



Noise Policy

Roadway Traffic and Construction Noise

This policy describes TxDOT's implementation of the requirements of the Federal Highway Administration (FHWA) Noise Standard at 23 Code of Federal Regulations (CFR) Part 772.

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1.0 Introduction

This document contains the Texas Department of Transportation's (TxDOT) noise policy on highway traffic noise and construction noise. This policy describes TxDOT's implementation of the requirements of the Federal Highway Administration (FHWA) Noise Standard at 23 Code of Federal Regulations (CFR) Part 772. TxDOT's noise policy incorporates 23 CFR 772 by reference. The following sections discuss TxDOT-specific policies for requirements of the CFR rules cited in each section heading. This policy was developed by TxDOT and reviewed and approved by FHWA.

During the rapid expansion of the Interstate Highway System and other roadways in the 20th century, communities began to recognize that highway traffic noise and construction noise had become important environmental impacts. In the 1972 Federal-aid Highway Act, Congress required FHWA to develop a noise standard for new Federal-aid highway projects. While providing national criteria and requirements for all highway agencies, the FHWA Noise Standard gives highway agencies flexibility that reflects state-specific attitudes and objectives in approaching the problem of highway traffic and construction noise. This document contains TxDOT's policy on how highway traffic noise impacts are defined, how noise abatement is evaluated, and how noise abatement decisions are made. Detailed procedures, examples, and instructions for applying this policy can be found in the TxDOT's Traffic Noise Policy Implementation Guidance and associated documents in TxDOT's online Traffic Noise Toolkit.

1.1 Purpose of the policy (23 CFR 772.1)

The purpose of TxDOT's noise policy is to provide procedures for noise studies and noise abatement measures to help protect the public's health, welfare and livability, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to Title 23, United State Code (USC).

1.2 Definitions (23 CFR 772.5)

A glossary of important noise policy terms that are specific to this policy is found in Section 7.0. To aid the reader, noise policy terms are in SMALL CAPS when used in this document.

1.3 Applicability of the policy (23 CFR 772.7(a))

This policy applies to all federal, federal-aid and state funded TYPE I PROJECTS authorized under Title 23, USC and applies to any ROADWAY project or multi-modal project that: (1) requires FHWA approval, regardless of funding source(s) or (2) is funded with Federal-aid highway funds. TxDOT has elected to not participate in a TYPE II (retrofit) program.

1.4 Process to evaluate and prioritize type II projects (23 CFR 772.7(e))

TxDOT does not participate in a TYPE II (retrofit) program.

1.5 Type II prioritization system (23 CFR 772.7(e))

TxDOT does not participate in a TYPE II (retrofit) program and, therefore does not have a prioritization system for Type II projects.

2.0 Traffic Noise Prediction

2.1 Use of the FHWA TNM 2.5 or another model determined by FHWA to be consistent with the methodology of TNM 2.5 for noise modeling (23 CFR 772.9(a))

TxDOT will derive PREDICTED NOISE LEVELS according to the most current version of the FHWA TRAFFIC NOISE MODEL (TNM) for all reasonable build alternatives under consideration in a NEPA document. Alternatives rejected for detailed analysis because they are not reasonable will not require future noise level predictions.

2.2 The requirement to use average pavement type (23 CFR 772.9(b))

TxDOT will use average pavement type in the FHWA TNM for future noise level prediction.

2.3 Usage of noise contour lines (23 CFR 772.9(c))

Noise contour lines may be used for project alternative screening or for land use planning to comply with 23 CFR 772.17, but shall not be used for determining highway traffic noise impacts.

2.4 Traffic used to represent the worst noise hour (23 CFR 772.9(d))

In predicting noise levels and assessing noise IMPACTS, TxDOT shall use traffic characteristics that would yield the worst traffic noise levels for the DESIGN YEAR. For details on traffic data requests and use of traffic data in the noise analysis, please see TxDOT's Traffic Noise Policy Implementation Guidance.

3.0 Analysis of Traffic Noise Impacts

3.1 Study area (23 CFR 772.11(a)) – must identify all expected impacts

TxDOT will determine and analyze expected traffic noise IMPACTS. For projects on new alignments, TxDOT will determine all existing traffic noise levels by field measurements and all predicted traffic noise IMPACTS by TNM modeling. For projects on existing alignments, TxDOT will predict existing and DESIGN YEAR traffic noise IMPACTS.

In order to determine traffic noise IMPACTS, noise sensitive land uses must be identified according to the NOISE ABATEMENT CRITERIA (NAC) and as described by ACTIVITY CATEGORY in the NAC table, found in Section 7.0 after the NOISE ABATEMENT CRITERIA definition.

3.2 Standard practice for analyzing Category B land uses (23 CFR 772.11(c)(2)(ii))

This ACTIVITY CATEGORY includes the exterior impact criteria for single-family and MULTIFAMILY RESIDENTIAL land uses. Default placement of a RECEIVER for single-family residences is within a backyard outdoor activity area.

Each RESIDENCE in a multifamily dwelling within line-of-sight of the roadway shall be counted as an individual RECEPTOR when determining IMPACTED and BENEFITED RECEPTORS. RECEIVER placement locations may include patios and multi-story balconies. If no such patio or balcony exists, an exterior common gathering area should be used as a RECEIVER location (i.e., pool, gazebo, or playground),

equivalent to the number of units facing the roadway. If there is no exterior gathering area, a MULTIFAMILY RESIDENTIAL land use would not be analyzed.

3.3 Standard practice for analyzing Category C land uses (23 CFR 772.11(c)(2)(iii))

This ACTIVITY CATEGORY includes the exterior IMPACT criteria for a variety of land use facilities. To determine impacts and acoustic reduction levels for barriers, RECEIVER placement for these land uses should be at actual locations of frequent outdoor human activity, such as a picnic table, gazebo, playground, trailhead, bleachers, or other common gathering area. If no defined gathering areas exist, a RECEIVER may be placed at the centroid of a reasonable area of the land use.

To determine the number of BENEFITED RECEPTORS for Cost Reasonableness (see 4.4 Cost Reasonableness (772.13(d)(2)(ii))) for NAC C land uses, TxDOT will determine the average representative lot size of residential development within the project area and the approximate impacted area within the NAC C land use. To determine the equivalent number of impacted RECEPTORS, the impacted land area of the NAC C RECEPTOR will be divided by the area of the representative lot size.

For specific instructions and examples, please see TxDOT's Traffic Noise Policy Implementation Guidance.

3.4 Standard practice for analyzing Category D land uses (23 CFR 772.11(c)(2)(iv))

This ACTIVITY CATEGORY includes the interior IMPACT criteria for certain land use facilities listed in ACTIVITY CATEGORY C that may have interior uses. An interior analysis shall only be done after exhausting all outdoor analysis options. An interior analysis may only be conducted after a determination is made that exterior ABATEMENT MEASURES will not be FEASIBLE and REASONABLE, or in situations where no exterior activities are to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the ROADWAY in a manner that prevents an IMPACT on exterior activities. In these cases, ACTIVITY CATEGORY D is the basis for determining noise IMPACTS.

To determine impacts and acoustic reduction levels for barriers, RECEIVER placement for Category D interior RECEPTORS should be at areas of frequent human activity where conversations are held.

In determining Cost Reasonableness (see 4.4 Cost Reasonableness (23 CFR 772.13(d)(2)(ii))) for Category D RECEPTORS, each establishment in a Category D area is equivalent to one RECEPTOR.

3.5 Standard practice for analyzing Category E land uses (23 CFR 772.11(c)(2)(v))

This ACTIVITY CATEGORY includes the exterior IMPACT criteria for developed lands that are less sensitive to highway noise. Modeled locations must be representative of areas of frequent external activity at the RECEPTOR. For a restaurant, an outdoor dining area is an appropriate exterior activity area. Hotels with outdoor activity areas will be evaluated in a manner similar to MULTIFAMILY RESIDENCES.

In determining Cost Reasonableness (see 4.4 Cost Reasonableness (23 CFR 772.13(d)(2)(ii))) for restaurants and offices, each establishment is equivalent to one RECEPTOR. Cost reasonableness for hotels will be determined in a manner similar to MULTIFAMILY RESIDENCES.

3.6 Identification of project limits (23 CFR 772.11(d)(1))

If any portion of a project is determined to meet the definition of a TYPE I PROJECT, then the entire project analyzed in the environmental document is a TYPE I PROJECT. The traffic noise analysis will include the entire project area defined in the environmental documentation.

3.7 The approach criterion for impacts (23 CFR 772.11(e))

The APPROACH criterion for IMPACTS is one (1) dB(A) below the FHWA NOISE ABATEMENT CRITERIA.

3.8 The substantial noise increase criterion for impacts (23 CFR 772.11(f))

A SUBSTANTIAL NOISE INCREASE occurs when the PREDICTED NOISE LEVEL exceeds the EXISTING NOISE LEVEL by more than 10 dB(A) (see RELATIVE CRITERION).

4.0 Analysis of Noise Abatement

4.1 Disclosure of the standard practice related to absorptive treatments (23 CFR 772.13(c)(2))

NOISE BARRIERS, retaining walls, bridges, and any other structure may require consideration for application of a SOUND ABSORPTIVE TREATMENTS. When the width between two NOISE BARRIERS is less than 10 times the height of the NOISE BARRIERS, the incorporation of SOUND ABSORPTIVE TREATMENTS shall be considered to reduce acoustic reflections that may degrade barrier performance.

4.2 Benefited criteria (23 CFR 772.13(e))

The recipient of an ABATEMENT measure that receives a noise reduction at or above the minimum threshold of 5 dB(A), regardless of whether or not the RECEPTOR was IMPACTED is termed a BENEFITED RECEPTOR. The total number of BENEFITED RECEPTORS is used to evaluate the cost reasonableness of an ABATEMENT MEASURE.

4.3 Feasibility criteria (23 CFR 772.13(d)(1))

The feasibility criteria include acoustic reduction requirements and engineering factors. A noise ABATEMENT MEASURE is not acoustically FEASIBLE unless the measure achieves a noise reduction of at least 5 dB(A) at greater than 50% of first-row impacted RECEPTORS and BENEFITS a minimum of two impacted RECEPTORS.

Feasibility may be restricted by site constraint factors, including topography, access requirements for driveways, presence of local cross streets, underground utilities, other noise sources in the area, maintenance requirements, and safety considerations. Engineering judgement will be used for determining constructability.

4.4 Solicitation of Viewpoints (23 CFR 772.13(d)(2)(i))

TxDOT will solicit the viewpoints of all BENEFITED RECEPTORS for a proposed ABATEMENT as well as non-BENEFITED RECEPTORS that border or are directly adjacent to a proposed abatement and obtain enough responses to document a decision on either desiring or not desiring the noise ABATEMENT MEASURE. TxDOT will also conduct at least one NOISE WORKSHOP in which noise IMPACTS and noise abatement are discussed.

As part of the solicitation, PROPERTY OWNERS and non-owner residents will receive information that: invites them to a NOISE WORKSHOP, describes the abatement (typically, a NOISE BARRIER) under consideration and the anticipated traffic noise effects with and without the barrier; and describes the process that TxDOT will follow to make a decision on whether to build the barrier.

TxDOT will distribute polling ballots to all BENEFITED RECEPTORS for a proposed abatement and to non-BENEFITED RECEPTORS that border or are directly adjacent to a proposed abatement. TXDOT will make a decision on whether to build the barrier based on the ballots returned by these RECEPTORS. TxDOT will specify the due date for ballots. Only ballots received by the due date will be counted.

One vote is allocated per residential RECEPTOR. For owner-occupied dwelling units, the property owner's response counts as one vote. For non-owner-occupied dwelling units, the resident or renter counts as 10% of the vote and the owner counts as 90% of the unit's vote.

Ballots for nonresponsive PROPERTY OWNERS or non-owner residents are never counted as a vote either for or against a proposed ABATEMENT MEASURE.

TxDOT will consider a noise barrier REASONABLE for incorporation into construction plans if a **majority of the total votes received** from benefited and bordering RECEPTORS indicate that they want the barrier constructed, unless votes are received from less than 25% of the benefited and bordering RECEPTORS. In the latter case, a second round of voting must occur. If less than 25% of benefited and bordering RECEPTORS cast a ballot after two rounds of voting, TxDOT may decide whether or not to propose noise ABATEMENT after a required consultation between TxDOT division subject matter experts and TxDOT division and district director level management. TxDOT will document the reason for the decision.

After a decision has been made to build or not build an ABATEMENT measure, TxDOT will only consider re-voting under the following conditions: an error was found in the original noise workshop voting process, there are substantial constructability or substantial design changes to a noise ABATEMENT proposal since the original workshop, or an approved barrier has not been constructed within five years of a noise workshop, due to project delays. Any decision to re-vote would require consultation between TxDOT division subject matter experts and TxDOT division and district director level management.

4.5 Cost Reasonableness (23 CFR 772.13(d)(2)(ii))

There are two types of cost reasonableness measures that may be used in a traffic NOISE BARRIER analysis. These are the STANDARD BARRIER COST and the ALTERNATE BARRIER COST. The STANDARD BARRIER COST must be used for all traffic noise analyses.

Under the STANDARD BARRIER COST, a proposed NOISE BARRIER (or berm) is cost reasonable if the cost to construct the surface area of the barrier wall does not exceed 1,500 square feet per BENEFITED RECEPTOR, based on an indexed-wall-only cost criterion¹ approved by FHWA. For berms, a centerline length and height would be used to determine if the equivalent square footage is cost reasonable. The STANDARD BARRIER COST does not include the costs of any additional right-of-way (ROW), utility adjustments directly associated with construction of a NOISE BARRIER, or costs for additional design elements necessary to accommodate unusual topographic or drainage features directly associated with construction of a NOISE BARRIER.

¹ FHWA Cost Memo approved in accordance with 23 CFR 772.13(d)(2)(ii). See TxDOT's online Traffic Noise Toolkit for the latest copy of the memo.

If the construction costs associated with a proposed barrier are believed to be unreasonably high, an ALTERNATE BARRIER COST analysis may be performed. This analysis includes the costs of any additional ROW, of utility adjustments directly associated with construction of a NOISE BARRIER, and for additional design elements necessary to accommodate unusual topographic or drainage features directly associated with construction of a NOISE BARRIER. The ALTERNATE BARRIER COST analysis is optional and may only be conducted after a STANDARD BARRIER COST analysis has been performed. A barrier may no longer be considered cost reasonable if the ALTERNATE BARRIER COST is greater than two times the FHWA-approved wall-only cost (STANDARD BARRIER COST).

4.6 Noise Reduction Design Goal (23 CFR 772.13(d)(2)(iii))

TxDOT has defined the NOISE REDUCTION DESIGN GOAL as achieving a reduction in noise that is at least 7 dB(A) (SUBSTANTIAL NOISE REDUCTION). At least one BENEFITED RECEPTOR must achieve the noise reduction design goal.

4.7 Optional reasonableness factors used by the agency (23 CFR 772.13(d)(2)(v))

TxDOT does not utilize any optional REASONABLENESS factors.

4.8 Method used to comply with 23 CFR 772.13(f)

TxDOT shall maintain an inventory of all constructed noise ABATEMENT MEASURES. The inventory shall include the following parameters: type of ABATEMENT; cost (overall cost, unit cost per/sq. ft.); average height; length; area; location (state, county, city, route); year of construction; average INSERTION LOSS/noise reduction 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); features (absorptive, reflective, surface texture); foundation (ground mounted, on structure); project type (TYPE I, TYPE II, and optional project types such as State funded, county funded, tollway/turnpike funded, other, unknown).

4.9 Noise study documentation requirements (23 CFR 772.13(g))

Before adoption of a CATEGORICAL EXCLUSION (CE), FINDING OF NO SIGNIFICANT IMPACTS (FONSI), or RECORD OF DECISION (ROD), TxDOT shall identify:

- (1) Noise ABATEMENT MEASURES which are FEASIBLE and REASONABLE, and which are likely to be incorporated in the project; and
- (2) Noise IMPACTS for which no noise ABATEMENT MEASURES are FEASIBLE and REASONABLE.
- (3) Documentation of highway traffic noise ABATEMENT. The environmental document shall identify locations where noise IMPACTS are predicted to occur, where noise ABATEMENT is FEASIBLE and REASONABLE, and locations with IMPACTS that have no FEASIBLE or REASONABLE noise ABATEMENT alternative. For environmental clearance, this analysis shall be completed to the extent that design information on the alterative(s) under study in the environmental document is available at the time the environmental clearance document is completed. 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 the final recommendations on the construction of ABATEMENT MEASURE(s)

as determined during the completion of the project's final design and the public involvement processes.

4.10 Identify the sound level metric used by the state to assess impacts; either Leq(h) or L10(h) Table 1 to Part 772

LEQ is the SOUND level metric used by TxDOT to assess IMPACTS. The NOISE ABATEMENT CRITERIA table in the glossary shows the LEQ SOUND levels for each NAC ACTIVITY CATEGORY.

4.11 Example of statement of likelihood (23 CFR 772.13(g)(3))

Because feasibility and reasonableness determinations for a proposed noise ABATEMENT MEASURE may change due to changes in project design after approval of the environmental document, the following required elements in the environmental documentation will be the STATEMENT OF LIKELIHOOD:

- The environmental documentation will include a preliminary noise ABATEMENT proposal table or narrative description that identifies each proposed noise ABATEMENT measure (usually a barrier), with the following information
 - number of benefited RECEPTORS;
 - length, height, and square footage; and
 - estimated square footage per BENEFITED RECEPTOR.
- The documentation must also include the following statement: “Any subsequent project design changes may require a reevaluation of this preliminary noise barrier proposal. The final decision to construct the proposed noise barrier will not be made until completion of the project design, utility evaluation and polling of all benefited and adjacent property owners and residents.”

4.12 Process related to design build projects (23 CFR 772.13(i))

For design-build projects, the preliminary technical noise study shall document all considered and proposed noise ABATEMENT MEASURES for inclusion in the NEPA document. Final design of design-build noise ABATEMENT MEASURES shall be based on the preliminary noise ABATEMENT design developed in the technical noise analysis. Noise ABATEMENT MEASURES shall be considered, developed, and constructed in accordance with this standard and in conformance with the provisions of [40 CFR 1506.5\(c\)](#) and [23 CFR 636.109](#).

4.13 Items allowed for 3rd Party Funding within the limitations of 23 CFR 772.13(j)

THIRD PARTY FUNDING is not allowed 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 to make functional enhancements, such as SOUND ABSORPTIVE TREATMENT and access doors or aesthetic enhancements, to a noise ABATEMENT MEASURE already determined FEASIBLE and REASONABLE.

4.14 Agency policy on cost averaging (23 CFR 772.13(k))

TxDOT has the option to cost average noise ABATEMENT among BENEFITED RECEPTORS within COMMON NOISE ENVIRONMENTS if no single COMMON NOISE ENVIRONMENT exceeds two times TxDOT's STANDARD BARRIER COST criteria and collectively all COMMON NOISE ENVIRONMENTS being averaged do not exceed TxDOT's STANDARD NOISE BARRIER COST reasonableness criteria. For details on using cost averaging, please see TxDOT's Traffic Noise Policy Implementation Guidance.

4.15 Use of insulation as abatement for Category D land uses (23 CFR 772.15(c)(5))

Noise insulation is only an option for ACTIVITY CATEGORY D land use facilities. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding. For details on using noise insulation as an ABATEMENT MEASURE, please see TxDOT's Traffic Noise Policy Implementation Guidance.

5.0 Federal Participation

5.1 Information to local officials – process and materials (23 CFR 772.17(a))

To minimize future traffic noise IMPACTS on currently undeveloped lands of TYPE I PROJECTS, TxDOT shall inform local officials within whose jurisdiction the highway project is located of:

- (1) Noise compatible planning concepts;
- (2) 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 meet TxDOT's definition of APPROACH for undeveloped lands or properties within the project limits. At a minimum, identify the distance to the exterior FHWA NOISE ABATEMENT CRITERIA.
- (3) Non-eligibility for Federal-aid participation for a TYPE II PROJECT as described in 23 CFR 772.15(b).

A copy of the noise analysis documentation containing the aforementioned information shall be made available to local officials via processes described within TxDOT's Traffic Noise Policy Implementation Guidance and templates available in TxDOT's online Environmental Compliance Toolkits.

Typically, the information to local officials will be sent to the applicable mayor's office in urban areas and to the county judge's office in rural areas. Information will not be sent out until after environmental clearance for the project.

5.2 State program for compliance with (23 CFR 772.17(b))

TxDOT does not participate in a TYPE II (retrofit) program.

6.0 Construction Noise

6.1 Guidelines for assessing construction noise (23 CFR 772.19)

For TYPE I PROJECTS, TxDOT shall:

- (a) Identify land uses or activities that may be affected by noise from construction of the project. The identification is to be performed during the project development studies.
- (b) Determine the measures that are needed in the plans and specifications to minimize or eliminate adverse construction noise IMPACTS to the community. This determination shall include a weighing of the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the ABATEMENT MEASURES.
- (c) Incorporate the needed ABATEMENT MEASURES in the plans and specifications.

7.0 Glossary

23 CFR 772 – Title 23, Code of Federal Regulations, Part 772 “Procedures for Abatement of Highway Traffic Noise and Construction Noise”: FHWA regulations for highway traffic noise analysis and ABATEMENT during the planning and design of federally aided highway projects

Abatement – Any positive action taken to reduce ROADWAY traffic noise levels for impacted RECEPTORS.

Abatement Measure – Typically a NOISE BARRIER in the form of a noise wall. Other noise abatement measures that can be considered are:

- Traffic management
- Alteration of horizontal and vertical alignment
- Acquisition of real property to serve as a buffer zone
- Insulation of NAC Category D structures
- Berms

Absolute Criterion – One of two criteria (see RELATIVE CRITERION) used to determine when a noise impact occurs. Under this criterion, a noise impact occurs when the PREDICTED NOISE LEVEL APPROACHES, equals, or exceeds the FHWA NOISE ABATEMENT CRITERIA.

Activity Category – Categories of land use adjacent to a ROADWAY project. See NOISE ABATEMENT CRITERIA table.

Approach – The approach level to determine a traffic noise impact is one (1) dB(A) below the FHWA NOISE ABATEMENT CRITERIA for Activity Categories A to E (see ABSOLUTE CRITERION).

Alternate Barrier Cost – An alternative method to determine cost reasonableness that includes the costs of any additional ROW, of utility adjustments directly associated with construction of a NOISE BARRIER, and for additional design elements necessary to accommodate unusual topographic or drainage features directly associated with construction of a NOISE BARRIER (see STANDARD BARRIER COST).

Average Daily Traffic (ADT) – The average 24-hour traffic count (vehicles per day). Typically, the total amount of traffic during a stated period (normally one year) divided by the number of days in that period. The ADT is only used as the basis for determining the DESIGN HOURLY VOLUME (DHV). The DHV is used to model a “worst case” scenario in DESIGN YEAR traffic noise levels.

A-Weighting dB(A) – An adjustment in SOUND meters and traffic noise modeling software to ensure SOUND levels are measured/calculated in a manner that approximates the SOUNDS that can be heard by the human ear. This is accomplished by suppressing the low and very high frequencies that cannot be heard by the human ear.

Benefit or Benefited Receiver/Receptor – The recipient of an ABATEMENT MEASURE that receives a noise reduction at or above the minimum threshold of 5 dB(A), regardless of whether or not the RECEPTOR was IMPACTED. The total number of benefited receptors is used to evaluate the cost reasonableness of an ABATEMENT MEASURE (see REASONABLE).

Categorical Exclusion (CE) – A document prepared for a project that involves actions that would result in no SIGNIFICANT environmental impacts. Specifically, these actions would not induce significant impacts to planned growth or land use for the area; would not require the relocation of significant numbers of people; would not have a significant impact on any natural, cultural, recreational, or historic resource; would not involve significant air, noise or water quality impacts; would not have significant impacts on

traffic patterns; or would not otherwise, either individually or cumulatively, have any significant environmental impact.

Common Noise Environment – A group of RECEPTORS within the same FHWA NOISE ABATEMENT CRITERIA (NAC) activity 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 cross-roads.

Contour (noise) – The location of a specific noise level relative to the source.

Date of Public Knowledge – The date of approval of the CATEGORICAL EXCLUSION (CE), the issuance of the FINDING OF NO SIGNIFICANT IMPACT (FONSI), or the RECORD OF DECISION (ROD) for a Type I roadway project - when FHWA and TxDOT are no longer responsible for providing noise ABATEMENT for new development adjacent to a proposed ROADWAY project.

Decibel (dB) – The basic unit for measuring SOUND pressure levels

Design Hourly Volume (DHV) – The traffic count (vehicles per hour) determined by applying the K-FACTOR to the AVERAGE DAILY TRAFFIC. The DHV is used to model a “worst case” scenario in DESIGN YEAR noise levels. DHV is the 30th highest hourly volume for the DESIGN YEAR.

Design Year – The future year used to estimate the probable traffic volume for which a highway is designed. Normally 20 years from the current (existing) year, but may also be the design year of the regional transportation plan used.

Environmental Assessment (EA) – A document prepared for a project when the significance of environmental impacts is not clearly exhibited. The assessment may result in either a FINDING OF NO SIGNIFICANT IMPACT or elevated to an ENVIRONMENTAL IMPACT STATEMENT.

Environmental Impact Statement (EIS) – A document prepared for a project when SIGNIFICANT impacts are evident or identified in an Environmental Assessment.

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.

Feasible – The combination of acoustical and engineering factors considered in the evaluation of a noise ABATEMENT MEASURE. See Section 4.2 and 23 CFR 772.13(d)(1).

Finding of No Significant Impact (FONSI) – Finding of No Significant Impact is one potential outcome from performing an Environmental Assessment. The other outcome is to perform an EIS.

Impact – The DESIGN YEAR condition noise levels that APPROACH or exceed the NAC listed in 23 CFR 772 Table 1 for the future build condition or DESIGN YEAR build condition noise levels that create a SUBSTANTIAL NOISE INCREASE OVER EXISTING NOISE LEVELS.

Insertion Loss – The actual benefit (noise level reduction) derived from the construction of a NOISE BARRIER.

K-factor – A number applied to the AVERAGE DAILY TRAFFIC to determine the DESIGN HOURLY VOLUME. The K-factor is normally 0.10 (plus or minus one percent).

LEQ (Equivalent Noise Level) – The equivalent steady-state SOUND level that, in a given time period, contains the same acoustic energy as a time-varying SOUND level during the same period. Leq is used for all traffic noise analyses for TxDOT ROADWAY projects.

Mitigation – The alternative to the preferred term ABATEMENT.

Multifamily residential – A type of residential structure containing more than one RESIDENCE, such as apartments, duplexes, townhomes, or condominiums. Each RESIDENCE in a multifamily dwelling shall be counted as an individual RECEPTOR when determining IMPACTED and BENEFITED RECEPTORS.

Noise Abatement Criteria (NAC) – These are absolute SOUND levels, provided by FHWA (see the following table), and used to determine when a noise IMPACT occurs (see ABSOLUTE CRITERION). The NAC categories are not used as a design goal for a noise ABATEMENT MEASURE.

Noise Abatement Criteria Table

Activity Category	FHWA (dB(A) Leq)	Description of Land Use Activity Areas
A	57 (exterior)	Lands on which serenity and quiet are of extra-ordinary 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	--	Agricultural, 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.

Noise Barrier – A physical obstruction, constructed between the highway noise source and noise sensitive RECEPTOR (s) that lowers the noise level. Noise barriers include stand-alone noise walls, noise berms (earth or other material), and combination berm/wall systems. The construction of a noise barrier is one of the ABATEMENT MEASURES that must be considered when a traffic noise analysis indicates that a ROADWAY project would result in a noise IMPACT.

Noise Reduction Design Goal – The desired noise reduction determined by calculating the difference between future build noise levels at a RECEIVER with ABATEMENT, compared to future noise levels at that same RECEIVER without noise ABATEMENT. The TxDOT noise reduction design goal is 7 dB(A) and is used to evaluate REASONABLENESS of an ABATEMENT MEASURE.

Noise Workshop – A formal or informal meeting for PROPERTY OWNERS and residents who are adjacent to or would BENEFIT from a proposed noise ABATEMENT MEASURE. The purpose of a workshop is to provide information and to solicit viewpoints regarding the proposed ABATEMENT MEASURE. Typically, the proposed ABATEMENT MEASURE is a NOISE BARRIER.

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.

Predicted Noise Level – The level of traffic noise modeled at a RECEIVER in the DESIGN YEAR of a proposed ROADWAY project.

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.

Reasonable – The combination of social, economic, and environmental factors considered in the evaluation of a noise ABATEMENT MEASURE. See Sections 4.3 through 4.5 and 23 CFR 772.13(d)(2).

Receiver – A modeled representative location of one or more noise sensitive area(s), for any of the land uses as described in FHWA's NOISE ABATEMENT CRITERIA (NAC). A receiver may represent multiple receptors.

Receptor – A discrete or representative location of a noise sensitive area listed in FHWA's NOISE ABATEMENT CRITERIA (NAC).

Record of Decision – A record of decision (ROD) issued by the FHWA signals formal federal approval of an ENVIRONMENTAL IMPACT STATEMENT (EIS) concerning a proposed highway project. The ROD identifies the selected alternative.

Relative Criterion – One of two criteria (see ABSOLUTE CRITERION) used to determine when a noise IMPACT occurs. Under this criterion, a noise IMPACT occurs when the PREDICTED NOISE LEVEL “substantially exceeds” (more than 10 dB(A)) the existing level even if it does not APPROACH, equal or exceed the FHWA NOISE ABATEMENT CRITERIA.

Residence – A dwelling unit; either a single family residence or each dwelling unit in a MULTIFAMILY RESIDENTIAL dwelling.

Roadway – A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

Significant – Do not use this term in a traffic noise analysis in order to avoid any conflict or confusion with a FINDING OF NO SIGNIFICANT IMPACT for ENVIRONMENTAL ASSESSMENTS.

Sound – Mechanical energy produced by the movement of waves of compressed air radiating spherically from a source that can be sensed by the human ear.

Sound Absorptive Treatment – Material or treatment applied to a reflective NOISE BARRIER to reduce acoustic reflections.

Standard Barrier Cost – A method to determine cost reasonableness using the indexed wall-only cost criterion approved by FHWA. The standard barrier cost does not include the costs of any additional ROW or utility adjustments directly associated with construction of a noise barrier or costs for additional design elements necessary to accommodate unusual topographic or drainage features directly associated with construction of a noise barrier (see ALTERNATE BARRIER COST)

Statement of Likelihood – Statement provided in the environmental clearance document based on the feasibility and reasonableness analysis completed at the time the environmental document is being approved. 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 ABATEMENT MEASURE(S) would be determined during the completion of the project's final design and the public involvement processes.

Substantial Construction – The granting of a building permit prior to ROW acquisition or construction approval for the ROADWAY.

Substantial Noise Increase – When the PREDICTED NOISE LEVEL exceeds the existing level by more than 10 dB(A) (see RELATIVE CRITERION).

Substantial Noise Reduction – A reduction in noise levels of at least 7 dB(A) at impacted RECEIVERS. This reduction is independent of the NAC impact threshold. The goal is to achieve a substantial noise reduction at all first row RECEIVERS. At least one first row RECEIVER must achieve a substantial noise reduction to be REASONABLE.

Third Party Funding – Funding by non-TxDOT or private entities is not allowed on federal or federal aid Type I projects 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 federal or federal aid Type I projects to make functional enhancements, such as SOUND ABSORPTIVE TREATMENT and access doors, or aesthetic enhancements to a noise ABATEMENT MEASURE already determined REASONABLE and FEASIBLE.

Through-Traffic Lane(s) – Includes the addition of a general purpose lane, toll lane, managed lane, High Occupancy Vehicle (HOV) lane, High Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or the addition of an auxiliary lane except for when the auxiliary lane is a turn lane, addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane and the addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza, also constitute a through-traffic lane.

Traffic Noise Model (TNM) – FHWA's required traffic noise modeling software.

Type I Project – a proposed ROADWAY project for:

1. The construction of a highway on a new location
2. The physical alteration of an existing highway where there is either:
 - 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,
 - Substantial Vertical Alteration – a project that removes shielding 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 HOV lane, HOT lane, bus lane, or truck climbing lane, or;
4. The addition of an auxiliary lane, 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; or,
8. If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project.

Type II Project – A Federal or Federal-aid highway project for noise abatement on an existing highway. For a Type II project to be eligible for Federal-aid funding, TxDOT must develop and implement a Type II program in accordance with section 772.7(e). The development and implementation of Type II projects are not mandatory requirements of Federal law or regulation. TxDOT does not participate in a Type II (retrofit) program.

Type III Project – A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

8.0 Abbreviations and Acronyms

ADT	Average Daily Traffic
CE	Categorical Exclusion
CFR	Code of Federal Regulations
dB	Decibel
dB(A)	Decibel (A-weighted)
DHV	Design Hourly Volume
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENV	Environmental Affairs Division of TxDOT
FHWA	Federal Highways Administration
FONSI	Finding of No Significant Impact
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
Leq	Equivalent Noise Level
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
ROD	Record of Decision
ROW	Right of Way
TNM	Traffic Noise Model
TxDOT	Texas Department of Transportation
USC	United States Code

Appendix A

The following table shows the revision history for this guidance document.

Revision History	
Effective Date Month, Year	Reason for and Description of Change
December 2019	Version 1 was released in February 2019. The effective date in December 2019.