<td>C\3\</td>
<td>67</td>
<td>70</td>
<td>Exterior</td>
</tr>
<tr>
<td>D</td>
<td>52</td>
<td>55</td>
<td>Interior</td>
</tr>
<tr>
<td>E\3\</td>
<td>72</td>
<td>75</td>
<td>Exterior</td>
</tr>
<tr>
<td>F</td>
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<tr>
<td>G</td>
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</tr>
</tbody>
</table>

\1\ Either Leq(h) or L10(h) (but not both) may be used on a project.

\2\ The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

\3\ Includes undeveloped lands permitted for this Activity Category.
Each Activity Category is described below.

**Activity Category A**
Activity Category A includes 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. Some examples of lands that have been analyzed as Activity Category A receivers include the Tomb of the Unknown Soldier, a monastery, an outdoor prayer area of a facility for nuns, and an amphitheater. Activity Category A land uses are analyzed at this stricter standard even if the land use is identified within an Activity Category with a higher NAC.

**Alert!** FHWA must approve a land use, on a case-by-case basis, as Activity Category A before a noise analysis involving this Activity Category is initiated.

**Activity Category B**
Activity Category B includes the exterior areas of residential land uses. This land use type encompasses single-family (including mobile home parks) and multifamily residences, including hotels and motels that primarily provide long-term accommodations (i.e., one month or more per stay). Multifamily dwelling units often have associated common areas for recreational or other use.

**Activity Category C**
Activity Category C includes the exterior areas of a variety of nonresidential land uses not specifically covered in Category A or B. This category may include public or private facilities.

**Alert!** Unless classified as Activity Category A or B, Section 4(f) properties must be analyzed as Activity Category C even if the land use without Section 4(f) designation would be exempt from analysis. Section 4(f) properties are analyzed at this stricter standard even if the Section 4(f) is identified within an Activity Category with a higher NAC.

**Activity Category D**
Activity Category D includes the interior of a variety of nonresidential public and private facilities that may be sensitive to increased noise levels. Some land uses in Activity Category D overlap with some land uses in Activity Category C. Analysts shall consider the interior levels at these land uses only if it is determined that exterior abatement measures would not be feasible and reasonable, and all outdoor analysis options have been exhausted.

**Activity Category E**
Activity Category E is the exterior criteria for motels, hotels, offices and other developed lands not included in Activity Categories A through D or F. Motels and hotels that primarily provide long-term accommodations (i.e., one month or more per stay), essentially functioning as short-term residences, are included under Activity Category B.
**Activity Category F**
Activity Category F includes a number of land uses that are not sensitive to noise. No noise analysis is required for these locations.

**Activity Category G**
Activity Category G includes undeveloped lands.

As shown in Table 1, each Activity Category has been assigned Noise Abatement Criteria (NAC), which are used later in the analysis for determining traffic noise impacts (see Subsection 4.4.18.5.2.5).

### 4.4.18.5.2.2 Noise Receivers
A receiver location is a point where highway traffic noise levels are measured and/or modeled. Receiver locations are normally restricted to “exterior areas of frequent human use.” Note that parking lots are not considered areas of frequent human use for noise analysis purposes.

**Tip!** Receivers are discrete points within a noise model that represent noise sensitive land uses. An individual receiver may represent multiple receptors. For example, the noise levels at an apartment building containing multiple receptors (dwelling units) may be modeled using one receiver.

Identify and locate noise receivers as follows:

- Activity Category A:
  1. Identify receivers in the manner described for the land use that best fits.

- Activity Category B:
  1. Identify exterior areas of frequent human use within the property limits. For a single-family residence, an area of frequent human use could consist of a picnic table or patio. For a multifamily dwelling, an area of frequent human use is typically an exterior common area, such as a picnic area that is available for use by all residents within the dwelling. If a multifamily dwelling does not have a ground level exterior area, exterior balcony/deck locations (if present) may be used for the analysis. Note that if the residence does not have any exterior areas of frequent human use, no noise impacts are anticipated and no further analysis is needed.
  2. Place receivers at the identified exterior area(s) of frequent human use. If receivers are being placed at the exterior balconies of a multi-story residence, only one receiver shall be placed per floor.

**Tip!** Balconies above a certain elevation will not likely be benefited by constructing noise barriers.
• Activity Category C:
  1. Identify each exterior area of frequent human use within the facility. For a park, an area of frequent human use could consist of a ball field or picnic area. For a hospital, an area of frequent human use could consist of a courtyard. For a day care center or school, an area of frequent human use could consist of a playground. For some facilities, such as cemeteries, frequent human use may be evenly spread throughout the facility.
  2. Place receivers at the center and/or a few feet in from the edge of the exterior area(s) of frequent human use.

• Activity Category D:
  1. Place receivers near the building edge. To calculate interior noise levels, use building noise reduction factors.
     Note that this Activity Category shall only be used where there are no exterior areas of frequent human use for the activities specified in Table 1 or where the exterior areas have characteristics that prevent highway traffic noise impacts on exterior activities (e.g., located far from the highway or already shielded from highway traffic noise).

• Activity Category E:
  1. Identify exterior areas of frequent human use. An exterior area of frequent human use for these facilities may consist of a patio area or courtyard. If a facility does not have a ground level exterior area, an exterior balcony/deck location (if present) may be used for the analysis. Note that if the facility does not have any exterior areas of frequent human use, no noise impacts are anticipated and no further analysis is needed.
  2. Place receivers at the exterior area(s) of frequent human use.

• Activity Category F:
  1. No noise analysis is required for this Activity Category. Receivers do not need to be identified.

• Activity Category G:
  1. Some analysis may be required to provide information to local officials (see Subsection 4.4.18.7.2.3). However, receivers do not need to be identified.

**Tip!** If there are no exterior areas of frequent human use for Activity Categories B and E, then no noise analysis of these Activity Categories is needed.

4.4.18.5.2.3 Existing Noise Levels
The existing noise levels shall be determined throughout the project area. For projects on new alignments, use field measurement to determine existing noise levels. For projects on existing alignments, predict existing noise levels with the most recent version of the [FHWA Traffic Noise Model](#) (FHWA TNM). Validate predicted noise levels through comparison between measured and predicted levels.
Perform noise measurements using the procedures specified in the current edition of the Department’s manual, “Field Measurement of Existing Noise Levels.” Please contact ESB for clarification of and assistance with field measurement practices and procedures.

**Tip!** Validation is required to verify the accuracy of noise models used to predict existing and/or future noise levels. This is unrelated to validation of the FHWA TNM model, which was accomplished in the TNM Validation Study.

Validation of the model requires a series of noise measurements along a project, taking three or four noise measurements per site along with simultaneous traffic counts. These sites are then modeled using the traffic volumes and speeds that were collected during the measurements. If the measured and modeled highway traffic noise levels are within +/-3 dB(A) for all the measurements at all the sites, then the model is considered valid and can be used to predict existing highway traffic noise levels along the entire project. If the model is not within +/-3 dB(A) for all the measurements at all the sites, then the model is not considered valid until additional measurements are made or until the analyst identifies the reason for the discrepancy and makes a correction within the model.

**Alert!** Calibration of a noise model, where the user adjusts the noise level at a specific receiver to account for differences between measured and modeled noise levels, shall not be done without specific concurrence from the ESB. Problems with validating most models usually are due to input errors rather than problems with the model, and users are encouraged to exhaust input options prior to making receiver adjustments. Typically, calibration is considered for situations where the model is consistently over-predicting or under-predicting by an amount greater than 3 dB(A). Adjusting the model by the difference between the measured and predicted values is a possible solution. The analyst must determine and document the reasons or causes for the difference between the measured and predicted highway traffic noise levels and the actual level of the adjustment. Generally, differences in measured and predicted noise levels greater than +/- 3 dB(A) occur due to a site condition not accounted for in the model, such as ground type, meteorological effects or contributions from non-transportation related noise sources.

4.4.18.5.2.4 Future Traffic Noise Levels
Future traffic noise levels shall be determined for each build alternative under detailed study. The noise regulation does not require analysis of the null alternative. However, the null alternative shall be analyzed if the noise analysis is being conducted for NEPA and/or SEQRA purposes.

The calculated noise levels shall be modeled with the most recent version of the TNM, which is described in FHWA Traffic Noise Model Report No. FHWA-PD-96-OID, including Revision No. 1, dated April 14, 2004. Average pavement type shall be used in
the FHWA TNM for future noise level prediction. Noise contour lines may be used for project alternative screening or for land use planning to comply with CFR 23 772.17 (“Information for Local Officials”), but shall not be used for determining highway traffic noise impacts.

In predicting noise levels and assessing noise impacts, traffic characteristics that will yield the worst hourly traffic noise impact on a regular basis for the design year shall be used. The worst hourly traffic noise impact occurs at a time when truck volumes and vehicle speeds are greatest, typically when traffic is free-flowing and at or near level of service (LOS) C conditions. Thus, the worst or peak traffic hour may not coincide with the worst noise hour, especially when the LOS drops to D or less. Noise analysts should not model congested traffic flow. Worst case hourly traffic volumes and speeds shall be consistent with the Highway Capacity Manual (latest edition). The project design year is generally ETC+20 for highway projects and ETC+30 for bridge projects.

### 4.4.18.5.2.5 Traffic Noise Impacts

Traffic noise impacts shall be determined for each alternative. Impacts occur when:

- The predicted future traffic noise levels approach within 1 dB(A) or exceed the Noise Abatement Criteria (NAC). NAC have been established for each of the Activity Categories (except Activities F and G) and can be found in Table 1 of this policy; or
- The predicted future traffic noise levels substantially (by 6 dB(A) or more) exceed the existing levels.

**Tip!** Note that there are two ways in which an impact may occur. Either way constitutes an impact after which no discrimination between the two is needed or desired. These determinations shall be quantified and include the land use type (e.g., residential, nonresidential, other, etc.) and number of impacted receptors.

For projects on new alignments, impacts are determined by comparing future projected noise levels to the measured existing levels. For projects on existing alignments, impacts are determined by comparing future projected noise levels to the modeled existing levels.

**Alert!** The impact definition further applies to traffic noise analyses that are being performed exclusively for NEPA or SEQRA purposes. For these analyses, however, it must be the project itself that creates the noise impact and not pre-existing conditions. Also note that the impact definition should not be used for the purpose of determining a “significant” noise impact under NEPA or SEQRA.

Noise abatement measures must be examined and evaluated for all areas where traffic noise impacts are determined to occur.
4.4.18.5.3 Abatement

4.4.18.5.3.1 Abatement Measures
If a traffic noise impact is identified, the abatement measures listed below must be considered.

- Traffic management measures, such as traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.
- Alteration of horizontal and vertical alignments.
- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.
- Construction of noise barriers (including landscaping for aesthetic purposes) within the highway right-of-way.
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to pre-empt development that would be adversely impacted by traffic noise. This measure may be included in Type I noise projects only.
- Noise insulation of publicly owned school buildings that are off the highway right-of-way in connection with a Department construction project undertaken with Federal-aid. For this measure to be recommended, the NYSDOT Commissioner must determine that it is in the best interest of the State considering, among other factors, the cost and feasibility of other alternatives. Post-installation operation and maintenance costs of noise insulation are not eligible for Federal-aid.

Note that vegetation can reduce highway traffic noise. According to FHWA “Highway Traffic Noise: Analysis and Abatement Guidance,” “A 200-foot width of dense vegetation can reduce noise by 10 decibels.” However, providing this amount of dense vegetation is not a viable option for most projects. Furthermore, even if the vegetation could be provided, an adequate noise reduction would not be achieved until the vegetation matures. As a result, FHWA does not consider the planting of vegetation to be a highway traffic noise abatement measure. The planting of vegetation could be considered, however, for psychological benefits (e.g., aesthetics).

Tip! Highway traffic noise abatement measures should be designed to meet or exceed the highway agency’s noise reduction design goal - not to attain the noise abatement criteria.
4.4.18.5.3.2 Establish Feasibility and Reasonableness
To be recommended, an abatement measure shall be both feasible and reasonable. In determining feasibility and reasonableness, the number of impacted receptors must first be established using the following methodologies:

- Activity Category A:
  1. Determine the number of receptors in the manner described for the land use that best fits.

- Activity Category B:
  1. Count each impacted single-family residence as one receptor. Count each residence in an impacted multifamily dwelling as one receptor. For impacted hotels and motels that primarily provide long-term accommodations (i.e., one month or more per stay), count each suite/unit as one receptor.

- Activity Categories C and E:
  1. Based on the local municipal zoning ordinance(s), determine the average minimum lot size for residential zoning districts near the project area.
  2. If a facility has more than one impacted exterior area of frequent human use, add the amounts of impacted land area together. Divide the total impacted land area by the average residential lot size to calculate an equivalent number of residential receptors. Round the number of receptors up to a whole number. This number shall serve as the number of impacted receptors within the facility.

Example: The total number of impacted receptors must be determined for a park with two impacted areas of frequent human use: a 0.25-acre playground area and a 2.0-acre playing field. Thus, the total impacted land area is 2.25 acres (0.25 acres + 2.0 acres). Based on review of the local municipal zoning ordinance, it is determined that the average minimum lot size for residential zoning districts near the project area is 0.30 acres. The total impacted area of 2.25 acres is divided by the minimum residential lot size of 0.30 acres to calculate an equivalent number of residential receptors of 7.5. This number is rounded up to arrive at a total of 8 impacted receptors for the park.

- Activity Category D:
  1. If local municipal and/or county housing data are readily available, determine the average square footage of residences near the project area. If housing data are not readily available, assume an average of 1,000 square feet per residence.
  2. Determine the “impacted square footage” of the building. For schools, “impacted square footage” shall only include classrooms and other noise-sensitive rooms (areas such as gymnasiums and cafeterias shall not be included). For any building in this Activity Category, “impacted square footage” shall not include any interior area that does not face the highway. Noise analysts should contact ESB staff when determining the “impacted square footage” for this Activity Category.
3. Divide the “impacted square footage” by the average residential square footage determined in Item 1 above to calculate an equivalent number of residential receptors. Round the number of receptors up to a whole number. This number shall serve as the number of impacted receptors for the building.

Example: The total number of impacted receptors must be determined for a medical building with no exterior areas of frequent human use and an “impacted square footage” of 20,000 square-feet. Based on review of local housing data, it is determined that the average square footage of residences near the project area is 1,400 square feet. The “impacted square footage” of 20,000 square feet is divided by the average residential square footage of 1,400 square feet to calculate an equivalent number of residential receptors of 14.3. This number is rounded up to arrive at a total of 15 impacted receptors for the medical building.

- Activity Category F:
  1. No noise analysis is required for this Activity Category. The number of receptors does not need to be established.

- Activity Category G:
  1. Some analysis may be required to provide information to local officials (see Subsection 4.4.18.7.2.3). However, the number of receptors does not need to be established.

**Tip!** When establishing the number of receptors for Activity Categories B, C, and E, consider the capacity limits of the area(s) of frequent human use for the impacted residence/facility. For example, if the capacity limit of a shared pool area is 50, counting more than 50 receptors for the associated impacted multi-family dwelling may not be appropriate.

The methodology used for determining impacted receptors shall also be used for determining benefited receptors when establishing reasonableness.

4.4.18.5.3.2.1 **Feasibility**

Feasibility involves the practical capability of the noise abatement measure being built as well as the capacity to achieve a minimum reduction in noise levels. Overall, feasibility deals primarily with engineering considerations (e.g., can a barrier be built given the topography of the location; can noise reduction be achieved given certain access control, drainage, safety, or maintenance requirements; are noise sources other than from the project present in the area, etc). For guidance, refer to AASHTO “Green Book - A Policy on Geometric Design of Highways and Streets,” and AASHTO “Guide Specifications for Structural Design of Sound Barriers, 1992 Interim,” as well as NYSDOT standards and specifications.

When noise abatement measures are being considered, every reasonable effort shall be made to obtain noise reductions of 10 or more dB(A). For a measure to be deemed feasible, it must provide a minimum 5 dB(A) reduction to the majority of impacted receptors.
4.4.18.5.3.2.2 Reasonableness

Reasonableness deals with the social, economic, and environmental factors to be considered when evaluating abatement measures. Reasonableness shall be based on the items listed below.

- **Viewpoints** - The viewpoints of the property owners and residents of the benefited receptors shall be a major consideration in reaching a decision on the reasonableness of abatement measures. The property owners and residents shall be contacted using one or more of these methods: informational meetings in or near to the neighborhood, direct mailings with return envelopes, telephone or internet surveys, or door-to-door inquiries. A response shall be obtained from at least half of the benefited property owners and residents and a majority of the responses must favor the abatement measure.

  Although the viewpoints shall be determined and addressed during the preliminary design phase of project development, the property owner and resident viewpoints on the desirability and acceptability of abatement need to be re-examined periodically during the final design phase prior to PS&E approval.

- **Cost** - NYSDOT has established the following reasonableness cost indices for abatement measures:
  - For a noise berm or noise insulation, a cost index of $80,000 per benefited receptor shall be used, based on the total cost of the material installed.
  - For barrier walls, a maximum of 2,000 square feet of wall per benefited receptor shall be used.

  All owner-occupied and rental dwelling units; detached, duplex, and mobile homes; and multifamily apartment units shall be counted if they are benefited, regardless of whether or not they were identified as impacted. The threshold of noise reduction that establishes a “benefited” property is at least 5 dB(A) determined at a point where frequent human use occurs and a lowered noise level would be of benefit.

- **Noise reduction** - This policy establishes a **Noise Reduction Design Goal** of 7 dB(A). For an abatement measure to be determined reasonable, a majority of the benefited receptors must achieve the design goal. For example, if 10 receptors were “benefited” (i.e., would receive at least a 5 dB(A) noise reduction if the abatement measure were implemented), then at least 6 receptors must receive a 7 dB(A) noise reduction for the abatement measure to be considered reasonable under this criteria. Note that the other criteria above must also be met for the measure to be considered reasonable for implementation.
Table 2 provides an example feasibility and reasonableness worksheet.

**TABLE 2: FEASIBILITY AND REASONABLENESS WORKSHEET**
Highway traffic noise abatement for a project

<table>
<thead>
<tr>
<th>PIN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abatement Measure:</td>
</tr>
<tr>
<td>Feasibility</td>
</tr>
<tr>
<td>Engineering Considerations</td>
</tr>
<tr>
<td>Noise Reduction (Acoustic Feasibility)</td>
</tr>
<tr>
<td>Reasonableness</td>
</tr>
<tr>
<td>Viewpoints of Benefited Property Owners and Residents</td>
</tr>
<tr>
<td>Do a majority of the responses favor the measure?</td>
</tr>
<tr>
<td>Cost Index</td>
</tr>
<tr>
<td>If a berm: Is the total estimated cost of the proposed berm less than $80,000 per benefited receptor?</td>
</tr>
<tr>
<td>If a barrier: Is the proposed barrier less than 2,000 square feet per benefited receptor?</td>
</tr>
<tr>
<td>Noise Reduction Design Goal</td>
</tr>
</tbody>
</table>

If all the questions can be answered “Yes,” then the measure is considered reasonable and feasible.

**4.4.18.5.3 Third Party Participation**
As stated in 23 CFR 772, “Third party funding is not allowed on a Federal or Federal-aid Type I or Type II project if the noise abatement measure would require the additional funding from the third party to be considered feasible and/or reasonable. Third party funding is acceptable on a Federal or Federal-aid highway Type I or Type II project to make functional enhancements, such as absorptive treatment and access doors or aesthetic enhancements, to a noise abatement measure already determined feasible and reasonable.”

**4.4.18.5.4 Absorptive Treatments**
Absorptive treatments may be proposed on roadside structures, including noise barriers, retaining walls, and/or bridges. This use must be approved by ESB.

**4.4.18.5.5 Construction Noise Analysis**
Construction noise related to transportation projects shall be addressed in the project's noise analysis report and/or in the project environmental document. Most projects will not require modeling or any form of analysis associated with construction-related noise. In most cases, construction noise can be adequately addressed through a narrative discussion.

The following general steps are to be performed for all projects:
• Identify the land uses or activities that may be affected by noise from construction of the project. Also identify the frequency of use (e.g., seasonal, continuous throughout the year) associated with the land uses and/or activities.

• Determine the temporary abatement measures that are needed for the plans and specifications to minimize or eliminate adverse construction noise impacts to the community. This determination shall include an evaluation of the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the abatement measures. Low cost, easy to implement measures should be identified.

• Incorporate the needed abatement measures in the contract plans and specifications.

The following items shall be considered to ensure that potential construction noise impacts are given adequate treatment during highway project development:

• If a detailed construction noise analysis is necessary, calculation of noise levels is not needed at all receptor locations. If a construction noise impact is anticipated at a particularly sensitive receptor, a noise level calculation for certain noisy construction or demolition operations may be done. Any construction noise analysis results shall be documented in the project record.

• An indication of the noise levels associated with certain types of construction equipment can be obtained from the FHWA Highway Construction Noise Handbook. The temporary nature of the noisy operations shall be noted.

• Major urban projects usually require more extensive analyses. For those projects, particularly sensitive receptors as determined by the project designer shall be identified and construction noise impacts determined. A construction noise impact will not normally occur at levels under $Leq=80\,\text{dB(A)}$, or $Leq=85\,\text{dB(A)}$ in New York City.

• The Roadway Construction Noise Model (RCNM) is FHWA’s national model for the prediction of construction noise. The new RCNM shall be used for projects that are large scale, complex and located in an urban or suburban area, and where severe construction noise impacts and abatement measures are likely. For smaller, more routine projects, the previously provided general guidance should suffice.

4.4.18.6 Interagency Coordination and Agreements
Adoption of this noise policy required consultation with and approval from FHWA. Subsequent revisions to this noise policy shall involve further consultation with FHWA.

4.4.18.7 Project Development and Construction Guidance

4.4.18.7.1 Project Scoping Stage
During this project development phase, a preliminary determination of project type (as per 23 CFR 772) shall be made (see Subsection 4.4.18.5.1 Applicability) and recorded in the project documentation.
4.4.18.7.2 Preliminary Design (Phases I-IV)
During preliminary design, the project type determination shall be reviewed and confirmed. If required, a noise analysis shall be performed (see Subsection 4.4.18.5.2). If impacts are identified in the noise analysis, a preliminary abatement analysis shall be performed (see Subsection 4.4.18.5.3).

4.4.18.7.2.1 Identification and Documentation of Abatement Measures
Before the adoption of a Record of Decision (ROD), Finding of No Significant Impact (FONSI), or FHWA concurrence with a Categorical Exclusion (CE), the Department must identify the following:
1. Locations where noise impacts are predicted to occur;
2. Noise abatement measures that are feasible and reasonable and that are likely to be incorporated in the project; and
3. Noise impacts for which no noise abatement measures are feasible and reasonable. Decibel reduction levels and, if needed, square footage per benefited receptor shall be shown for each barrier section that does not meet the feasibility or reasonableness criteria.

The above items must be included in the project approval document. The analysis shall be completed to the extent that design information on the alternative(s) under study is available at the time the project approval document is completed.

**Tip!** The installation of noise barriers or alterations to existing publicly owned school buildings to provide for noise reduction meets the criteria for a Categorical Exclusion and normally do not require any further NEPA approvals (23 CFR 771.117(c)(6)).

**Alert!** The overall noise abatement benefits must be determined to outweigh the overall social, economic, and environmental effects and the costs of the noise abatement measures.

**Alert!** Noise abatement measures that are determined to be feasible and reasonable must be incorporated into the plans and specifications for the project.

**Tip!** The date when the public is officially notified of the adoption of the location of a proposed highway project is the “date of public knowledge.” This date establishes when the Department is no longer responsible for providing noise abatement for new development that occurs adjacent to the proposed highway project. The “date of public knowledge” shall be the date of approval of the project’s Categorical Exclusion (CE) determination, the Finding of No Significant Impact (FONSI), or the Environmental Impact Statement (EIS) Record of Decision (ROD).
4.4.18.7.2.2 Statement of Likelihood

A **statement of likelihood** shall be included in the environmental document since feasibility and reasonableness determinations may change due to changes in project design after approval of the environmental document. The statement of likelihood shall include the preliminary location and physical description of noise abatement measures determined feasible and reasonable in the preliminary analysis. The statement of likelihood shall also indicate that final recommendations on the construction of an abatement measure(s) are determined during the completion of the project’s final design. If a project involves the consideration of more than one barrier, the environmental document shall include a statement of likelihood for each barrier.

The following is example language:

Based on the studies performed thus far, the Department recommends abatement in the form of a ___ foot high **noise barrier** along the _____ side of _________ between__________ and __________ for a length of ___ feet. These initial indications of likely recommended abatement are based upon a preliminary design for a ______ square foot barrier that will reduce the noise level by ____ dB (A) for ____ receptors. If these conditions change substantially during the final design phase, the barrier may no longer be recommended and not included in the project’s contract plans. A final decision on the recommendations will be made upon completion of the project design and public involvement processes.

**Tip!**  The choice of the word “likely” was deliberate, and reflects the fact that project design changes may occur after approval of the environmental document. However, if a decision maker is to make an informed decision and if the public is to be made aware of the impacts, the Department must make its abatement intentions known. If the Department later decides that abatement is not recommended, this decision should have strong documented support.

4.4.18.7.2.3 Outreach to Local Officials

Noise-compatible land use planning can help to minimize future traffic noise impacts in the vicinity of highway projects. The effective implementation of noise-compatible planning measures is a shared responsibility between NYSDOT (who analyzes highway noise impacts) and local governments (who regulate land uses). As such, outreach to local government officials is an important part of NYSDOT’s noise policy.

For projects where NYSDOT has completed a traffic noise analysis, NYSDOT shall contact and/or meet with the local officials whose jurisdiction(s) are within the project limits. An in-person meeting with local officials may be necessary based on the project details (e.g., anticipated substantial increase in noise levels, public concerns). The timing of the contact/meeting shall depend on the project specifics. For many projects, this outreach effort should occur soon after design approval. However, in areas that are under development pressure, it would be appropriate to meet prior to design approval, allowing the municipality to consider development issues prior to the “date of public knowledge.”
During this outreach effort, NYSDOT shall provide the local officials with the following information:

1. Project design report/environmental documentation
2. Future traffic noise estimates, as follows:
   a. The best estimation of the future design year noise levels at various distances from the edge of the nearest travel lane of the highway improvement where the future noise levels are within 1 dB(A) of the noise abatement criteria (NAC) listed in Table 1 of FHWA’s noise regulation; or
   b. The distance to the exterior NAC in Table 1 of FHWA’s noise regulation (if the information described in 2a. is unavailable).

The information may be presented graphically (e.g., noise contour map) or in a table of future noise levels at specific locations. NYSDOT shall encourage local officials to make this information available for disclosure in real estate transactions.

3. The implications of the “date of public knowledge,” which is the date of approval of the project’s CE determination, FONSI, or EIS ROD
   NYSDOT shall inform local officials that FHWA is not responsible for providing highway traffic noise abatement for local development permitted after the “date of public knowledge.” However, for future Type I projects, FHWA and NYSDOT are responsible for analyzing and documenting the existing and future levels on these lands.

4. Noise-compatible planning concepts
   Local governments should be encouraged to prohibit noise-sensitive land uses adjacent to highways and require developers to plan, design, and construct projects in a manner that is sensitive to highway traffic noise.

5. Eligibility for Type II projects as described by this policy
   NYSDOT shall communicate and emphasize the critical importance of substantial construction predating the right-of-way acquisition for the original highway and the availability of separate additional funding provided by the Legislature for this specific purpose.

   NYSDOT shall document all contact and meetings with local government officials for the project record.

4.4.18.7.3 Final Design (Phases V & VI)
During this phase of project development, abatement measures that were recommended during preliminary design and are still feasible and reasonable undergo final design.

FHWA design guidance can be found here:
FHWA Guidance Noise Barriers - Design and Construction

NYSDOT guidance for noise barrier design is under revision and will be in Chapter 28 of the Highway Design Manual.

4.4.18.7.4 Construction Considerations
During this phase of the project, commitments made in the Design Approval Document are implemented (see 4.4.18.5.5). Communications with residents and affected property
owners during this phase can be very helpful in addressing complaints. Additional modeling and/or analysis of construction noise during construction is not required and usually not warranted.

In some cases there may be local laws or ordinances that govern construction noise levels or hours. New York City has a local law that is quite restrictive in many areas. The Department is not generally subject to local noise control ordinances; nevertheless, the existence of those laws should be investigated during project development and every reasonable effort made to comply with their provisions during construction following the procedures provided above. However, in no case will construction or alternative noise mitigation forms be required. New York City Construction Noise Mitigation Plan forms should be used as a guideline to consider construction phases, devices and abatement measures that will be included in the analysis.

4.4.18.7.5 Abatement Measure Reporting
In order to maintain an inventory of all constructed noise abatement measures as required by the noise regulation, each NYSDOT Region will, within three months of contract completion of a new abatement measure, submit the following data:

- Location
  - If barrier or berm, GIS position of the start and end of each segment (NAD 1983 UTM zone 18N), or CAD coordinates of the start and end of each segment with the projection of the CAD file
  - County
  - Municipality(ies)
  - Route(s)
  - Direction of the Route; can be NWSE (Northbound, Westbound, Southbound, or Eastbound)
  - Crossroad at the beginning of the barrier
  - Crossroad at the end of the barrier
- Project Identification Number (PIN)
- D Number
- Year constructed
- Type of abatement
- Overall cost (as per contract bid)
- Cost/square foot (as per contract bid)
- Average height
- Length
- Average insertion loss/noise reduction for benefited receptors as reported by the model in the noise analysis
- NAC category(s) protected
- Material(s) used (precast concrete, berm, block, cast in place concrete, brick, metal, wood, fiberglass, combination, plastic (transparent, opaque, other))
- Color of the barrier on the highway side
- Color of the barrier on the residential/non-highway side
- Texture of the barrier on the highway side
• Texture of the barrier on the residential/non-highway side
• Features (absorptive, reflective, surface texture)
• Foundation (ground mounted, on structure)
• Project type (Type I or Type II under 23 CFR 772, and optional project types such as State-funded, county-funded, NYS-Thruway funded, other, unknown)

4.4.18.8 Operations Guidance
To be developed.

4.4.18.9 Flow Chart
To be developed.

4.4.18.10 Local Projects Guidance
Locally-administered Federal-aid projects shall follow the procedures provided in this section to address highway noise issues.

4.4.18.11 Appendices

A. Legal Citation
   a. Federal-Aid Highway Act of 1970 (23 USC §109(i))
   b. FHWA highway traffic noise regulation is 23 CFR 772

B. Scope of Services
   https://www.dot.ny.gov/divisions/engineering/design/consultant-management/repository/5000_09a_102009.rtf

C. Definitions

   Benefited Receptor - The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A).

   Common Noise Environment - A group of receptors within the same Activity Category in Table 1 that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. Generally, common noise environments occur between two secondary noise sources, such as interchanges, intersections, and crossroads.

   Date of Public Knowledge - The date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), as defined in 23 CFR 771.

   Design Year - The future year used to estimate the probable traffic volume for which a highway is designed.
**Existing Noise Levels** - The worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in a particular area.

**Feasibility** - The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.

**Impacted Receptor** - The recipient that has a traffic noise impact.

**Leq** - The equivalent steady-state sound level that in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

**L10** - The sound level that is exceeded 10% of the time (the 90th percentile) for the period under consideration, with L10(h) being the hourly value of L10.

**Multifamily Dwelling** - A residential structure containing more than one residence. Each residence in a multifamily dwelling shall be counted as one receptor when determining impacted and benefited receptors.

**NEPA** - National Environmental Policy Act

**Noise Barrier** - A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) that lowers the noise level, including stand alone noise walls, noise berms (earth or other material), and combination berm/wall systems.

**Noise Reduction Design Goal** - The optimum desired dB(A) noise reduction determined from calculating the difference between future build noise levels with abatement, to future build noise levels without abatement. The noise reduction design goal for NYSDOT is 7 dB(A).

**Permitted** - A definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit.

**Property Owner** - An individual or group of individuals that holds a title, deed, or other legal documentation of ownership of a property or a residence.

**Reasonableness** - The combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

**Receiver Location** - A point where highway traffic noise levels are measured and/or modeled. An individual receiver may represent multiple receptors.

**Receptor** - A discrete or representative location of a noise sensitive area(s), for any of the land uses listed in Table 1.
Residence - A dwelling unit. Either a single-family residence or each dwelling unit in a multifamily dwelling.

SEQRA - State Environmental Quality Review Act

Statement of Likelihood - A statement provided in the environmental clearance document based on the feasibility and reasonableness analysis completed at the time the environmental document is being approved.

Substantial Construction - The granting of a building permit, prior to right-of-way acquisition or design approval for the highway.

Substantial Noise Increase - One of two types of highway traffic noise impacts. For a Type I project, an increase in noise levels of 6 dB(A) in the design year over the existing noise level.

TNM - FHWA’s Traffic Noise Model.

Traffic Noise Impacts - Design year build condition noise levels that approach (within 1 dB(A)) or exceed the NAC listed in Table 1 for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels.

D. References
   - Measurement Manual (Revised May 1986)
   - Traffic Noise Model background and guidance
   - FHWA Guidance Noise Barriers - Design and Construction

E. Contacts
   To be developed.

F. Sample Statements
   To be developed.